MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION

SUBMISSION TO DEADLINE 11:

COMMENTS ON RESPONSES TO ExA's FOURTH WRITTEN QUESTIONS [TR020002/D9/FWQ]

G.4 General and Cross-topic Questions (including local policy)

General Comment

- We would respectfully remind the Examining Authority that in [TR020002-004469] we evidenced and substantiated out concerns that the Applicant's submission at Appendix ISH619, paragraph 2.1.5, relating to input parameters for the updated air quality and noise assessments provided in the accompanying zip file 8, Ref19_V1.zip, which states:
  "*These two files do not have contemporaneous datestamps since the original files used in the modelling contain additional intellectual property*"

- This is of great concern since there is clearly no way of verifying whether or not the aforementioned files are indeed the same files or contain the same data as was used in the air quality and noise assessments as submitted by the Applicant or whether they have been created and/or amended after the fact.

NEW SCIENTIFIC EVIDENCE CLIMATE CHANGE

- As the Examining Authority will be aware a new study published on 27 June 2019[1] warns that the global heat-trapping effect of **contrail clouds will triple by 2050** unless airlines and airplane builders **dramatically reduce emissions or air traffic patterns change**.
- As such, if granted the DCO would lead to the United Kingdom being in breach of national law and international obligations.
- As such, we respectfully request that the Examining Authority make a robust recommendation that the DCO should be refused.

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[1] *Contrail cirrus radiative forcing for future air traffic,* Lisa Bock and Ulrike Burkhardt, European Geosciences Union (EGU) journal Published 27 June 2019: **Appendix G.4.1 (Contrail cirrus radiative forcing for future air traffic)**

- Contrail cirrus clouds are already the largest contributor to aviation's climate impact, and the study found that their warming effect will be three times larger in 2050 than in 2006[2].
- It has been reported that air travel is growing so fast that current efforts to curb the climate-harming effects of airplane pollution won't be able to keep up with the expected increase in the formation of heat-trapping clouds, scientists wrote in a study published on 27 June 2019 in the European Geosciences Union (EGU) journal[3]
- The Contrail cirrus radiative forcing for future air traffic[4] study abstract states:

> *"The climate impact of air traffic is to a large degree caused by changes in cirrus cloudiness resulting from the formation of contrails. Contrail cirrus radiative forcing is expected to increase significantly over time due to the large projected increases in air traffic. We use ECHAM5-CCMod, an atmospheric climate model with an online contrail cirrus parameterization including a microphysical two-moment scheme, to investigate the climate impact of contrail cirrus for the year 2050. We take into account the predicted increase in air traffic volume, changes in propulsion efficiency and emissions, in particular soot emissions, and the modification of the contrail cirrus climate impact due to anthropogenic climate change.*
>
> *Global contrail cirrus radiative forcing increases by a factor of 3 from 2006 to 2050, reaching 160 or even 180 mW m−2, which is the result of the increase in air traffic volume and a slight shift in air traffic towards higher altitudes.* ***Large increases in contrail cirrus radiative forcing are expected over all of the main air traffic areas [North America and Europe]****, but relative increases are largest over main air traffic areas over eastern Asia. The projected upward shift in air traffic attenuates contrail cirrus radiative forcing increases in the midlatitudes*

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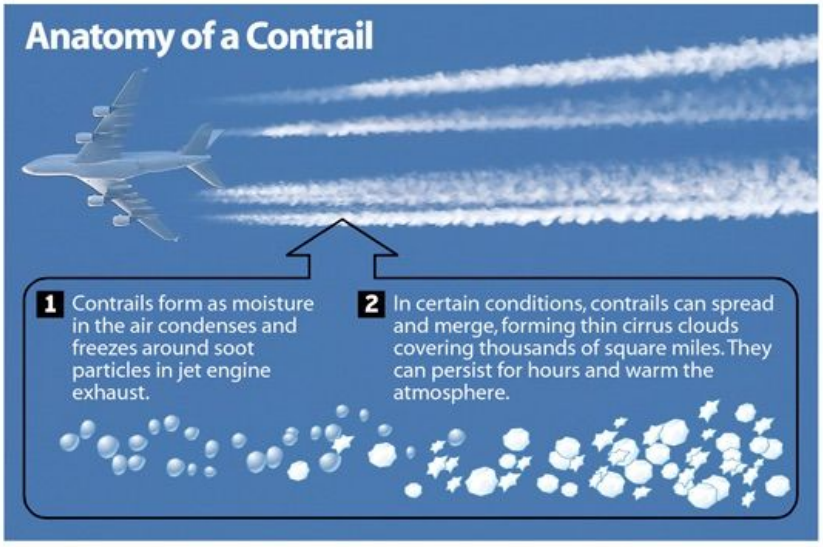
2 https://insideclimatenews.org/news/27062019/climate-change-contrails-airplane-jet-pollution-clouds-global-warming

3 *Contrail cirrus radiative forcing for future air traffic,* Lisa Bock and Ulrike Burkhardt, European Geosciences Union (EGU) journal Published 27 June 2019: **Appendix G.4.1 (Contrail cirrus radiative forcing for future air traffic)** https://insideclimatenews.org/news/27062019/climate-change-contrails-airplane-jet-pollution-clouds-global-warming

4 *Contrail cirrus radiative forcing for future air traffic,* Lisa Bock and Ulrike Burkhardt, European Geosciences Union (EGU) journal Published 27 June 2019: **Attached Appendix G.4.1 (Contrail cirrus radiative forcing for future air traffic)**

but reinforces it in the tropical areas. Climate change has an insignificant impact on global contrail cirrus radiative forcing, ***while regional changes are significan****t. Of the emission reductions it is the soot number emission reductions by 50 % that lead to a significant decrease in contrail cirrus optical depth and coverage, leading to a decrease in radiative forcing by approximately 15 %. The strong increase in contrail cirrus radiative forcing due to the projected increase in air traffic volume cannot be compensated for by the decrease in initial ice crystal numbers due to reduced soot emissions and improvements in propulsion efficiency*" (bold added for emphasis)

The prevalence of tiny ice crystals intensifies the heat-trapping effect. In the short term, the climate impact of the clouds formed by jet exhaust is greater than the warming effect of aviation's greenhouse gas emissions.



SOURCE: ICN research PAUL HORN / InsideClimate News

G.4.1

i)

- DEFRA has determined that air-freighting of food has the highest carbon dioxide emissions per tonne [RE4-036] which speaks to climate change and Applicant's operational viability.
- Ocean transport has a lower carbon footprint that 1/25th the size of air travel [REP7-007]

- The Applicant has said that it will target perishable and pharmaceuticals. Market demand has moved to sea freight/ocean transport due to market forces such as sustainability in these areas [REP4-036] and [REP7-007]

- The Applicant states in its answer:

  "*Emissions from aviation sources were assessed in Chapter 16 of the Environmental Statement (ES) [APP-034] which concludes that CO2 emissions from the Proposed Development* ***represent 1.9% of the total UK aviation emissions target***".

- As the Examining Authority will be aware, the Government is committed to the UK to emitting no more than 37.5 million tonnes of carbon dioxide by 2050.
- We respectfully draw the Examining Authority's attention to the Future of UK Aviation: Making Best Use of Existing Runways Freedom of Information Data release: Explanatory note[5]. It states that:

  "*In June 2018, the Government published The Future of UK Aviation: Making Best Use of Existing Runways. This provided policy support for airports beyond Heathrow making best use of their existing runways, subject to related economic and environmental considerations. In developing this policy, the Government recognised that airports making the best use of their existing runways could lead to increased air traffic which could increase carbon emissions. Therefore, to ensure that our policy was compatible with the UK's climate change commitments, we used the DfT aviation model to look at the impact on carbon emissions of allowing all airports to make best use of their existing runway capacity. This FOI data release presents the passenger, Air Transport Movement (ATM) and CO2 forecasts produced for the Making Best Use work. The forecasts are for United Kingdom (UK) airports, and cover a central demand scenario that includes the proposed Northwest Runway at Heathrow (LHR NWR) and the possible impact of the Making Best Use policy*".

[5] the Future of UK Aviation: Making Best Use of Existing Runways Freedom of Information Data release: Explanatory note: **Appendix_G.4.1**

- We respectfully draw the Examining Authority's attention to the attachment of the press release which shows the Department of Transport: Making Best Use of Airport Capacity; Airport Level Data[6].
- As the Examining Authority will be aware the central CO2 forecasts show the 37.5 million tonnes of **carbon dioxide limit being exceeded** and **despite an expected decline still not complying by 2050.**
- The Airports Commission Do Minimum (DM) and AoN Carbon Capped 2014[7] are used as the major source for baseline and scheme assessment (they provide passenger numbers, ATMs and carbon outputs).
- The AoN Carbon Capped Forecast 2014 contains estimated carbon emissions for all UK airports each year from 2011 to 2050 for: (1) A baseline (no new runway) scenario; and (2) The proposed new runway schemes (in different scenarios: this assessment uses AoN Carbon Capped as noted above.
- As the Examining Authority will be aware **these different scenarios/forecasts clearly do not include Manston[8].**
- **Any development at Manston would simply make the overshoot even worse** and incompatible with the Government's commitment on carbon dioxide emissions.
- As such, if granted the DCO would lead to the United Kingdom being in breach of national law and international obligations.
- As such, we respectfully request that the ExA make a robust recommendation that the DCO should be refused.

ii) • energy consumption for each of its large temperature-controlled storage facilities;

- The Applicant has stated that it will freight perishables and pharmaceuticals. To do so the industry and regulatory and legal environment requires large temperature controlled storage facilities.
- The Applicant states that the Regulations "*Paragraph 14(2)(b) states that [an ES is a statement that includes, at least] 'a description of the likely significant effects of the*

[6] the Future of UK Aviation: Making Best Use of Existing Runways Freedom of Information Data release: Explanatory note: **Appendix_G.4.1**
[7] The carbon capped forecast restricts demand for air travel to that which can be met under a UK aviation emissions total of circa 37.5 million tonnes CO2 in line with the CCC recommendations, JACOBS 8. CARBON: BASELINE, prepared for the Airports Commission, November 2014: **Appendix G.4.1 (Carbon Baseline)**
[8] the Future of UK Aviation: Making Best Use of Existing Runways Freedom of Information Data release: Explanatory note: **Appendix_G.4.1**

proposed development on the environment'. Paragraph 14(3)(b) goes on to state that the ES must 'include the information reasonably required for reaching a reasoned conclusion on the significant effects of the development on the environment, taking into account current knowledge and methods of assessment".

- We respectfully draw the Examining Authority's attention to Paragraphs 5.77 of the Airports NPS which states that:

  "***As far as possible, the applicant's assessment should also seek to quantify impacts including:*** *• Emissions from surface access due to airport and construction staff; • Emissions from surface access due to freight and retail operations and construction site traffic. • Emissions from surface access due to airport passengers / visitors;* ***and Emissions from airport operations including energy and fuel use.*** *This should be undertaken in both a 'do minimum' and also in the 'do something' scenario for the opening, peak operation, and worst case scenario"* (bold added for emphasis).

- Storage facilities for perishables and pharmaceuticals need to be DEFRA /PEACH compliant and WHO[9] for example has 13 Model guidance for the storage and transport of time- and temperature-sensitive pharmaceutical products
- We note the Applicant has stated that:

  "'*Storage warehouse or depot' was used to estimate emissions for the relevant facilities.* ***Specific details relating to temperature-controlled facilities have not been considered*** *and* ***are not differentiated.*** *However, the scale of the difference in emissions by doing so would be* ***insignificant compared to the emissions from aviation and surface transport and would not affect the conclusions reported in the ES***".

- We respectfully submit to the Examining Authority that the Applicant has provided absolutely no evidence to support it assumptions.

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9 https://www.gmp-compliance.org/gmp-news/who-publishes-interesting-new-guidance-for-the-storage-and-transport-of-pharmaceutical-products

- Further, the Applicant in its answers has compared emissions from large temperature controlled storage facilities against emissions from aviation and surface transport to determine that is insignificant rather than applying a cumulative approach.
- Further we respectfully submit the Applicant would need to run the same temperature controlled storage facilities irrespective of demand for freight services (ie even if empty or slightly filled it would still need to be completely temperature controlled) to be lawfully compliant.
- We respectfully submit that it is not acceptable and it is inaccurate to state that:" *the detailed end use for all buildings on site could not be known until after the Development Consent Order (DCO) is made"*
- Because this particular NSIP relies on usage - ie its ability to achieve a number of cargo ATMS from the market identified by the Applicant to quantify and justify that need - to determine its status as a NSIP.
- Therefore as the Applicant has identified this market as a key element of its need evidence to justify the NSIP it would be reasonable that the proposed development would include large temperature controlled storage facilities. Therefore the end use of at least some (if not a large part) of the proposed development **is known** and/or must be known otherwise there is no case for need.
- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (**including any longer term and cumulative adverse impacts**) as well as any measures to avoid, reduce or compensate for any adverse impacts (paragraph 4.4 Airport NPS).
- In this context, environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level (paragraph 4.5 Airport NPS).

ii)• sole dependency on road surface access by HGVs, fuel tankers, passengers and workers for the airport?

- We respectfully draw the Examining Authority's attention to Paragraphs 5.69 of the Airports NPS which states that:

  "*The Planning Act 2008 requires that a national policy statement must give reasons for the policy set out in the statement and an explanation of how the*

policy set out in the statement takes account of Government policy relating to the mitigation of, and adaptation to, climate change. ***The Government has a number of international and domestic obligations to limit carbon emissions****. Emissions from both the construction and* ***operational phases of the project will be relevant to meeting these obligations***" (bold added for emphasis).

- We respectfully draw the Examining Authority's attention to Paragraphs 5.74 of the Airports NPS which states that:

  "*The carbon impact of the proposed development falls into four areas: increased emissions from air transport movements (both international and domestic) as a result of increased demand, emissions from airport buildings and ground operations,* ***emissions from surface transport accessing the expanded airport****, and emissions caused by construction. The first is by far the largest of these impacts*" (bold added for emphasis).

- We respectfully draw the Examining Authority's attention to Paragraphs 5.76 of the Airports NPS which states that:

  "*Pursuant to the terms of the Environmental Impact Assessment Regulations, the applicant should undertake an assessment of the project as part of the environmental statement, to include an assessment of any likely significant climate factors. The applicant should* ***provide evidence of the carbon impact of the project*** *(including embodied carbon), both from* ***construction and operation****, such that it can be assessed against the Government's carbon obligations, including but not limited to carbon budgets. The applicant should quantify the* ***greenhouse gas impacts before and after mitigation to show the impacts of the proposed mitigation****. This will require emissions to be split into traded sector and non-traded sector emissions, and for a distinction to be made between international and domestic aviation emissions"* (bold added for emphasis).

- We respectfully draw the Examining Authority's attention to Paragraphs 5.77 of the Airports NPS which states that:

"***As far as possible, the applicant's assessment should also seek to quantify impacts including: • Emissions from surface access due to airport and construction staff; • Emissions from surface access due to freight and retail operations and construction site traffic. • Emissions from surface access due to airport passengers / visitors;*** *and Emissions from airport operations including energy and fuel use.* ***This should be undertaken in both a 'do minimum' and also in the 'do something' scenario for the opening, peak operation, and worst case scenarios****."* (bold added for emphasis).

- Surface access matters to sustainable growth[10].
- As the Examining Authority will be aware the central CO2 forecasts show the 37.5 million tonnes of carbon dioxide limit being exceeded and despite an expected decline still not complying by 2050.
- As the ExA will be aware **these forecasts do not include Manston, so any development at Manston and its <u>sole dependency on road surface access by HGVs, fuel tankers, passengers and workers for the airport</u> would simply make the overshoot even worse** and incompatible with the Government's commitment on carbon dioxide emissions.
- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (**including any longer term and cumulative adverse impacts**) as well as any measures to avoid, reduce or compensate for any adverse impacts (paragraph 4.4 Airport NPS).
- In this context, environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level (paragraph 4.5 Airport NPS).
- Further, if granted the DCO would lead to the United Kingdom being in breach of national law and international obligations.
- As such, we respectfully request that the Examining Authority make a robust recommendation that the DCO should be refused.

<u>G.4.2</u>

[10] Our Approach to Developing A Surface Access Strategy January 2018: **Appendix G.A.4.1 (surface access)**

- The Applicant has not provided any evidence to support its statement that "*The Environment Agency is familiar with the site and has been consulted on the fuel farm design and is satisfied with the proposed design".*

- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (**including any longer term and cumulative adverse impacts**) as well as any measures to avoid, reduce or compensate for any adverse impacts (paragraph 4.4 Airport NPS).
- In this context, environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level (paragraph 4.5 Airport NPS).

G.4.3

- The Applicant has not provided any evidence to support its statement that "*the extract from ICCAN set out [above] does not relate to the Manston project*".
- Aviation 2050 Paragraph 3.108 states that:

  "*The government has established a new Independent Commission on Civil Aviation Noise. ICCAN will begin its work in January 2019 and* ***will advise the government on best practice on noise mitigation****, and how t****he needs of affected communities can best be served in the airspace modernisation programme.*** *The government has committed to review ICCAN's powers within two years and this will include the possibility of putting it on a statutory footing*".

- ICCAN will be significantly involved in the Airspace Change Process which the Applicant is yet to complete. Pursuant to CAP1616, the Airspace Change Process will run for at least 110 weeks from 14 January 2019.
- The Applicant has not provided any evidence to support its statement that "*ICCAN representatives attended the first Noise hearing in March 2019 and raised no objections to the project*".
- We respectfully draw the Examining Authority's attention to [REP7a-033] from ICCAN in which it states:

  "*ExQ3 Ns.3.12 Turning to the question on which ICCAN has been invited to comment: as you may recall from our introduction on the day of the hearing at*

which we appeared, ***ICCAN is a new body and is in the process of building a team of commissioners and staff, as well as our expertise. We have recently published our first corporate strategy (available at bit.ly/CorporateStrategyICCAN), which sets out our intentions in terms of building that expertise…***(bold added for emphasis)".

- We respectfully draw the Examining Authority's attention to our submission in regard to a recent refused Airspace Change Proposal at Leeds Bradford Airport[11] due to the failings of the consultation process.
- We respectfully draw the Examining Authority's attention to a small sample of our submissions:

  [TR020002-004568] **[TR020002-004480]** **[TR020002-004587]**
  [TR020002-004581] **[TR020002-004464]** **[TR020002-004487]**
  [TR020002-004478] **[TR020002-004477]** **[TR020002-004471]**
  [TR020002-004380-AS]

  including but not limited to recent submissions at Deadline 11 resubmitted and shown at **Appendixs 2-8 and 17**[12] which evidence that the Applicant has **not identified impacts, not provided significant and material information to assess the impact, and not provided appropriate mitigation**.

- We, also, respectfully draw the Examining Authority's attention to [TR020002-004481] which highlights to the ExA the omissions, anomalies and discrepancies relating to the information submitted by the Applicant an excerpt is cited below:

  "2.3 4(c) Climate Change:

  2.3.1 In the course of the Hearing the Applicant asserted that a benefit of the Applicant's business model is that transporting freight by air rather than trucking was more environmentally sustainable. However, this assertion (or any evidence to support it) was not included within the Applicant's Written Summary.

[11] Resubmitted and shown at **Appendix_1 and Appendix_1.1**
[12] Resubmitted and shown at **Appendix_2-8 and 17**

2.3.1 As demonstrated in paragraphs 2.13-2.15 and Appendix 2 of Written Summary [REP8-032] UK Government data shows that CO2 emissions of Airfreight are between 5.8 and 27.4 times higher than for trucked freight. If the additional impacts of Radiative Forcing - the influence of other climate change effects of aviation (such as water vapour and nitrogen oxides) – the UK Government recommends using a multiplier of 1.9 to these figures to ensure a holistic view of the additional environmental impacts of airfreight are recorded".

- We note at Paragraph 4, Line 1 of Page 7 of the Applicant's Answers to Fourth Written Questions that again the Applicant is relying on Aviation 2050 to support its argument.
- As the Examining Authority will be aware Paragraph 3.122 of the Aviation 2050 states:

  "*Such schemes, while imposing costs on the industry, are an important element in giving impacted communities a fair deal. The government therefore proposes the following noise insulation measures: • to extend the noise insulation policy threshold beyond the current 63dB LAeq 16hr contour to 60dB LAeq 16hr • 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 ICCAN to issue new guidance to airports on best practice for noise insulation schemes, to improve consistency • for airspace changes which lead to significantly increased overflight, to set a new minimum threshold of an increase of 3dB LAeq, which leaves a household in the 54dB LAeq 16hr contour or above as a new eligibility criterion for assistance with noise insulation".*

- The Applicant has not provided mitigation at the 60 dB LAeq 16 hr contour not has it provided mitigation at a 57 dB LAeq 16hr contour or 54dB LAeq 16hr contour.
- We would respectfully remind the Examining Authority that in its submission application the Applicant did not provide noise contours at 60 dB LAeq 16 hr, 57 dB LAeq 16hr contour or 54dB LAeq 16hr contour [APP-042] this is contrary to the regulatory requirements of the CAA as per CAP1616a[13].

[13] ERCD CAA CAP1616a: **Appendix G.4.1(CAP1616a)**

- From December 2017, CAP1616a forms a technical annex to CAP 1616, Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements. This technical annex outlines relevant methodologies for use in environmental assessments relating to airspace change.
- Paragraph 1.21 of CAP1616a states that: Contours should be portrayed from 51 dB LAeq, 16 hours (for daytime) and 45 dB LAeq, 8 hours (for nighttime) at 3 dB intervals. Department for Transport policy is that these values represent the Lowest Observed Adverse Effect (LOAEL), the point at which it regards adverse effects begin to be seen on a community basis. In order to explain noise impacts, a table should be produced showing the following data for each 3 dB contour interval: area (km2) population (thousands) – rounded to the nearest hundred. Paragraph 1.22 It is sometimes useful to include the number of households within each contour, especially if issues of mitigation and compensation are relevant.
- The Applicant has not identified or provided appropriate measures to avoid, reduce or compensate for any adverse impacts.
- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (**including any longer term and cumulative adverse impacts**) as well as **any measures to avoid, reduce or compensate for any adverse impacts** (paragraph 4.4 Airport NPS).
- In this context, environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level (paragraph 4.5 Airport NPS).

G.4.4

- The Applicant states that "*...does not detail every single component of demolition and construction"*.
- The Applicant therefore has not assessed the cumulative impact of demolition and construction in the ES.
- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (**including any longer term and cumulative adverse impacts**) as well as **any measures to avoid, reduce or compensate for any adverse impacts** (paragraph 4.4 Airport NPS).

- In this context, environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level (paragraph 4.5 Airport NPS).

AQ.4: Air Quality and Emissions

AQ.4.1

i)

- Applicant states "*aircraft with the greatest air quality impacts*" will also be captured by Noise Quota Count system and the NMP
- Applicant has provided absolutely no evidence to support its assertion
- Conversely, Five10Twelve have provided **scientific evidence of significant impact** that different **types of planes** have on air quality particularly in relation to **turboprops (25% of the fleet mix assessed by the Applicant in its ES) and turbofan (jets) (not assessed by the Applicant and now proposed which have significant air quality impact)** [AS-206] [TR20002-004568] [TR020002-004565] and [TR020002-004380-AS]
- Noise Quota Count system is only in place between 7am - 8am. Outside of this hour, the aircraft in question will not be captured by the Noise Quota Count system
- Applicant has not specified which aircraft have the greatest air quality impacts
- Applicant's statement appears to assume a direct link between aircraft noise and emissions impacting on air quality without providing any evidence to support this assumption
- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (**including any longer term and cumulative adverse impacts**) as well as **any measures to avoid, reduce or compensate for any adverse impacts** (paragraph 4.4 Airport NPS).
- In this context, environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level (paragraph 4.5 Airport NPS).
- We, also, respectfully draw the Examining Authority's attention to [TR020002-004481] which highlights to the ExA the omissions, anomalies and discrepancies relating to the information submitted by the Applicant an excerpt is cited below:

"2. AGENDA ITEM 4: EIA MATTERS

2.1 ***4(a) Air Quality:***

2.1.1 As SHP noted at the Hearing and in paragraphs 2.1 – 2.7 of its Written Summary [REP8-032], there is a fundamental error in the Azimuth Report [APP-085] and the asserted fleet mix that infects the environmental effects assessed in the application. In summary, c.25% of all cargo ATMs are assumed to be the very small ATR-72 aircraft, for which there would be no apparent use under the Applicant's business model.

2.1.2 It is revealing that the Applicant's Written Summary [REP8-015] does not comment on the fleet mix that was used to assess the likely significant effects in the ES.

2.1.3 During the Hearing Mr Hilton for the Applicant suggested that there could be "some variability in the fleet mix" but "did not believe they would be significant in any way". This entirely subjective comment was made without evidence and without any sensitivity testing having been carried - Mr Hilton noted that only the fleet mix provided by the Applicant had been assessed and that Wood were unable to answer questions on it. It is not clear whether Wood have any expertise in this area.

2.1.4 As explained in SHP Written Summary (including its Appendix 1) [REP8-032], the effect of replacing small ATR-72 aircraft (that would not form part of the Applicant's asserted e-commerce integrator model) with larger aircraft is likely to be material. These effects have not been assessed".

- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (**including any longer term and cumulative adverse impacts**) as well as **any measures to avoid, reduce or compensate for any adverse impacts** (paragraph 4.4 Airport NPS).
- In this context, environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level (paragraph 4.5 Airport NPS).

Ec.4: Ecology and Biodiversity

Ec.4.1

i)

- Applicant provides no evidence to support its claim that *"There will be no adverse effects on the integrity of European sites due to dust deposition".*

i) b)

- Applicant has provided no evidence to support its claim that *"habitats are not sensitive to due deposition"*

Ec.4.2

- Agreement between the Applicant and **Natural England cannot be relied** upon since this agreement is based upon potentially false and/or misleading and/or superseded information provided to Natural England by the Applicant. Please see our submission to Deadline 11[14] for evidence, full details and explanation of these concerns.
- As such, if granted the DCO would lead to the United Kingdom being in breach of national law and international obligations.
- As such, we respectfully request that the ExA make a robust recommendation that the DCO should be refused.
- Further, Natural England's submission at Deadline 10 and Deadline 9 it places a reliance on the Applicant's Appendix Ec4.2 - Technical Notes: Pegwell Bay: Noise and Turnstone.
- Page, 5 of the Applicant's Appendix Ec4.2 states:

  "1. *The noise mitigation plan secures a* ***ban on certain noisier aircraft*** *as well as placing an* ***overall noise envelope*** *and* ***QC based limit on aircraft movement****. Both of these factors will motivate the airport to accept quieter aircraft as both the QC measure as well as the noise envelope would be exceeded more rapidly if noisier aircraft use the airport*".

- The "*ban on certain noisier aircraft*" is **not enshrined in the DCO** and is not clear in the Noise mitigation Plan.

[14] Resubmitted and shown at **Appendix 12**

- The "*overall noise envelope*", refers to the noise contour cap at Paragraph 1.18 of [REP8-018], under which residents and wildlife would have to **wait over 20 years during the day and even longer at night until this mitigation measure was engaged.** Please see our submission to Deadline 11[15] for evidence, full details and explanation of these significant concerns.
- The "*overall noise envelope*", the noise contour cap at Paragraph 1.18 of [REP8-018] is **not consistent with the regulatory requirements of CAA** CAP 1129 Noise Envelopes [16] and therefore cannot be relied upon by the Applicant as a mitigation measure.
- The "*QC based limit on aircraft movement",* pursuant to Paragraph 1.7 of [REP9-XXX] [TR020002/D9/2.4] is **engaged during only one hour of** operation only 06:00-07:00 of the 17 hours of proposed operation of the airport.
- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (including any longer term and cumulative adverse impacts) as well as **any measures to avoid, reduce or compensate for any adverse impacts** (paragraph 4.4 Airport NPS).
- In this context, environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level (paragraph 4.5 Airport NPS).

Ec.4.3

i)

We respectfully suggest that the Applicant should provide an evidenced update with regards to the bat licence, prior to close of the Examination on 9 July 2019.

b)

- Applicant has provided no evidence to supports its claim that Chapter 7 in the Environmental Statement, [APP-033], is the "*worst-case*" assessment.
- Given the Applicant's statement that its *"own (**incomplete**) studies suggest that the mitigation (roost provision) required for bats is expected to be less than is detailed in the Mitigation and Habitat Creation Plan",* It is not clear how the ExA can have any comfort that there is no risk to European species from such an incomplete survey.

[15] Resubmitted and shown at **Appendix 15**
[16] ERCD Noise Envelopes CAP 1129: **Appendix Ec.4.2**

- As such, if granted the DCO would lead to the United Kingdom being in breach of national law and international obligations.
- As such, we respectfully request that the Examining Authority make a robust recommendation that the DCO should be refused.

Ec.4.2, 4.3 and 4.4

- We, also, respectfully draw the Examining Authority's attention to [TR020002-004481] which highlights to the ExA the omissions, anomalies and discrepancies relating to the information submitted by the Applicant an excerpt is cited below:

> *"2.2* ***4(b)(i) Biodiversity:***
>
> *2.2.1 The Applicant has not addressed its failure to undertake the many outstanding ecology surveys that it had committed to that were required "to confirm the worst case ecological impact assessment" [REP1-001].*
>
> *2.2.2 A summary of the issues was set out in paragraphs 2.8-2.12 of SHP's Written Summary [REP8-032]"*

Ec.4.5

i)

- There is no mention here of Ultra-Fine Particles, ("UFPs"), namely PM10 and P2.5, and if or how they have been included in the air quality assessment.
- As detailed in our Submission to Deadline 11[17], Air Quality assessments for UFPs appear to have been carried out only with roadside traffic in mind rather than UFP emissions from aviation. As such findings cannot be relied upon.
- As such, if granted the DCO would lead to the United Kingdom being in breach of national law and international obligations.
- As such, we respectfully request that the ExA make a robust recommendation that the DCO should be refused.

Ec.4.7

[17] (DEFRA UFP in the UK report), and DL11_E.c.4.5(a), USC report on health impacts of aviation-related UFPs: **Appendix 17**

Applicant references Section 4.2.5 [REP7a-014], which states at 4.2.5.2:

"TDC have identified land for a further 4,875 dwellings in nine separate areas (IDs A-I, see Figure 18.1 and Table 18.4 in Chapter 18: Cumulative Effects). These developments and plans have the potential to have an adverse effect on the four European sites identified in Table 4.1 due to increased disturbance from residents visiting these sites for recreational purposes."

- Applicant's conclusion appears to place the responsibility for identifying and agreeing mitigation in each of these nine separate areas identified by TDC on the Local Authority and/or any developers who may be involved.

- This fails to acknowledge the fact that the sole reason why these nine separate areas on green belt land were identified by TDC for housing development was as a direct consequence of the Applicant's lobbying of local MPs and councillors, resulting in TDC member's decision to reverse its earlier decision to allow mixed-use development and allocate housing on the Manston site.

- This decision was counter to TDC's own evidence-base and against the advice of TDC Officers, as detailed in our submission to Deadline 2, [REP2-012], resulting in intervention in the Local Plan by the Secretary of State for Housing, Communities and Local Government and subject to challenge and further consultation in the current TDC Draft Local Plan examination.

- As such, the risk - and any mitigation as may be required - relating to these nine other sites, is a direct cumulative effect of the Applicant's proposed development that would not exist without the Applicant's intervention in the TDC Local Plan.

- It is therefore disingenuous of the Applicant to absolve itself of any responsibilities as regards the risk of adverse effect on the European sites or of mitigation, or to claim *"that there would be no adverse effect on the integrity of European Sites due to the in-combination effects"*

- It was our contention in our Deadline 2 submission - and it remains our contention - that these cumulative impacts should be taken into account and weigh against the Applicant in the question as to whether the proposed development is in the public interest.

Ec.4.8

- We note that Applicant states the Zone of Influence, ("ZoI"), "has been taken to be the same as that for construction disturbance". We challenge this assumption on the basis that Airport Operations must surely have very different impacts, across wider areas and environments, than any areas or zones impacted by construction. These are not in any way comparable.
- We further note that the Applicant has partially defines its methodology for identifying the ZoI at paragraph 3.3.2.8, [REP7a-014], as follows:

  > *"This initial search area took into consideration the **potential aircraft flight paths** and the environmental changes and effects (such as air quality) by which the European sites could be affected"*

- As per our previous submissions at [REP1-019], [REP2-013], [REP3-060], [REP4-042], [REP5-074], our Deadline 9 submission, [TR020002-004581], and current submissions to Deadline 11 (Commenting on Natural England's Comments on the REIS[18]) and Additional Submission [AS-108] [AS-119] [AS-120] [AS-121] the Applicant's proposed flight paths cannot be relied upon.
- Further, it is clear from our current submission to Deadline 11 with regards to Natural England[19] that the Applicant has presented conflicting and inconsistent information with regards to proposed flightpath and natural habitats.
- As such, any ZoI or conclusions based on such ZoI that is in whole or in part derived from the Applicant's proposed Flight Path can also not be relied upon and the **Precautionary Principle** should take precedence.
- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed

[18] Resubmitted and shown at: **Appendix 12**
[19] Resubmitted and shown at: **Appendix 12**

development's potential adverse impacts (including any longer term and cumulative adverse impacts) as well as **any measures to avoid, reduce or compensate for any adverse impacts** (paragraph 4.4 Airport NPS).

- In this context, environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level (paragraph 4.5 Airport NPS).

Ca.4: Compulsory Acquisition

CA.4.1

- The Applicant has missed another item off the Book of Reference and/or Compulsory Acquisition (CA) Status Report.
- As the Examining Authority will be aware Iceni Projects Limited on behalf of Cogent Land LLP and the Manston Green development of circa 785 houses were also missed off the Book of Reference and/or Compulsory Acquisition (CA) Status Report.
- The Applicant has provided little (if any) comfort that there are not other entities that it has similarly missed.

CA.4.5

- We respectfully remind the ExA of Paragraph 1.2 of the Airport NPS which states that: "*1.20 Unlike the regime for the granting of planning permission under the Town and Country Planning Act 1990, there is no provision in the Planning Act 2008 for the making of an 'outline' application for development consent, followed by 'reserved matters' approval. This does not mean, however, that development cannot be phased, so that particular parts are brought forward at different times, or that the details of a proposal cannot be reserved for determination later. Guidance by the Ministry of Housing, Communities and Local Government recognises that development projects advanced through the development consent order process may be phased, but* ***emphasises that every phase of the project contained in a development consent application must be considered in the application for the order and the order itself***" (bold and underlined added for emphasis)
- Therefore pursuant to Paragraph 1.2 of the Airport NPS the Manston-Haine Link Road should be included in the draft DCO in addition to revisions to the Work Plans.
- This addition would be a material change and subject to the Wheatcroft test.

CA.4.6

i)

- Applicant states it has taken *"proactive steps to engage with over 80 presumed owners of the pipeline"*, including a recent meeting *"held in Cliffsend on 17 June 2019"*.

- It is our understanding that the DCO process is intended to be "***front-loaded with a number of pre-application consultation requirements****, which, depending on the complexity of the project, can take a number of years to carry out."*[20]

- Given that the Applicant has - apparently - been developing its proposals for the current DCO since 2017 and, for at least three years prior to this date, during its two earlier failed CPO attempts with TDC, it is unclear to what extent meetings held on this matter in June 2019, three weeks from the end of the Examination period, can be reasonably deemed to be *"proactive steps to engage"* or in any way consistent with "front-loading" of the DCO process.

- The updated Compulsory Acquisition Status Report [REP8-008], appears to show - for the vast majority of owners - only one letter sent *"seeking to advance voluntary negotiations"* in February or March 2018, prior to submitting the DCO Application in July 2018. In the vast majority of cases, there appears to be little or no attempt at any follow-up until September 2018 and no significant 'ramping up' of activity until March 2019, three months into the Examination period.

- In any case, we challenge whether *"proactive steps to engage"* - however reactive or proactive they may turn out to be - is sufficient to meet the requirement of the Applicant to **explore all reasonable alternatives** to Compulsory Acquisition.

- Applicant states there is *"little incentive for owners to enter into voluntary agreements".*

[20] Planning for Nationally Significant Infrastructure Projects, House of Commons Briefing Paper No.06881, 17 July 2017 (page 3) **Appendix CA 4.6**

- It is surely up to the Applicant to define and provide appropriate incentives for owners to enter into voluntary agreements, since there is a considerable incentive for the Applicant to do so.

- Applicant has failed to provide any evidence as to the precise nature of its *"proactive steps to engage"* or evidence of any incentives it has offered for owners to enter into voluntary agreements.

- The Applicant has failed to provide evidence of any of the *"legal documents"* or letters it claims to have provided to the owners.

- We respectfully submit that such evidence might assist the Applicant in supporting its claim that it has taken any *"proactive steps"* and/or explored all reasonable alternatives to Compulsory Acquisition.

- Such evidence might also support the Applicant's rebuttal of the ExA's view, as expressed during the Second Compulsory Acquisition Hearing, that generic letters have been sent out to owners. In any case, we submit that a letter specifying plots and land plans, but with the same generic content outside of this information, might still be considered a generic letter.

- In the absence of any such evidence, we respectfully disagree with the Applicant's assertions and submit that it is, in fact, quite correct to suggest that the Applicant has failed to explore reasonable alternatives to compulsory acquisition.

- We further submit that given the failure of the Applicant to give these matters due focus at an early stage in the process and prior to Application, and given the potential significance of this failure, the Applicant has failed to demonstrate that *"any potential risks or impediments to the implementation of the scheme have been properly managed"*, as per Paragraph 19 of the guidance on compulsory acquisition.

CA.4.6

- We respectfully question the veracity of the Applicant's costings in relation to Finance and Funding submitting the difference between the projected cost of the Stone Hill Park as part of the Applicant's application at [APP-013] [REP6-015] and [REP7a-006] and the actual cost to the Applicant of the Stone Hill Park acquisition as evidence
- In light of the recent news re Stone Hill Park we respectfully draw the ExA attention to our submission at Deadline 11[21]
- Further, we would respectfully remind the Examining Authority that throughout the Examination and detailed in [REP8-011] that:

> "*Agenda Item 6: Resource Implications 4.1 The Applicant explained that the £7.5m figure was not an under-provision as advanced by the principal landowner, Stone Hill Park (SHP), but rather a figure identified by the Applicant's highly experienced advisor Colin Smith of CBRE in accordance with the Compensation Code and is greater than his estimate of the value of the land. 4.2 The Applicant explained that the existing use value of the site would be low, as there is no planning permission secured in relation to the site, nor can a planning permission be assumed in this instance. As such, any valuation is necessarily based on 'hope value'. The Applicant noted that there was small prospect of a planning permission being secured. Of course if SHP had brought forward its planning applications and pressed the Local Planning Authority to determine the applications, then there might be an extant planning permission, and any valuation would then not be on a 'hope value' basis. Instead, the planning applications remain incomplete, and so SHP is not in a position to appeal on the basis of non-determination. Previous planning applications made by SHP in for the site have been refused, including on appeal. There is no Local Plan allocation support for SHP's applications. In conclusion, over a very long period of time, SHP has failed to secure permission for an alternative scheme. 4.3 Mr Smith explained that there were a number of factors that affected the valuation of the site, which had led him to the figure of £7.5m. Mr Smith noted that SHP was clearly operating under the misunderstanding that a commercial offer, whereby the applicant for an order granting compulsory acquisition powers might offer a premium to enable voluntary acquisition to take place quickly, should be comparable to the calculation of compensation due under the Compensation Code. 4.4 Mr Smith*

[21] Resubmitted and shown at **Appendix 18**

noted that the only recent arm's length transaction for the site was the purchase by Ms Gloag who bought the site in 2013 for £1. Mr Smith noted that a figure of £350,000 had also been noted in the press; either way the figure was not substantial. Mr Smith noted that when Ms Gloag bought the airport she did so to run it operationally as an airport, but it was then quickly closed and the assets were sold, likely to reduce any value it has still further. Mr Smith also noted that there is insufficient land held by SHP to enable its current proposal to come forward. SHP would not benefit from compulsory acquisition powers to assist it in land assembly. As such, the best evidence available for the value of the site is the arm's length sale at a nominal amount. Mr Smith noted that he does not agree that the £7.5m estimate is an underestimate, nor that the site's value would reflect development as an airport because this project might get consent, which is wholly in contravention of one of the fundamental principles of the Compensation Code. 4.5 Mr Smith noted that SHP's advisors had not at any point presented him with a value based on the Compensation Code, preferring instead to reference commercial negotiations that have been ongoing between the parties. Mr Smith reiterated that the amounts offered in the context of commercial offers do not provide evidence for the calculation of value on the Compensation Code basis".

- We understand the figure Colin Smith had allocated from the £7.5m to the Stone Hill Park land was in the region of £2m (although we note that at Para 4.3 above the Applicant refers only to the Stone Hill Park land not all CA land).
- We draw the Examining Authority's attention to a news report in Loadstar[22] in which:

  *"But Niall Lawlor, director of RSP, told The Loadstar: "There has never been any question that RSP would be able to fund all of the costs of the Manston project. "Indeed, including t****he deal with SHP to buy the Manston site, we've already spent in excess of £30m on the project****. However, it is not always possible or prudent to publicly reveal information about commercial discussions going on in the background"* (bold added for emphasis).

- We respectfully make the following comments:

[22] https://theloadstar.com/new-owner-for-manston-but-freighter-airport-plan-faces-objections/

(1) The Applicant throughout the Examination has stated it has spent x or y amount of monies with little evidence. Nonetheless, this implies the SHP land cost the Applicant circa £14m (now evidenced at on 8 July 2019 on the Planning Inspectorate website as £16.5m)

(2) This is 220% **more than the entire amount allocated** for compulsory acquisition in its Revised Funding Statement [REP7a-007]

(3) At Deadline 10, the Applicant did not published a Revised Funding Statement

(4) On 2 July 2019, the Applicant wrote to the Examining Authoritystating that:

> *"[I am] writing to inform you that a subsidiary company of the Applicant for the above Development Consent Order, RiverOak MSE Ltd, has today exchanged contracts with Stone Hill Park Limited for the purchase of all of the land it owns at Manston Airport. Completion of the transaction is expected by 11 July 2019 at the latest. The Applicant will provide a fuller summary of its overall case in the light of this significant development, which may not be until completion has taken place. Any submissions made after 9 July 2019 will be made to the Secretary of State for Transport"*

(5) We respectfully draw to the Examining Authority attention that there is still a number of properties on the Compulsory Acquisition (CA) Status Report including but not limited to the land required in relation to the HRDF and Manston Green and KCC transport requirements.

(6) The Applicant has not provided a Revised Funding Statement to account for the impact the acquisition of Stone Hill Park's land and to demonstrate that it still has allegedly sufficient funds to meet Land Acquisition obligations.

(7) Throughout the Examination the Applicant has refused to provide any breakdown on the costs of Compulsory Acquisition.

(8) The only information before the examination on the Applicant's "value estimate" is the copy of the letter dated 10 October 2018 from the Applicant's adviser Colin Smith of CBRE, stating his view that the SHP land was valued at £2m - this letter was submitted by SHP as part of its Answers of First Written Questions [REP3-303]

CA.4.9

- We respectfully note that the Applicant has not furnished theExamining Authority with this information despite its undertaking.
- We note that due to the said acquisition - not completed at the time of the Examination - perhaps this is of no longer any importance.
- We strongly request the ExA nevertheless make note of Stone Hill Park's submission cited by the ExA that:

  "*…the Applicant had continually failed to honour "commitments" made to SHP and pointed to the evidence showing engagement from the Applicant tended to be timed around an impending deadline for DCO submissions or an examination hearing."* and that*: "In essence, the Applicant's efforts appear focussed on creating the illusion that it was making efforts, instead of taking any actions that could evidence real efforts were being mad*e.

Because the Applicant's conduct to Examining Authority, Defence Infrastructure Organisation, Kent County Council, Thanet District Council and Stone Hill Park demonstrate that no (or little) confidence can be taken from the Applicant's promises, assertions and undertakings.

CA.4.10

- The Applicant claims it has been *"managing the securing of the site properly"* and that *"If a third party does not respond promptly that does not necessarily indicate a lack of risk management from the Applicant - insisting that third parties respond tends to have the opposite effect on their level of co-operation".*

- Notwithstanding the recent agreement reached between SHP and the Applicant, this appears to be rather disingenuous. It is surely also the case that the Applicant's own actions - or lack thereof - in the years leading up to this eventual agreement may also have the opposite effect to achieving prompt responses and/or managing the securing of the site properly.

- Specific examples might include failing to *"honour commitments"* , focusing on *"creating the illusion that [the Applicant] was making efforts, instead of taking any actions that could evidence real efforts were being made"* , as detailed in SHP's response to CA.3.17 [REP7a-044].

- We note the Applicant forcefully and robustly argued during the second Compulsory Acquisition Hearings as recently as 4 June 2019 that SHP's land should be valued at only £2m, only to agree a sale price in excess of £15m three weeks later - and less than a week before the end of the Examination period.

- Notwithstanding the recent agreement reached between SHP and the Applicant, the above is more indicative of last-gasp desperation - and lack of confidence in the Applicant's own case - rather than evidence that *"any potential risks or impediments to implementation of the scheme have been properly managed".*

CA.4.11

- We respectfully draw the Examining Authority attention to our Deadline 11[23] submission in relation to CA or *other disposition, of the land* —by the Museums and statutory requirements not undertaken

CA.4.16

- We respectfully submit that the Applicant has failed to meet the required standards regarding the 'front-loading' of the DCO process. The Applicant has failed to carry out work to an appropriate standard during the pre-Application stage to ensure its Application is examination-ready in order to facilitate a smooth and efficient process within the statutory timelines, as summarised in the House of Commons Briefing Paper of 17 July 2017[24]:

  "*The process however, is front-loaded with a number of pre-application consultation requirements , which, depending on the complexity of the project, can take a number of years to carry out.*"

[23] Resubmitted and shown at **Appendix 16**

[24] Planning for Nationally Significant Infrastructure Projects, House of Commons Briefing Paper No.06881, 17 July 2017 (page 3)**Appendix CA 4.6**

- We respectfully submit that the Crown has not used its statutory power to disclaim its interest[25] in bona vacantia.
- We respectfully submit that the Government Legal Department on 20 March 2019 confirmed that are yet to make a decision:

  "*There has been no change in this matter. I suspect that all of my colleagues across government are waiting on the Brexit outcome. As a result, there may be no change in our position until next year.* ***I would remind you that we have up to three years (from February 2018) to come to a decision on these interests***" (bold added for emphasis).

- Therefore the Crown has decided it has decided to make a decision on these interests by February 2021.
- We respectfully submit that the Applicant cannot be enriched simply because it did not meet the required standards of a "front-loading" of the DCO process.
- Further, we respectfully submit this is further evidence of the Applicant's poor project management.

CA.4.17

- We respectfully submit that as of Deadline 10, the Applicant has provided no evidence of: a letter of no impediment from the MET office or formal Crown consent.

CA.4.18

- We respectfully note that the Applicant has not provided any evidence of its communication back in April with the Department of Transport on this matter.
- We respectfully conversely note that the Applicant wrote twice to attempt to remove Thanet District Council as the discharging body and provided the evidence.

CA.4.19

- We respectfully note the Defence Infrastructure Organisation Deadline 9 and Deadline 8 submissions materially differ from the Applicant's answer.
- Further, we respectfully note at Deadline 9 that the DIO states:

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[25] House of Commons Library Briefing Paper Number 8567, 16 May 2019 Tracing Ownership of property or land **Appendix CA.4.16**

Crown Lands

> "*The various issues relating to Crown Lands will not be resolved or agreed prior the close of the examination period on 9th July. As stated previously, there are two freehold sites which the Applicant wishes to acquire – the Aerial Farm (Plot No. 26) and the Motor Transport Unit (Plot No. 38), in addition to various other interests of a more minor nature. The Aerial Farm has yet to be formally declared redundant and until this decision has been taken this site cannot be considered for disposal. It should also be noted that in addition to the Aerial Farm site itself there is covenant preventing any building or structure above ground level being erected within 150m of the boundary of the site. The site plus the restricted area around it impinge upon the land within the dDCO Application boundaries. The Motor Transport Unit is still operational and although the applicant has made an offer to relocate the facility no specific site has been proposed or identified for this (in any event this proposal would be entirely dependent on the DCO Application being successful and the potential alternative site being acquired, so it cannot be viewed at this stage as being an offer of substance). Notwithstanding this offer the MoD wishes the facility to remain in its existing location. Again, this site is within the existing dDCO Application boundaries. No agreement will be concluded in regard to these matters before the close of the Examination Period on 9th July*" (underlined for evidence)

- We respectfully submit that the Applicant cannot be enriched simply because it did not meet the required standards of a "front-loading" of the DCO process.
- Further, we respectfully submit this is further evidence of the Applicant's poor project management.
- We respectfully submit the Applicant's conduct to ExA, Defence Infrastructure Organisation, Kent County Council, Thanet District Council and Stone Hill Park demonstrate that no (or little) confidence can be taken from the Applicant's promises, assertions and undertakings.

CA.4.20

i)

- We respectfully submit that the Revised Funding Statement does not meet this obligation despite the fact that the HRDF but for the Applicant's proposed development would not have to move or require another situs.

CA.4.20

ii)

- We respectfully submit that the **valuation of £100,000 is not evidenced** and in light of the recent Stone Hill Park acquisition seems very low.

CA.4.20

iii)

- We respectfully remind the Examining Authority of Paragraph 1.2 of the Airport NPS which states that:

  "*1.20 Unlike the regime for the granting of planning permission under the Town and Country Planning Act 1990, there is no provision in the Planning Act 2008 for the making of an 'outline' application for development consent, followed by 'reserved matters' approval. This does not mean, however, that development cannot be phased, so that particular parts are brought forward at different times, or that the details of a proposal cannot be reserved for determination later. Guidance by the Ministry of Housing, Communities and Local Government recognises that development projects advanced through the development consent order process may be phased, but* ***emphasises that every phase of the project contained in a development consent application must be considered in the application for the order and the order itself***" (bold and underlined added for emphasis)

CA.4.20

iv), vi) and vii)

- We respectfully note the Defence Infrastructure Organisation Deadline 9 and [REP6-030] [REP7a-025] [REP7a-026] [REP8-025] submissions significantly and materially differ from the Applicant's answer.
- We respectfully note that the Defence Infrastructure Organisation in its Responses to ExA's Third Questions clearly states that:

"At point CA.3.5 (pages 13-14) the Applicant makes the comment that in practice Crown Consent being in place prior to the completion of the examination phase is rarely ever achieved. At stated in oral evidence Manston is unique in that on the Crown Land within the DCO Application there is ***infrastructure of national importance and significance which needs to be protected*** *which it is considered unlikely to be the case in the other examples cited*" (bold added for emphasis)

- The Defence Infrastructure Organisation in its Deadline 9 submission penultimate paragraph to Section 3 that:
  "*No timescales can be imposed on the Ministry of Defence in the dDCO regarding this process*".

- We respectfully state that is a significant and material risk and impediment to the proposed development's operational viability.

- Further, the Defence Infrastructure Organisation at Section 2 The Role of Aquila and paragraph 3 states:

  "*It should be noted that as part of the process of engagement with Aquila RSP have also been in communication with the Project Marshall Delivery Team in an attempt to secure a letter of "no impediment" from them to present to the Planning Inspectorate (a copy of the relevant email is attached).* ***This would effectively bypass the correct process which is that it is only the MoD that are in a position to issue such a letter having considered all the facts. This approach by Osprey to the MoD's contractor is wholly inappropriate***".

- Further, we respectfully submit this is further evidence of the Applicant's poor project management.
- We respectfully submit the Applicant's conduct to Examining Authority , Defence Infrastructure Organisation, Kent County Council, Thanet District Council and Stone Hill Park demonstrate that no (or little) confidence can be taken from the Applicant's promises, assertions and undertakings.

- Airport operations are heavily regulated and rely on excellent project management and an understanding and respect for procedure. The Applicant's behaviour demonstrates poor project management, poor engagement and a poor understanding and respect for procedure and/or regulatory requirements time and time again.
- We respectfully state that these factors are a significant and material risk and impediment to the proposed development.

CA.4.20

v)

- We respectfully note the Iceni Projects Limited on behalf of Cogent Land LLP Deadline 9 submission significantly and materially differs from the Applicant's answer;

  (i) stating at Paragraph 5.4:

  > *"The ExA will need to request that the Applicant resolves this matter before the 9th July. At present Cogent do not agree to have the HRDF on their land and will strongly resist it being in close proximity to the Manston Green development where it could potentially limit the development"* (underlined for emphasis)

  (ii) stating at Paragraph 5.8:

  > "*We ask that the ExA request the Applicant to provide further details into the nature of the CPO acquisition, including a detailed plan of the of the exact boundary of the land required and information on the potential access and maintenance arrangements and that the Applicant engages with Cogent on compensation matters relating to the CPO of this land*" (underlined for emphasis)

  (iii) stating at Paragraph 5.12:

  > "*We believe that the information and assessments undertaken in support of the DCO to date are not sufficient to enable the ExA to make an informed decision in relation to this DCO application. In addition to the points raised above, there is a significant degree of uncertainty in relation to key pieces of information, including the fleet mix and flight paths which require further assessment in order for this application to be sufficiently robust to*

inform a decision. The ExA should request that the Applicant undertakes further assessment of the worst-case scenarios and that the impacts are appropriately mitigated. A condition on the grant of the DCO should ensure that all dwellings within the Manston Green development that require mitigation is provided by the Applicant" (underlined for emphasis)

CA.4.22

- We respectfully submit that the Applicant cannot be enriched simply because it did not meet the required standards of a "front-loading" of the DCO process.
- Further, we respectfully submit this is further evidence of the Applicant's poor project management.

CA.4.23

- We respectfully draw the Examining Authority attention to Deadline 9 submission from Network Rail Infrastructure Limited that states at paragraph 3:
  "*In the absence of the proper protections, and in particular the inclusion of full and proper Protective Provisions for Network Rail in the Order, being agreed to Network Rail's satisfaction the Order and the compulsorily acquisition powers sought by the Applicant would* ***create a serious detriment to the continued safe, efficient and economic operation of the railway.*** *In such circumstances Network Rail would be unable to withdraw its representation and would continue its objection to the proposals*"
  (bold and underlined for emphasis)

- We respectfully submit that the Applicant cannot be enriched simply because it did not meet the required standards of a "front-loading" of the DCO process.
- Further, we respectfully submit this is further evidence of the Applicant's poor project management.
- We respectfully submit that the ExA and the Secretary cannot be satisfied that the rights can be purchased without any serious detriment to the carrying on of the undertaking Network Rail as Network Rail has explicitly stated that it would "***create a***

serious detriment to the continued safe, efficient and economic operation of the railway".

- Pursuant to Section 127(5) of the PA2008 this is a significant risk and impediment to the proposed development.
- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (**including any longer term and cumulative adverse impacts**) as well as any **measures to avoid, reduce or compensate for any adverse impacts** (paragraph 4.4 Airport NPS).
- In this context, **environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level** (paragraph 4.5 Airport NPS).

CA.4.24

- We respectfully note that as of 8 July 2019 there is no agreement from SEPN on the Planning Inspectorate website and we respectfully note that "*The only remaining issue is the level of fees which the Applicant is obliged to pay to SEPN. The Applicant is waiting for a response from SEPN on this issue*" (underlined for empahsis)

- We respectfully note that Kent County Council at deadline 11 that Kent County Council is also waiting on fees:
  "*Thank you for confirmation that your client has agreed to pay KCC's legal costs. I would be grateful if you could confirm whether or not you are now in funds*" (underlined for emphasis).

  The amount of fees in question are:
  "*Could you therefore please provide an undertaking initially limited to* ***£3,255*** *in respect of their legal costs of negotiating the section 106 obligation, whether or not the matter proceeds to completion*" (bold added for emphasis).

- As you will be aware SHP evidenced that the Applicant had failed to honour its financial commitments in relation to licences to access the land to SHP.

- We would respectfully state this pattern of conduct does not evidence that the Applicant has sufficient means to fund and finance the proposed development quite the opposite. These amounts for fees or licences are small amounts of money that have been and are an impediment to the DCO Examination.

- Further, there is no "*fail safe*" we are losing and will continue to lose inward investment opportunities because of this proposal as evidenced by [REP8-061] and damage to investment was evidence in Ramsgate Town Council's submission [REP1-035] and at [AS-141]
- The proposed development is a black cloud hanging over us.

DCO.4.22

- We respectfully commend you to York Aviation Supplementary Note[26] (comments after paragraph 37)[27] and respectfully remind the ExA of York Aviation's submission [TR020002-004642-YORK AVIATION LLP][28]:

> "*[We] recognise the ExA's concern that vehicles being used by passengers to access the Airport result in congestion on the highway network during the morning peak period, particularly if there is concern that the impacts have not been properly assessed in the TA. T****hese concerns would equally apply in the afternoon traffic peak, particularly in relation to aircraft arriving between 15.00 and 17.00 and departing between 17.00 and 19.00 as implied by the ExA's Question Tr.4.6. In our experience, this is often the more critical interaction between the highway network and the timing of flights."***

> *"However, the key issue is the extent to which any restrictions would impact on the ability of airlines to operate flights at the times required to optimise the utilisation of their aircraft and meet passenger demand.*

[26] Resubmitted and shown at **Appendix DCO.4.22 (York Aviation)**
[27] Resubmitted and shown at **Appendix DCO.4.22 (York Aviation)**
[28] LETTER FROM YORK AVIATION TO EXA OF 5 JULY 2019 states , *Dear Sir, Proposed Manston Airport Development Consent Order (TR0200002) – The Applicants Responses to the ExA's 4th Written Questions Due in part to the recent development in the case and the lack of time available, Stone Hill Park have necessarily not instructed us to prepare a commentary on the responses to the Examining Authority's Fourth Written Questions received at Deadline 9. However, we wish to put on record that we strongly refute the criticism of our work made by the Applicant in its written answers. We consider that we have provided substantial and well evidenced responses throughout the process.*

Significantly, given Ryanair is indicated as the operator of the majority of flights, it is informative to consider their operating pattern across UK airports. [We] have extracted the timetable of all of Ryanair's UK flights for the week beginning 24th June 2019 (Appendix B). ***This shows that across the UK as a whole, 6% of all departing flights were between 09.00 and 12.00. More importantly, for smaller airports of a similar scale (up to 85 flights per week), 19% of all departures were between 09.00 and 12.00.*** *Imposing a restriction during this period would have a significant impact on the ability of the airline to schedule its operations efficiently. Furthermore, any constraints on operations in this period would increase the likelihood of the airline needing to schedule arrivals later than 23.00 in order to attain full utilisation of the aircraft over the day. Restrictions on operations in the late afternoon period could be even more impactful on the overall operation, certainly pushing more movements into requiring night period slots, which would simply not be available at Manston.*

[We] have also looked at the timetable of KLM operations at UK airports (Appendix C). ***Again, at smaller airports with a similar frequency to that projected for Manston, there is heavy reliance on morning departures between 09.00 and 12.00. Some 29% of departures are during this period.*** *This is because the flights are optimally timed so as to allow passengers arriving on early morning long haul flights at Amsterdam to connect into the UK and for passengers to reach Amsterdam in time for afternoon long haul departures. If the airline could not achieve such flight connections, it is unlikely to operate from Manston.* ***Overall, the imposition of yet further restrictions on the timing of flight operations, which we understand are required to ensure that the impact of airport operations on the highway network are managed, would, when coupled with the proposed ban on scheduled night operations, severely limit an airline's ability to optimise its schedule and make efficient use of its aircraft.*** *Such restrictions would make it very unlikely that passenger airlines would be willing to operate at*

Manston, other than a small number of niche operations for which the flight timings are not material. However, we understand the importance of restricting the impact of the Airport's operation on the highway network, particularly where inadequate mitigation has been proposed."

- We would respectfully make the following comments, this is further evidence of the Applicant's inability to project manage, its lack of understanding of the airline industry and its lack or robustness as to operational viability.
- We respectfully remind the ExA that paragraph 4.5 of the Airports National Policy Statement also requires evidence that the NMP can be implemented in stating:

"*... environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be identified in the Airports NPS, or elsewhere.* ***The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in their delivery****."*

NE.4.1

- We respectfully draw to the attention of the ExA; the Planning Inspectorate Advice Note 18, The Water Framework Directive (WFD)[29] and the summary of the advice note:

  "*...The Examining Authority (ExA) for a Nationally Significant Infrastructure Project (NSIP) will therefore need, by the close of the Examination, to be in a position to report to the SoS on the effects of the Proposed Development on the relevant RBMP (and the water bodies therein) as well as any supplementary plans.* ***The ExA will also need to ensure that the SoS has sufficient information to determine whether or not the Proposed Development has implications for the UK's obligations under the WFD (including necessary information in support of any derogation that may be sought under the provisions of Article 4.7 of the WFD)***".

- We respectfully note that the Applicant is stating that as the Environment Agency did not take the opportunity to expressly disagree in the Statement of Common Ground with the Environment Agency; it must therefore agree with the Applicant.

[29] Planning Inspectorate Advice Note 18: The Water Framework Directive Appendix **NE.4.1 (Water Framework)**

- We do not agree and there is precedent on the Planning Inspectorate website for the Statement of Common Ground with the Environment Agency to expressly state the "**Water Framework Directive: Matters Agreed and/or Compliance with Water Framework Directive** so therefore the Applicant cannot unilaterally make this assumption.
- We respectfully draw to the ExA the following NSIP examples of Statements of Common Ground with the Environment Agency which expressly state the "**Water Framework Directive: Matters Agreed and/or Compliance with Water Framework Directive**". For example: Thames Tideway Tunnel York Potash Harbour Facilities Order Able Marine Energy Park
- Further, we respectfully submit that the Applicant has failed to address the Precautionary Principle or to provide sufficient evidence that adverse impacts on individuals, communities and the environment have been sufficiently avoided and/or mitigated. In this respect, the Precautionary Principle may be as defined by the Wingspread Statement[30].

  "*When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically:*

  In this context the ***proponent of an activity****, rather than the public, should* ***bear the burden of proof****"*

- In addition, we respectfully submit that in failing to provide consistent, objective evidence to support its case, the Applicant has failed to meet its obligations with regards to the European Court of Justice 'Waddenzee' ruling[31] which States:

  "***A risk of significant effect exists if it cannot be excluded on the basis of objective information***".

- As such, if granted the DCO would lead to the United Kingdom being in breach of national law and international obligations.

[30] Wingspread Conference on the Precautionary Principle **Appendix NE.4.1**
[31] ECJ Directive 92/43/EEC, Case C172/02, paragraphs 4445

- As such, we respectfully request that the ExA make a robust recommendation that the DCO should be refused.

F.4.1

- We respectfully remind the ExA that the Applicant has not provided a Revised Funding Statement. At Deadline 10 or Deadline 11 or with its recent submissions.
- The last Revised Funding Statement was submitted by the Applicant at Deadline 7a [REP7a-006]
- We respectfully remind the ExA that noise mitigation compensation has been quantified on a demonstrated unreliable foundation. Even at >63 dB the noise contours Five10Twelve commissioned from the CAA ERCD evidenced 200 households at SOAEL levels as opposed to the Applicant's 115. This is almost double.
- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (**including any longer term and cumulative adverse impacts**) as well as any measures to avoid, reduce or compensate for any adverse impacts (paragraph 4.4 Airport NPS).
- In this context, environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level (paragraph 4.5 Airport NPS).
- The Applicant has not evidenced how it has quantified blight payments.
- The Applicant has not taken into account the Land Compensation Act 1973[32] in relation to its quantification of blight.
- Under Part 1 of the Land Compensation Act 1973 ('the Act'), compensation can be claimed by people who own and also occupy property that has been reduced in value by more than £50 by physical factors caused by the use of a new or altered runway. The physical factors are noise, smell, vibration, fumes, smoke and artificial lighting and the discharge onto the property of any solid or liquid substance. The cause of the physical factors must be the new or altered runway in use.
- We respectfully submit evidence that London Stansted Airport had received claims and some have been successfully resolved[33]

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[32] Part 1: Land Compensation Act 1973 The Valuation Office Agency's *technical manual covering all aspects of compulsory purchase and acquisition.* **Appendix F.4.1 and [REP4-046]**

[33] Stansted Airport Limited Claims Relating to Airport Works **Appendix F.4.1 (Stansted)**

- We respectfully submit evidence that Southend Airport had received claims and some have been successfully resolved[34]
- **In the last 5 years since the airport closed house prices have increased by 34.14%**

- In the last year alone **house prices have increased by 6.91%**[35]
- Whereas average house prices in the UK increased by 1.7% in the year to January 2019 [36]
- The Act also applies to an Agricultural unit such as Quintas Energy UK Limited on behalf of Manston Thorne Limited the owner of the Manston Solar Farm located at the South of the project alongside the former airport runway [RR-1609]
- The Act also applies to small business such as those in Ramsgate.
- The Applicant has provided no evidence as to why it has not provided for these blight sums.

[34] https://www.southend.gov.uk/info/200158/common_projects/493/london_southend_airport/3 Southend Airport Claims Relating to Airport Works **Appendix F.4.1 (Southend)**

[35] https://www.zoopla.co.uk/house-prices/browse/kent/ramsgate/?q=ramsgate&results_sort=newest_listings&search_source=home

[36] https://www.ons.gov.uk/economy/inflationandpriceindices/bulletins/housepriceindex/january2019

- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (including any longer term and cumulative adverse impacts) as well as any **measures to avoid, reduce or compensate for any adverse impacts** (paragraph 4.4 Airport NPS).
- In this context, **environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level** (paragraph 4.5 Airport NPS).

F.4.2

- We respectfully remind the ExA that the Applicant has not been accurate, is highly selective in its quotes and fails to acknowledge the degree to which some existing airports already have noise insulation schemes **starting at 57 dBLAeq, 16hr.**
- **We respectfully remind the ExA that the Applicant has submitted erroneous information.**
- **It is of grave concern to Five10Twelve that Wood has failed to even take account of its own ES on Bristol Airport (as noted below).**
- We respectfully remind the ExA of our submission [TR020002-004469] in which we raised grave concerns of files without contemporary date stamps with unknown IP and we voice the concern that work done by someone else is perhaps merely being topped and tailed by Wood and submitted as Wood's work perhaps as a cost cutting exercise.
- We respectfully draw the ExA attention to the Applicant's technical note submitted as Appendix ISH6-21 as part of [REP8-015]
- A detailed note to the ExA on 20 June 2019 [AS-207], highlighting the material errors and omissions in the information submitted by the Applicant at Appendix ISH6-21 as part of [REP8-015] regarding the trigger levels for noise mitigation measures at other airports.

  "The detailed note states that:

  This submission by Wood, on behalf of the Applicant, responded to a request from the ExA to provide details of those airports that have used 60dB as the trigger for their Noise Insulation provision.

2. There are two material issues with the information provided by the Applicant;

2.1. Firstly, the information provided by the Applicant in Table 2.1 is materially inaccurate in places;

2.2. Secondly, it fails to acknowledge the move to reduce these trigger levels further as a key mitigation measure as part of plans to extend/develop airports.

In view of the Government's approach, as set out in the 2050 Green Paper, the Applicant's proposals must be compared against those that are ***currently being consulted upon (e.g. Heathrow)*** *and those for which* ***planning consent has recently been granted (e.g. London Stansted)****.*

3. As a consequence, the document provides a wholly misleading perspective of the levels at which Noise Insulation provisions are set.

4. The Applicant is yet again failing to disclose factual information that would undermine its case.

5. Whilst SHP has only had a very short time since the information was published to review and check the Applicant's assertions, the [Table] below highlights a number of material inaccuracies / issues with the information submitted by the Applicant".

"Airport Commentary on Noise Insulation Scheme Bristol Airport

"The Applicant has asserted that the Noise Insulation trigger level for Bristol is 63dB LAeq. This is wrong. It is difficult to comprehend how Wood were not aware of this having prepared the Environmental Statement that accompanies Bristol Airport's December 2018 planning application to enable a throughput to 12 million passengers (planning reference: 18/P/5118/OUT). Paragraphs 7.8.7 – 7.8.8 of Chapter 7 of the ES[37] *accompanying the application notes the following;*

"7.8.7: Air noise is currently limited by a condition which states that the area enclosed by the 57 dB LAeq,16h (07:00 to 23:00) summer

[37] Bristol Airport's December 2018 planning application to enable a throughput to 12 million passengers (planning reference: 18/P/5118/OUT). Paragraphs 7.8.7 – 7.8.8 of Chapter 7 of the ES: Attached **Appendix A**

noise contour shall not exceed 12.42km2 using the standardised average mode (Planning condition 30)"

"7.8.8: *Residential properties located within this 57 dB LAeq,16h contour (which did not previously qualify for noise insulation in the A38 Diversion Scheme) are eligible for a grant under the noise insulation grant scheme (Planning condition 31). This grant scheme is on the same basis as the previous A38 Diversion Scheme and is described in more detail in paragraph 7.8.25.*

Paragraphs 7.8.25 – 7.8.26 of Chapter 7 of the ES accompanying the application, provides information on the Noise insulation grants (please also note the extension announced by the airport below); "

"7.8.25 As part of the Bristol Airport Environmental Improvement Fund, grants are available from Bristol Airport to cover some or all of the costs of new glazing and ventilators for properties most closely overflown and impacted by noise from Bristol Airport flights. Depending on location a property could be eligible for a grant of 100% (up to a maximum of £5,000) or 50% (up to a maximum of £2,500).

7.8.26 ***Eligible properties are within the 63 dB, 60 dB and 57 dB noise contours. If a property is within the 63 dB contour, the grant can cover 100% of new double glazed windows or ventilators up to a sum of £5,000. If a property is within the 60 dB and 57 dB contours, the grant can cover 50% of new double-glazed windows or ventilators up to a sum of £2,500.***

7.8.27 As there is a limit of annual funding grant applications are prioritised according to categories based on the contour the property is in, and whether it has had a grant before. Should the fund be oversubscribed in any one category, priority is given to those living closest to the extended centreline of the runway i.e. those closest to overflying aircraft."

*"I**t is noted that the Wood's ES, explains in paragraph 7.1.1 (see below) that it itself did not prepare the Noise Chapter, however, this raises further questions regarding the experience of Wood in undertaking such work**".*

> *"7.1.1 This chapter of the Environmental Statement (ES) has been prepared by Bickerdike Allen Partners LLP and assesses the likely significant effects of the Proposed Development with reference to noise and vibration".*

"It should be noted that scheme has been further enhanced as evidenced by a press release from Bristol Airport[38] appended along with the relevant Annex as Appendix B, which states; Under the new proposals, grants will cover 100 per cent of costs up to £7,500 (in the 63dB LAeq 16hr contour) and £3,750 (in the 60dB and 57db contours). This is intended to encourage take up to ensure as many eligible properties as possible benefit from noise insulation."

"Airport Commentary on Noise Insulation Scheme London Gatwick Airport
"In Table 2.1, the trigger level given for Gatwick is 63dB. This is wrong. We would refer the ExA to page 65 of the Adopted 2019 Noise Action Plan, an extract of which is given below;

"SECTION 15 – DETAILS OF CURRENT NOISE ASSISTANCE SCHEMES NOISE INSULATION SCHEME The current Noise insulation Scheme was launched in 2014. This scheme was expanded significantly from the previous version covering 1,000 more properties in areas across Surrey, West Sussex and Kent. The major changes to the scheme are two-fold. First the noise boundary for the scheme has increased by using a lower level of noise from 66 Leq to ***60 Leq as a baseline with the boundary line drawn flexibly to ensure entire roads and communities are included. Secondly, the noise contour boundary has been drawn along the flight paths by 15km to both the east and west of the airport."***

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[38] *Bristol Airport dated 12 February 2019 (https://www.bristolairport.co.uk/about-us/news-and-media/news-and-media-centre/2019/2/noise-insulation-scheme)* Attached Appendix B

"A copy of the adopted 2019 Noise Action Plan is appended along with the relevant Annex as Appendix C[39]. It is of note that the Noise Insulation Scheme boundary shown in Figure 29 of the Annex (Annex 7 – page 17), extends over a considerably longer distance than either the 57dB or 60dB contours shown in Figure 4 (Annex 7 – page 41)".

Airport Commentary on Noise Insulation Scheme London Stansted

- In Table 2.1 of Appendix ISH6-21 as part of [REP8-015], the noise trigger level is given as 63dB LAeq.
- This is misleading, as the insulation scheme has been extended to 57 dB noise contour: Stansted Airport planning application UTT/18/0460/FUL, which Uttlesford District Council resolved to grant in November 2018, includes a requirement to extend the sound insulation grant scheme to include households in the 57 dB LAeq,16h noise contour.
- At Appendix D is the draft s106 agreement[40] (see schedule 3: Part 1) that secures this, and other obligations"

Airport Commentary on Noise Insulation Scheme Heathrow Airport

- Heathrow launched its statutory consultation for its proposed DCO on 18 June 2019.
- Included within the consultation documents was a Draft Noise Insulation Policy [41].
- Paragraph 3.2.1 on Page 21 states;
- "*3.2.1 The Noise Insulation Schemes are designed to ensure a suitable internal acoustic amenity for habitable rooms as summarised in the table below*." The relevant tables providing details of the schemes and the trigger levels for each are Table 3.1 and Table 4.2 (cut and pasted below), respectively.
- For example, these Tables show that all those in the full single mode easterly and westerly 60dB LAeq,16hr noise contour of an expanded airport would be entitled to Scheme 1 compensation as noted below;

[39] London Gatwick Airport Noise Action Plan: **Appendix C**
[40] Draft Deed of Planning Obligations between (1) Uttlesford District Council; (2) Essex County Council; (3) Stansted Airport Ltd and (4) Citicorp Trustee Company Limited **Appendix D**
[41] Airport Expansion Consultation Noise Insulation Policy **Appendix E**

- The policy also explains that those in full single mode easterly and westerly 57dB LAeq,16hr or the full 55dB Lden noise contours of an expanded airport, (whichever is the bigger) would be entitled to financial support.

3.2 *Proposed New Residential Noise Insulation Schemes*

3.2.1 The Noise Insulation Schemes are designed to ensure a suitable internal acoustic amenity for habitable rooms as summarised in the table below.

Table 3.1 New Residential Noise Insulation Schemes

Scheme	Noise Source	Description
Scheme 1	Aircraft noise	This includes a full package of noise insulation to habitable rooms, including bedrooms, living rooms, and dining rooms. This may include kitchens, toilets, bathrooms, but does not including porches, conservatories, out buildings and rooms solely for leisure activities. Windows may be upgraded to acoustic double glazing or by the addition of secondary glazing or both. External doors to habitable rooms may be upgraded. Ceilings or lofts may be over-boarded with additional lining. Acoustic thermal insulation batts (or equivalent) may be installed above ceilings in lofts. Suitable ventilation may be provided so that windows can be kept closed in warm weather. The scheme will be prioritised in the following order to: a) prevent exposure above UAEL due to the Project, b) avoid exposure newly above SOAEL due to the project, c) avoid exposure above SOAEL due to the project or existing operations, and d) deliver Heathrow's wider noise insulation commitments
Scheme 2	Road, rail and construction noise	Existing windows may be upgraded with replacement acoustic double-glazed units with "acoustic ventilation" or by the addition of secondary glazing, and external doors to habitable rooms may be replaced with doors that comply with the requirements of the Noise Insulation Regulations. Works are usually only to the façade (side) of the house that is closest to (or has line of sight of) the road or construction site.
Scheme 3	Aircraft noise	This is a £3000 contribution to a package of noise insulation treatment. For example, an owner might choose to replace certain windows or external doors, or install ventilation.

3.2.2 The Noise Insulation Schemes will provide additional noise insulation within properties that are exposed, or likely to be exposed, above the Action Levels set out below in Section 4.2.

3.2.3 Insulation aims to improve the internal acoustic amenity of the property in accordance with NPSE and the Airports NPS. The scheme is not intended to improve the noise environment outside of the property or building e.g. gardens.

3.2.4 To ensure the schemes are sustainable and will provide lasting benefit for people and properties, Heathrow will provide work packages from agreed suppliers with

4.2 Action Levels

4.2.1 The Action Levels for air, road, rail and construction noise, are provided below, based on metrics described in more detail in Appendix B and the PEIR.

Table 4.1: Action Levels for Aircraft, Road, Rail and Construction Noise

Noise Source	Action Level	Noise Insulation Scheme	Requirement Reference
Aircraft Noise	Unacceptable Adverse Effect Level (UAEL) Day time: 71dB $L_{Aeq,16hr}$ Night time: 66dB $L_{Aeq,8hr}$	Scheme 1 (with bespoke insulation package)	PEIR
	Initially, SOAEL values of 63dB $L_{Aeq,16hr}$ day, 55dB $L_{Aeq,8hr}$ night and one additional awakening per night (92-day summer averages). Then the full single mode easterly and westerly 60dB $L_{Aeq,16hr}$ noise contour of an expanded airport	Scheme 1	PEIR/ Airports NPS
	The full single mode easterly and westerly 57dB $L_{Aeq,16hr}$ or the full 55dB L_{den} noise contours of an expanded airport, whichever is the bigger	Scheme 3	Airports NPS
Road Noise	Day time: 63dB $L_{Aeq,16hr}$ Night time: 55dB $L_{Aeq,8hr}$ (and a change of at least 1dB from before expansion)	Scheme 2	PEIR
Rail Noise	Day time: 65dB $L_{Aeq,16hr}$ Night time: 55dB $L_{Aeq,8hr}$ >20 passbys per night: 80dB L_{Amax} <20 passbys per night: 85dB L_{Amax}	Scheme 2	PEIR

- We would respectfully remind the ExA that throughout the Examination it has been necessary for interested or affected parties to be forced to incur unnecessary and wasted expense (time-lost and money) in providing evidence to the Examination that rebuts unsubstantiated assertions by the Applicant.
- As demonstrated through this submission and every submission by us (Five10Twelve), the correct information is accessible even to lay-people like ourselves, provided a reasonable effort is undertaken to find it on your desktop or by telephone.
- To date, we have had to put in 122 submissions (either through our company or individually) and commission noise contours from the CAA/ ERCD because the evidence provided by the Applicant is out-of-date (in the most part the evidence is pre-2017 or even older) , erroneous, flawed and/or inaccurate.
- We respectfully remind the ExA that SHP also made the same comment and provided evidence of the same.

- Accordingly, the Applicant's submissions/assertions on this and other matters in its entire application cannot be accepted at face value.
- There also remains the uncertainty over both the accuracy of the noise contours submitted by the Applicant and the fleet mix assessed by the Applicant. The noise contours prepared by Wood (previously Amec Foster Wheeler) are contradicted by those submitted by us, Five10Twelve, and No Night Flights, both of whom used the independent ERCD to prepare the contours.
- **Wood's experience in this area is unknown, and as highlighted above, the preparation of the Noise Chapter in the Bristol Airport application was undertaken by a specialist company, and not Wood.**
- We would respectfully remind the ExA that the level and accessibility of information on noise and its impacts provided by the Applicant is wholly unsatisfactory when compared to the information contained within the planning /consultation documents for schemes at Bristol, Heathrow and Stansted.
- As per our submission to Deadline 9, [TR020002-004581], and recent submission to Deadline 11[42], we have evidenced that the Applicant's Noise Contours cannot be relied upon and that Noise Contours commissioned by Five10Twelve and produced by CAA/ERCD should be used for the purposes of this Examination and budgeting for Noise Insulation under the NMP.
- As per our submission to Deadline 9, [TR020002-004478], we have evidenced that the Applicant has failed to consider a **tailored** Noise Mitigation Plan, ("NMP"), as is required under paragraph 3.40 of the Aviation Policy Framework, ("APF"), and, as such - and contrary to the Applicant's assertions - the Applicant's proposals fail to comply with current Government policy.
- We have further evidenced in our submission to Deadline 9, [TR020002-004478], that an NMP that is tailored to the **location** and **character** of the areas and households most affected by the proposed development should adopt a SOAEL at 57dB rather than 60dB and certainly not as high as 63dB.
- We note that the Applicant continues to base its arguments with regards to a SOAEL of 63dB solely on the general minimum expectations. This confirms our assertion that the Applicant has not shown any evidence that they have considered a tailored NMP, as is

[42] Resubmitted and shown at **Appendix 18** : Project management, front-Loading and legal and policy context

required by the APF for *"Any potential proposals for new nationally significant airport development projects".*

- As shown in table 6 of our submission [AS-120] presenting the CAA/ERCD Noise Contours to the ExA based on the same fleet mix and number of ATMs as the Applicant [AS-119], the number of Households in the:
    - 63 dB Contour , (70% West/30% East), is 200
    - 60dB Noise Contour, (70% West/30% East), is 1,350
    - 57dB Noise Contour is 4,650.
- We would respectfully strongly remind the ExA that the number of households identified by the Applicant in the:
    - 63 dB Contour, is 115
    - 60dB Noise Contour, is 883
    - 57dB Noise Contour is unknown.
- There is a significantly large difference between the number of households affected - 74% more households at 63 dB and 53% more households at 60 dB and an unknown amount at the 57 dB.
- Without prejudice to our contention that the DCO should be refused, we respectfully draw the ExA's attention to our submission to Deadline 9, [TR020002-004487], and specifically to paragraphs 19-24 with regards to appropriate levels of compensation in a tailored NMP.
- The Applicant maintains that *"it is only properties where land compensation is expected to be payable that are included"* in the compensation sum of £13.1m.
- As stated in our Oral Submission at Deadline 9, [REP8-063], we maintain that failure to present any evidence that funds are in place to meet NMP commitments represents a significant risk to the project since Requirement 9a of the Draft DCO states:
  "No part of the authorised development must be commenced until measures set out in sections 2, 3, 4 and 5 of the Noise Mitigation Plan have been implemented".

- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (including any longer term and cumulative adverse impacts) as well as any **measures to avoid, reduce or compensate for any adverse impacts** (paragraph 4.4 Airport NPS).

- We respectfully remind the ExA that paragraph 4.5 of the Airports National Policy Statement also requires evidence that the NMP can be implemented in stating:
  "*... environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be identified in the Airports NPS, or elsewhere.* ***The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in their delivery****."*

- In the event that the Applicant is unwilling or unable to provide evidence of sufficient funding in place to meet its obligations under the NMP, we respectfully ask the ExA whether it is in a position to provide any degree of comfort or confidence to the Secretary of State that the conditions therein can be met.
-

F.4.3

i)

- We note Applicant has not attempted to answer that ExA's question showing where this commitment is costed.
- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (including any longer term and cumulative adverse impacts) as well as any **measures to avoid, reduce or compensate for any adverse impacts** (paragraph 4.4 Airport NPS).
- We respectfully remind the ExA that paragraph 4.5 of the Airports National Policy Statement also requires evidence that the NMP can be implemented in stating:
  "*... environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be identified in the Airports NPS, or elsewhere.* ***The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in their delivery****."*

ii)

- Since the Applicant has not shown where this commitment is costed, there is no evidence to support the Applicant's belief that £30,000 is in any way a realistic or reasonable estimated cost for this commitment.

- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (including any longer term and cumulative adverse impacts) as well as any **measures to avoid, reduce or compensate for any adverse impacts** (paragraph 4.4 Airport NPS).
- We respectfully remind the ExA that paragraph 4.5 of the Airports National Policy Statement also requires evidence that the NMP can be implemented in stating:
  "*... environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be identified in the Airports NPS, or elsewhere.* ***The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in their delivery****."*

iii)

- As with our comments at F.4.2, above, in the event that the Applicant is unwilling or unable to provide evidence of sufficient funding in place to meet its obligations under the NMP, we respectfully ask the ExA whether it is in a position to provide any degree of comfort or confidence to the Secretary of State that the conditions therein can be met.
- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (including any longer term and cumulative adverse impacts) as well as any **measures to avoid, reduce or compensate for any adverse impacts** (paragraph 4.4 Airport NPS).
- We respectfully remind the ExA that paragraph 4.5 of the Airports National Policy Statement also requires evidence that the NMP can be implemented in stating:
  "*... environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be identified in the Airports NPS, or elsewhere.* ***The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in their delivery****."*

F.4.4

i)

- We note the Applicant has made no attempt to provide an answer to the ExA. As such, we can only assume that no attempt to cost this commitment has been made by the Applicant.
- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (including any longer term and cumulative adverse impacts) as well as any **measures to avoid, reduce or compensate for any adverse impacts** (paragraph 4.4 Airport NPS).
- We respectfully remind the ExA that paragraph 4.5 of the Airports National Policy Statement also requires evidence that the NMP can be implemented in stating:
  "*... environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be identified in the Airports NPS, or elsewhere.* ***The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in their delivery****."*

ii/iii)

- According to the Five10Twelve Noise Contours produced by CAA/ERCD, Smuggler's Leap Caravan Park - as one example - is located entirely within the 63dB Noise Contour. (See Fig. 1, overleaf).

- According to satellite images on Google Maps, there are 42 dwellings in Smuggler's Leap within the 63dB Noise Contour, (See Fig. 1 below).

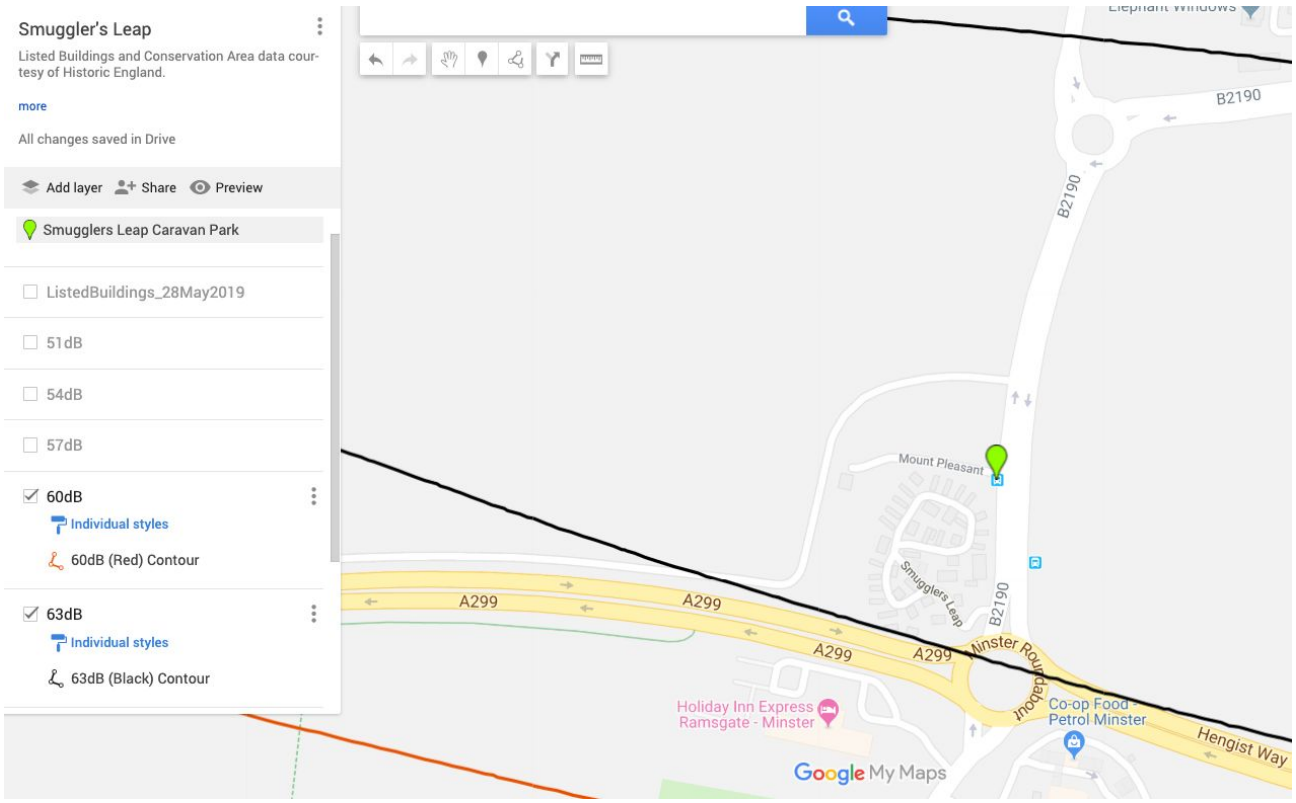


Fig.1 : Google Map / Satellite image showing 63dB Noise Contour (black) and Smuggler's Leap

- We note the Applicant's response to the ExA's Third Written Questions at Ns.3.6, referenced by the Applicant in its response to F.4.4, states that in the Applicant's view: *"it is not possible to comment on how effective noise insulation and ventilation will be on caravan park homes without undertaking a detailed survey and inspection".*

- We further note that in the absence of any objective information, the Applicant has formed its own conclusions, entirely without evidence, that the risk that noise mitigation and ventilation cannot be suitably applied to caravan park homes *"is not considered likely to occur"* and therefore *"has not been included as a cost".*

- Notwithstanding the fact that this position is neither realistic nor reasonable, the Applicant's assumption, without any supporting evidence, directly contravenes both the Precautionary Principle and the Waddenzee ruling, which state that:
  "When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.

In this context ***the proponent of an activity, rather than the public, should bear the burden of proof****."*

and

"A risk of significant effect exists if it cannot be excluded on the basis of objective information".

- At the very least, in line with the Equalities Act 2010, residents in caravan park homes deserve the same protections as residents of permanent housing and structures. Even under the Applicant's own NMP proposals, this would mean mitigation measures should be costed for all properties at Smuggler's Leap since they all lie within the 63dB Noise Contour.
- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (including any longer term and cumulative adverse impacts) as well as any **measures to avoid, reduce or compensate for any adverse impacts** (paragraph 4.4 Airport NPS).
- We respectfully remind the ExA that paragraph 4.5 of the Airports National Policy Statement also requires evidence that the NMP can be implemented in stating:
  "*... environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be identified in the Airports NPS, or elsewhere.* ***The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in their delivery****."*

F.4.6

i)

- The Applicant continues to provide no real evidence of funding for the scheme despite working on it for 4-5 years.
- The Applicant continues to provide no real evidence that any funder is "*fully committed to bringing forward the funding*"

- We respectfully draw the ExA's attention to our many submissions in relation to evidence of funding (or lack thereof) by the Applicant, the track record of the Applicant etc [REP4-042] [REP4-042] [REP5-074] and in particular [REP6-037]
- We respectfully note that despite the ExA asking Aldgate Developments directly to "*Confirm or otherwise whether this letter constitutes an undertaking to fund "the initial phase of the project, which will bring the airport back into use, estimated to cost about £186 million" (paragraph 17 of the revised Funding Statement [REP7a-006])? ii. Indicate any possible split between your own investment capital and funds gained from other potential investors*".

- Aldgate Developments have as of 9 July declined to answer the ExA.
- Further, Aldgate has no experience of airport related or similar development. Aldgate is an office and data centre developer, the latter being exactly the type of commercial use that could be accommodated on part of the Manston site[43]. Rubicon Capital Advisors does not appear to have any relevant experience of raising development funding for projects of a similar nature to the Applicant's proposed project. Based on the full list of transactions published on Rubicon's website, the only "airport transaction" listed was advising Balfour Beatty on the 2013 debt refinancing of a UK Regional Airport on behalf of Balfour Beatty – this was Blackpool Airport - a very small airport; and Balfour Beatty subsequently closed the airport in 2014 (see attached article on BBC website: https://www.bbc.co.uk/news/ukengland-lancashire-29529327).
- We note that Applicant has now produced weeks before the end of the Examination letters of 'interest'.
- Two letters in the Appendices - Unitechnik Systems GmbH (who is a supplier who will presumably if the DCO is granted take up warehousing space no more no less) and another from China Silver Asset Management Ltd - a Cayman company - and therefore the directors, shareholders, accounts are not visible to the public.
- Neither of these letters constitute an undertaking to fund. Neither of these letters offer any details as to the corporate structure, shareholding, directors, encumbrances, amount of investment, type of investment, timing of investment etc.

[43] https://aldgatedevelopments.com/

(ii)

- The Applicant provides no evidence and Aldgate appears to have declined to answer.
- We respectfully state that the following decided DCO's on the PINS website with a private sponsor unlike the Applicant have long team experience of successful operation in their chosen fields, years of experience of raising funding and financing and delivering projects of national importance. They are often publicly traded (or have a publicly traded parent) and rated by the major international rating agencies with evidence of significant balance sheet strength openly and transparently available to the examiners of those projects.
- Examples are: The Rookery South (Resource Recovery Facility) Order 2011 (SI203/680), The Able Marine Energy Park Development Consent Order 2104 (SI2014/2935) and The Swansea Bay Tidal Generating Station Order 2015 (SI2015/1386); The Wylfa Newydd (Nuclear Generating Station)

- The example provided by the Applicant - Thames Tideway Tunnel - the sponsor was Thames Water Utilities Limited (TWUL)

  TWUL is the largest provider of water and sewerage services in the UK, based on the number of customers served and with a regulatory capital value (RCV) of £10,897 million as of 31 March 2013 (at the time of application). It forms the principal business of the Thames Water Group.
- We respectfully state this is not at all comparable with the Applicant with no audited accounts.
- We respectfully remind the ExA that paragraph 4.5 of the Airports National Policy Statement also requires evidence that the NMP can be implemented in stating:

  "*... environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be identified in the Airports NPS, or elsewhere.* ***The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in their delivery****."*

F.4.7

i)

- The Applicant has not provided and evidence (and neither has Aldgate despite being directly asked by the ExA at ExA F.4.6).

ii)

- Similar to those mentioned by Mr Rothwell no evidence has been provided that directly links an investor to RSP.
- The Applicant has provided no evidence of these spurious allegations. Perhaps more tellingly no evidence has been provided by Aldgate to substantiate these allegations.
- We note that Applicant has now produced weeks before the end of the Examination letters of 'interest'
- Two letters in the Appendices - Unitechnik Systems GmbH (who is a supplier who will presumably if the DCO is granted take up warehousing space no more no less) and another from China Silver Asset Management Ltd - a Cayman company - and therefore the directors, shareholders, accounts, encumbrances etc are not visible to the public.
- Neither of these letters constitute an undertaking to fund. Neither of these letters offer any details as to the corporate structure, shareholding, directors, encumbrances, amount of investment, type of investment, timing of investment etc.

(iii)

- Rubicon Capital Advisors does not appear to have any relevant experience of raising development funding for projects of a similar nature to the Applicant's proposed project. Based on the full list of transactions published on Rubicon's website[44], the only "airport transaction" listed was advising Balfour Beatty on the 2013 debt refinancing of a UK Regional Airport on behalf of Balfour Beatty – this was Blackpool Airport - a very small airport; and Balfour Beatty subsequently closed the airport in 2014 (see attached article on Financial Times website: https://www.ft.com/content/2e75883b-ec26-3588-b294-57bcc58e1dd2

(iv)

- The Applicant has not provided evidence of a signed NDA with Rubicon (redacted or otherwise).

[44] https://rubiconcapitaladvisors.com/

- The Applicant has provided absolutely no evidence of it "*generating very significant interest and enthusiasm in the market*".
- The Applicant has not provided evidence of "*expending over £15m*" in pursuing this project.
- We respectfully remind the ExA that paragraph 4.5 of the Airports National Policy Statement also requires evidence that the NMP can be implemented in stating: "*... environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be identified in the Airports NPS, or elsewhere.* ***The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in their delivery****."*

F.4.8

- The Applicant's own evidence shows redacted copies of three letters, each dated 1 December 2016, from Business Investment Relief, HMRC (reference numbers 0498, 0499 and 0500). Each of these letters states that: "*I remind you that: As the person claiming relief,* ***you are wholly responsible for the accuracy of the information supplied to HMRC****. This opinion is based solely on the information you provided and will not apply in any circumstances beyond those described by you."*

- The Applicant has made a number of assertions none of which have been substantiated or evidenced.
- The Applicant has provided no evidence whatsoever to support the assertion that due to the "*complexity of the DCO the investors were particularly thorough with the application to HMRC*".
- We respectfully remind the ExA of our submission at [REP6-037]
- The Applicant has made an assumption on the part of HMRC with no evidence to support it.
- We respectfully remind the ExA that paragraph 4.5 of the Airports National Policy Statement also requires evidence that the NMP can be implemented in stating: "*... environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be*

identified in the Airports NPS, or elsewhere. ***The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in their delivery****."*

F.4.9 and F.4.25

(i)

- The Applicant's unaudited accounts mostly evidences a large amount of debt.
- The two accounts referred to by the Applicant are held by a separate legal entity with no legal relationship with the Applicant [REP6-037] [AS-073]
- We respectfully note that the letter from BDB Pitmans is not witnessed nor is it an undertaking. BDB have merely confirmed that they saw 2 accounts holding monies in them.
- BDB has no confirmed who are the legal and beneficial owners of those monies.
- BDB has not confirmed that the beneficial owners of these monies agree that these monies are to be used in any way let alone by the Applicant.
- BDB has not confirmed the location of these monies.
- We respectfully remind and draw attention to the ExA of our submission at [REP6-037]
- The PwC letter and the Joint Venture Agreement do not evidence any legally binding relationship or legal obligation to fund the Applicant.
- We respectfully submit that as the monies are held on trust (ie a legal entity is holding the funds for a number of beneficiaries) these monies referred to in the PwC letter are held on trust for others for an undisclosed purpose.
- This relationship as a trust is evidenced in writing by a trust deed.
- The Applicant has not provided any such trust deed in relation to the monies referred to in the PwC letter.
- These monies are simply held by X for Y for the purpose of Z.
- The applicant has not provided any evidence that 'Z' is a legal obligation to invest in the Applicant or to invest in Applicant to build an airport or to invest in Applicant to build houses.
- The Joint Venture Agreement does not evidence a legally binding obligation for anyone to furnish RSP in funds whether demanded or not. It simply states that when X feels like it they can provide monies.

- The Joint Venture Agreement obliges the Applicant to issue Notes on receipt of any funds but there is no obligation for funds to be made available or any guarantee that they will be so made.
- In relation to the blight funds, Applicant has provided a redacted bank statement dated 18th March 2019 from RBS for an account in the name of Calder & Co/RiverOak showing an opening balance of £4,184. A credit of £500,000 on 18th March 2019 is shown, but no closing balance. Calder & Co are apparently the company's auditor but there is no statement from them.
- Calder & Co (the Applicants' auditors) have not provide a final and signed Independent Limited Assurance Report to evidence monies spent by the Applicant [REP6-014]
- All company accounts to date provided by the Applicant have been unaudited and evidence large amounts of debt on terms not furnished to the ExA.
- The Applicant does not confirm monies for other land to be compulsory acquired, HRDF relocation land, MET relocation land, monies that will be required (if agreement is reached) with the Statutory Undertakers, monies that will be required (if agreement is reached) with Manston Green/KCC/TDC etc.
- We respectfully note that as of 8 July 2019 there is no agreement from SEPN on the Planning Inspectorate website and we respectfully note that "*The only remaining issue is the level of fees which the Applicant is obliged to pay to SEPN. The Applicant is waiting for a response from SEPN on this issue*" (underlined for empahsis)
- We respectfully note that Kent County Council at deadline 11 that Kent County Council is also waiting on fees:
  "*Thank you for confirmation that your client has agreed to pay KCC's legal costs. I would be grateful if you could confirm whether or not you are now in funds"* (underlined for emphasis).

  The amount of fees in question are:
  "*Could you therefore please provide an undertaking initially limited to* ***£3,255*** *in respect of their legal costs of negotiating the section 106 obligation, whether or not the matter proceeds to completion*" (bold added for emphasis).

- As you will be aware SHP evidenced that the Applicant had failed to honour its financial commitments in relation to licences to access the land to SHP.

- We would respectfully state this pattern of conduct does not evidence that the Applicant has sufficient means to fund and finance the proposed development quite the opposite. These amounts for fees or licences are small amounts of money that have been and are an impediment to the DCO Examination.
- We respectfully remind the ExA that paragraph 4.5 of the Airports National Policy Statement also requires evidence that the NMP can be implemented in stating: "... *environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be identified in the Airports NPS, or elsewhere.* ***The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in their delivery****."*

(ii)

- No evidence has been provided to support this assertion.
- All company accounts provided have been unaudited.

F.4.10

(i)

- No evidence has been provided to support these assertions.
- The Applicant has not identified which director (if any) has had what experience (structuring or raising and/or placing) and in what capacity and at what level of seniority.
- The Applicant has not identified what happened to the projects afterwards/ success rates.
- The Applicant has not identified whether this experience was as an individual, with their own company or as part of bigger organisation.
- We respectfully remind the ExA of our submission at [REP4-042] in which we document and evidence the directors experience.
- We respectfully remind the ExA that paragraph 4.5 of the Airports National Policy Statement also requires evidence that the NMP can be implemented in stating: "... *environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be identified in the Airports NPS, or elsewhere.* ***The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in their delivery****."*

(ii)

- No evidence has been provided to support this assertion.
- Rubicon Capital Advisors does not appear to have any relevant experience of raising development funding for projects of a similar nature to the Applicant's proposed project. Based on the full list of transactions published on Rubicon's website[45], the only "airport transaction" listed was advising Balfour Beatty on the 2013 debt refinancing of a UK Regional Airport on behalf of Balfour Beatty – this was Blackpool Airport - a very small airport; and Balfour Beatty subsequently closed the airport in 2014(see attached article on Financial Times website: https://www.ft.com/content/2e75883b-ec26-3588-b294-57bcc58e1dd2

- We respectfully remind the ExA that paragraph 4.5 of the Airports National Policy Statement also requires evidence that the NMP can be implemented in stating: "... *environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be identified in the Airports NPS, or elsewhere.* ***The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in their delivery****."*

F.4.11

- We respectfully state that we will be putting in a claim for costs.

F.4.27

- We respectfully remind and draw attention to the ExA of our submission at [REP6-037]
- The PwC letter and the Joint Venture Agreement do not evidence any legally binding relationship or legal obligation to fund the Applicant.
- We respectfully submit that as the monies are held on trust (ie a legal entity is holding the funds for a number of beneficiaries) these monies referred to in the PwC letter are held on trust for others for an undisclosed purpose.
- This relationship as a trust is evidenced in writing by a trust deed.

[45] https://rubiconcapitaladvisors.com/

- The Applicant has not provided any such trust deed in relation to the monies referred to in the PwC letter.
- These monies are simply held by X for Y for the purpose of Z.
- The applicant has not provided any evidence that 'Z' is a legal obligation to invest in the Applicant or to invest in Applicant to build an airport or to invest in Applicant to build houses.
- The Joint Venture Agreement does not evidence a legally binding obligation for anyone to furnish RSP in funds whether demanded or not. It simply states that when X feels like it they can provide monies.
- The Joint Venture Agreement obliges the Applicant to issue Notes on receipt of any funds but there is no obligation for funds to be made available or any guarantee that they will be so made.
- In relation to the blight funds, Applicant has provided a redacted bank statement dated 18th March 2019 from RBS for an account in the name of Calder & Co/RiverOak showing an opening balance of £4,184. A credit of £500,000 on 18th March 2019 is shown, but no closing balance. Calder & Co are apparently the company's auditor but there is no statement from them.
- Calder & Co (the Applicants' auditors) have not provide a final and signed Independent Limited Assurance Report to evidence monies spent by the Applicant [REP6-014]
- All company accounts to date provided by the Applicant have been unaudited and evidence large amounts of debt on terms not furnished to the ExA.
- We respectfully remind the ExA that paragraph 4.5 of the Airports National Policy Statement also requires evidence that the NMP can be implemented in stating: "... *environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be identified in the Airports NPS, or elsewhere.* ***The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in their delivery.***"

F.4.28

- The answer provided by the Applicant is that the **sole purpos**e of the HLX Nominees Ltd is to **prevent transparency**.

- Whilst this may well be standard market practice of banks and fiduciaries onshore and offshore. It has not provided any evidence that this is standard practice of airport owners and/or airport owners asking the SoS to grant a DCO for an airport.
- Heathrow Airport Limited for example which also will be asking the SoS to grant a DCO for an airport is completely transparent on the UK Companies House registry we can view that all officers are individuals and all are UK-situs with their UK addresses clearly visible[46]. We can, also, view all accounts, charges and solvency statements also on UK Companies House[47].
- **Part of the reason for transparency as to legal and beneficial ownership is in relation to the prevention of terrorism, politically exposed persons, money laundering *as well as the* prevention of any embarressment or the like for the UK government.**
- **At this time of Brexit, when trade and negotiations are highly sensitive the granting of a DCO of an airport to unknown entities carries a substantial and unknown risk.**

F.4.29

- We respectfully note that in Helix Fiduciary AG in its letter at [REP8-011] at paragraph 5, Page 1 states that it has attached its most recent membership certificate to the self-regulating organisation.
- We respectfully draw the Examining Authority's attention to the date of the most "*recent membership certificate*" in the top left corner it is dated Zug, **03.08.2017**

F.4.30

(i)

- The Applicant states in its answer to F.4.30(i) that cash at bank of £13,100,000 shown in the financial statements for RiverOak Strategic Partners Ltd **is the sum secured by Article 9**. That sum was transferred on 24 May 2019 to a BDB

[46] https://beta.companieshouse.gov.uk/company/01991017/officers?page=3
[47] https://beta.companieshouse.gov.uk/company/01991017

Pitmans account. These monies have been sent to be used for the purchase of SHP land.

- **Where is the funding that is sum secured through Article 9 now?**
- It is not clear that monies have not come into by way of loan to RSP and gone by way of loan from RSP to ROL and then on to BDB to buy the SHP land
- It is not clear how RMSEL owns land but did not have the monies

    - Unaudited accounts of RSP show £13.1m loans falling due after more than 5 years from an unknown entity and on unknown terms - (confirmed at Applicant's response at F.4.30 is the sum secured by Article 9) - were transferred to BDB account on 24 May 2019 - these monies were said to be used to purchase the SHP land (where is the sum secured by Article 9?)
    - RSP has a loan and no means to service it and no assets.

    - Unaudited accounts of RFL (Riveroak Fuel Limited)
    - Has one asset (Jentex) and loans of 2.69m (made up of those falling with the year and due more than one year)

    - Unaudited accounts of RML (Riveroak Manston Limited)
    - Show debtors of £1 x4

    - Unaudited accounts of RALL (Riveroak AL Limited)
    - Show losses of £111,177 (owed to group undertakings)
    - Commitments under operating leases of £717,300

    - Unaudited accounts of ROL (Riveroak Operations Limited)
    - Show net liabilities of £12,840,533 (loan due more than one year £13,639973)

    - Unaudited accounts RMSEL (Riveroak MSE Limited)
    - Show debtors of £1 x3
    - The SHP asset is held here now

- Unaudited accounts RIL (Riveroak Investments Limited)
- Show debtors of £1 X 999

HE.4 Historic Environment

In relation to Ramsgate, Manston and the Villages

- We respectfully draw the Examining Authority's attention to the following submissions of Five10Twelve : [REP4-047] [REP4-048] [REP4-049][REP4-052] [REP4-050] [REP4-045] [AS-129] [TR020002-004480] [REP3-056] [REP3-056]

- We respectfully draw the Examining Authority's attention to The Ramsgate Society submissions in particular Deadline 11 submission *Ramsgate Heritage Assets Under Threat*
  found at
  https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR020002/TR020002-004684-The%20Ramsgate%20Society%20-%20Ramsgate%20Heritage%20Assets%20under%20Threat%20vfinal.pdf

- We respectfully draw the Examining Authority's attention to the **refused DCO** PROPOSED NAVITUS BAY WIND PARK found at
  https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010024/EN010024-000055-Secretary%20of%20State%20Decision%20Letter%20and%20Statement%20of%20Reasons.pdf

- We respectfully draw the Examining Authority's attention to the **statutory law requirements** of Section 72 of the Planning (Listed buildings and conservation areas) Act 1990 and Section 66(1) of the 1990 Act.
- We respectfully draw the Examining Authority's attention to the case law - Barnwell Manor Wind Energy Ltd v East Northamptonshire District Council and Others CA 18 Feb 2014

- We respectfully cite the following from the Local Government Lawyer website[48]:

  "*Despite the decision in Barnwell Manor, the decision-makers in the subsequent cases mentioned below, Forge Field, South Lakeland and Mordue, fell into the same trap of carrying out a balancing exercise in accordance with paragraph 134 of the NPPF (after concluding the relevant proposal will lead to less than substantial harm to designated heritage assets) without* ***demonstrably giving "considerable importance and weight"*** *to the d****esirability of preserving those heritage assets****. In all t****hree cases, the High Court quashed the grant of planning permission****. In Mordue, which was decided on 9 March 2015, John Howell QC (sitting as a Deputy High Court Judge) stated that in his judgment the correct* ***interpretation of paragraph 134 and the first part of paragraph 132 requires them to be read together, and that a decision-maker who does this will comply with the obligation imposed by section 66(1) of the act as interpreted by the Court of Appeal in Barnwell Manor.***

  The above cases illustrate the need to demonstrably give "considerable importance and weight" to the desirability of preserving heritage assets and to refer expressly to the advice in both the first part of paragraph 132, and 134, of the NPPF in cases where less than substantial harm to heritage assets has been identified".

- As the ExA will be aware 51% of the heritage assets (over 200 listed buildings) would be directly under the flight path of the proposed development (Deadline 11 submission *Ramsgate Heritage Assets Under Threat)*
- As such, if granted the DCO would lead to the United Kingdom being in breach of case law, statute law and the NPPF.
- As such, we respectfully request that the Examining Authority make a robust recommendation that the DCO should be refused.

ND.4 Need

48 https://www.localgovernmentlawyer.co.uk/litigation-and-enforcement/311-litigation-features/25163-heritage-issues-and-planning-applications

ND.4.1

- The Applicant is using passenger flight data to evidence dedicated freight capacity.
- The Applicant has not provided any relevant evidence provide evidence on the freight capacity available within such airports and any consented or planned capacity increases.
- The CODA Digest Q1 2019 does not mention the word "freight" once.
- https://eurocontrol.int/sites/default/files/2019-07/coda-diget-q1-2019.pdf

ND.4.2

- Extract from York Aviation Supplementary Note (Appendix 1 – comments after paragraph 37). "*The key point is that for dedicated freighter services to be viable, they need to operate at high load factors. Hence, the importance of consolidating operations where high volumes of import and export freight can be concentrated. This is why there is a 'golden triangle' of airports with high air freight volumes in northern Europe reflecting a concentration of population and industry generating demand for air freight. The same logic applies within the UK in relation to concentration at East Midlands. It is a gross over-simplification to suggest that freight destined for the UK could be flown to Manston instead as the local area would not generate sufficient freight demand for such a service to be viable.*"

ND.4.3

- We respectfully refute the Applicant's claim that the new integrators who specialise in e-commerce do not fall within the 4 major sub-markets identified in the Steer Report.
- We respectfully draw the ExA attention to the following excerpt from the Steer Report October 2018**:**

  *"**Express freight***

  2.10 Although air freight is, by its nature, time-critical, express freight services are used when particularly rapid delivery is required and are generally sold on the premise of a guaranteed delivery slot. As well as a guaranteed delivery time, customers are also often able to track a shipment's progress, enabling them to have up-to-date information on geographical position, estimated time of delivery, details of any delays and revised delivery times.

2.11 The international express market is dominated by the four main integrators (DHL, FedEx, TNT (now a subsidiary FedEx)) and UPS), who carry freight on a mixture of their own aircraft and purchased bellyhold capacity. Integrators use their own aircraft within Europe and on high volume long-haul routes, and purchase bellyhold capacity on lower volume long-haul routes where they do not operate their own aircraft.

2.12 ***Although business-to-business (B2B) activity still accounts for much of express freight volumes (for example on just in time supply chains), the growth of E-Commerce has increased the demand for business-to-consumer (B2C) services. This has, to some extent, changed the dynamic of express air freight services as a growing share of express demand is now driven by consumer expectation of fast delivery".***

ND.4.4

- We respectfully draw the ExA attention to [REP6-033] and the PwC Freight Report (Airport Commission) [REP7-008] and the Government of Science report Understanding the Freight Market[49]

ND.4.5

- "*Extract from York Aviation Supplementary Note (Appendix 1 – comments after paragraph 37). "See comments above [NB. in York Aviation Supplementary Note] on the comparability of the proposed charges with East Midlands. We agree with the ExA that, at least in the early years, Manston would need to incentivise airlines to use it and would need to rebate charges substantially until its place in the market is established*."

ND.4.6

- Extract from York Aviation:Deadline 9: Supplementary Note in the Applicant's Summaries of Oral Evidence at ISH5 regarding Socio-Economics and CAH2 regarding Compulsory Acquisition

  "*Business Model*

  - *Appended to the Applicant's Note on CAH2, are two documents responding to the ExA's request for an updated and more detailed business plan and business model. We provided, in our Note on CAH2, an explanation of the minimum level of*

[49] Resubmitted and shown at **Appendix 13**

information that a Business Plan for an Airport seeking funding or to demonstrate viability should contain. The information provided by the Applicant remains woefully deficient and certainly insufficient for any party to assess the plausibility of the revenue and cost estimates that underpin the claimed viability of the proposed development and operation of Manston as a cargo airport.

- *In its response, the Applicant has provided a brief note explaining the differences between how it intends to operate Manston compared to East Midlands Airport and a revised spreadsheet with limited further information in relation to revenues and costs. There is no meaningful explanation as to how the figures have been derived sufficient for their veracity to be tested. In any event, a spreadsheet is not a Business Plan. A Business Plan is a document that sets out clearly how a business is going to achieve its forecasts by reference to the revenues to be earned and the costs of doing so. As became evident at the Need and Operations Hearing (ISH2), the Applicant appears not to have made the linkage between the deliverability of the so-called 'forecasts', or rather a wish list of who might operate at Manston, and the costs to users of doing so based on the expected prices to be charged. The spreadsheet as presented cannot be considered a Business Plan in any normal sense of the term, nor are the assumptions underpinning the calculations clearly set out.*
- *In terms of the comparison to East Midlands, we note that RSP intend for Manston to provide its own handling, except for the (e-commerce) integrator, and so would earn revenue from this source, which we understand is included in the aeronautical revenue estimates. Clearly there would be a cost attached to providing this handling service, which we assume is contained within the staff and other operating costs, albeit this is not clear from the level of detail provided. We have some doubts as to the profitability of operating such handling services in house as experience at most airports would suggest that handling activities are outsourced given the low revenues that can be earned relative to the staff and other costs involved. Insufficient detail has been provided to enable this to be ascertained for Manston. We note that the ExA has asked for further information in relation to benchmarked charges for cargo handling (Question ND.4.6). Without such information it is simply not possible to check the reasonableness of the assumed income from this source.*

- *We note also the RSP intends to supply aviation fuel directly and the explanatory note to the spreadsheet suggests that the income is shown within aeronautical revenues net of the costs of buying the fuel, i.e. as a profit margin on sales. Firstly, we note that it tends only to be very small airports that operate on this basis. This is because major airlines tend to have global fuel supply contracts with the main oil companies at heavily discounted rates applicable at most airports from which they operate. An airport itself, operating on a stand alone basis, can seldom match the selling price of aviation fuel offered by the main suppliers. Thus, most of the UK's larger airports, including East Midlands, contract out the supply of aviation fuel taking only a small throughput levy typically included within commercial revenues to ensure that the cost of aviation fuel, which makes up a major part of an airline's costs, does not act as a deterrent to airlines operating to/from them.*
- *Airlines tend to seek to minimise fuel purchases at airports where their contracted supplier is not able to provide the fuel. As an independent supplier of fuel, RSP would a) be purchasing fuel from the oil companies and, as a relatively small operation, not able to avail of discounts available on a high volume basis and b) their mark-up on the base price (profit margin) would of itself increase the sale price to the airline still further. The extent of fuel sales would, thus, in all likelihood be in an inverse relationship to the overall cost to the airline relative to buying fuel elsewhere. Insufficient information is provided to explain the assumptions that underpin this part of the aeronautical revenue estimate in terms of the expected selling price of fuel relative to other airports and the margin on sales assumed (% or fixed amount).*
- *The note setting out the comparison to East Midlands asserts that, once these revenues have been separated out, the comparable aeronautical revenue per WLU is £3.18, which RSP compare to the average aviation revenue earned at EMA in 2017/8 of £2.75 per WLU. The spreadsheet shows that the Manston estimate of £3.18 per WLU is made up of an assumed aeronautical revenue per passenger of £0.50, which is consistent with our expectation of the level of aeronautical income per passenger that Manston might attain, albeit some marketing support payments might need to be made in the early years reducing the net income for a period, and an assumed freight related aeronautical income of £4.28 per WLU*

(42.83 per metric tonne) in Year 20. This is then weighted by the relative WLU's produce an estimated average aeronautical revenue per WLU.

- *First of all, it is relevant to consider what this tells us about comparability to the level of charges at EMA. Whilst the assumed aeronautical revenue per passenger at Manston is of the order that we would expect for a small airport trying to establish itself in the market, this does not mean that passenger related aeronautical revenues would necessarily be as low at an established airport such as East Midlands. Taking the closest example of a regional airport, with limited cargo activity, average aeronautical revenue per passenger at Leeds Bradford Airport was £2.51 in 2016/7 (the most recent year for which information is available). It is notable that this is amongst the lowest average aeronautical revenues at airports covered in the report. Leeds Bradford has outsourced its handling and does not directly sell fuel. Taking this as a reasonable proxy for passenger related revenues at East Midlands would imply that East Midlands earns around £3.10 per WLU of freight based on the WLUs set out by the Applicant for East Midlands for the FY ending March 2018. Hence, direct aeronautical charges at Manston would be still be 40% higher than at East Midlands, still acting as a significant deterrent to attracting airlines to use it, leaving aside whether Manston is cost competitive in other aspects of the service it seeks to provide directly.*
- *The other costs of using an airport are equally relevant to whether airlines will chose to operate, particularly fuel and handling costs as noted above. This is particularly relevant given that, based on the information provided by the Applicant, such charges are assumed to make up the vast majority of the aeronautical income that RSP expects to earn at Manston: Aeronautical Income: Passenger Income: £3,407,000 Direct Aeronautical Income £703,877 Handling and Fuel Income £2,703,123 79% of pax related income Cargo Income: £50,966,000 Direct Aeronautical Income £14,594,665 Handling and Fuel Income £36,371,335 71% of cargo related income*
- *In overall terms, handling and fuel related income accounts for 72% of the claimed aeronautical revenue, yet the build up of this income is without any explanation as to the assumptions used. This is all the more extraordinary given that the e-commerce integrator, accounting for 50% of cargo traffic is not*

expected to purchase any handling services. Potentially each cargo aircraft departing Manston would be facing a fuel mark-up (additional cost) of c.£3,000-4,000, dependent on what is assumed for handling income.

- *Handling and fuel costs would be an important part of airlines' decision making as to whether they would be willing to operate yet no information is provided by the Applicant to justify such high levels of revenue being realistically attainable. Whilst we appreciate that the Azimuth Report provides a table of fuel storage required (Table 8), no information is provided as to how this has been calculated in terms the extent to which airlines would purchase fuel at Manston at the price proposed. These levels of income from handling charges and fuel margin seem extraordinarily high and likely to constitute another material factor as to why airlines would not choose to operate from Manston and would certainly influence the extent to which they were willing to purchase these services or goods from the airport operator when alternatives are available, handling freight off-site or purchasing fuel elsewhere, particularly given the propensity of freighter aircraft to multi-stop across Europe en-route to longer haul destinations. 3 Leigh Fisher UK Airport Performance Indicators for 2016/7.*
- *In terms of property income, which makes up over 35% of total income in Year 20 (over £32 million), SHP provide separate comments on the realism of this. Given that the clear intention of RSP is to operate its own cargo sheds, the scope for rental income would be limited by the extent to which legitimate airport related uses can be attracted and the level of rent they are likely to be willing to pay. Most essential airport operationally related activities are generally only low rental income generators. At the very least, further explanation is required of the build up of this large rental stream in order that the legitimacy of the proposed rental generating activities can be ascertained. By way of comparator, total other income (including property income) at East Midlands Airport in 2017/8 (Annual Report and Accounts attached at Appendix A) was only £5.34 million, including income earned from the large scale DHL cargo hub, UPS building and other cargo operations, as well as the Airport's share of rental income from Pegasus Business Park (developed in conjunction with Wilson Bowden). In the circumstances where Manston intends to own and operate its own cargo facilities, the estimated property income at six times that earned at East Midlands is not credible given*

that the projected cargo throughput in Year 20 is of a similar order to that at East Midlands currently.

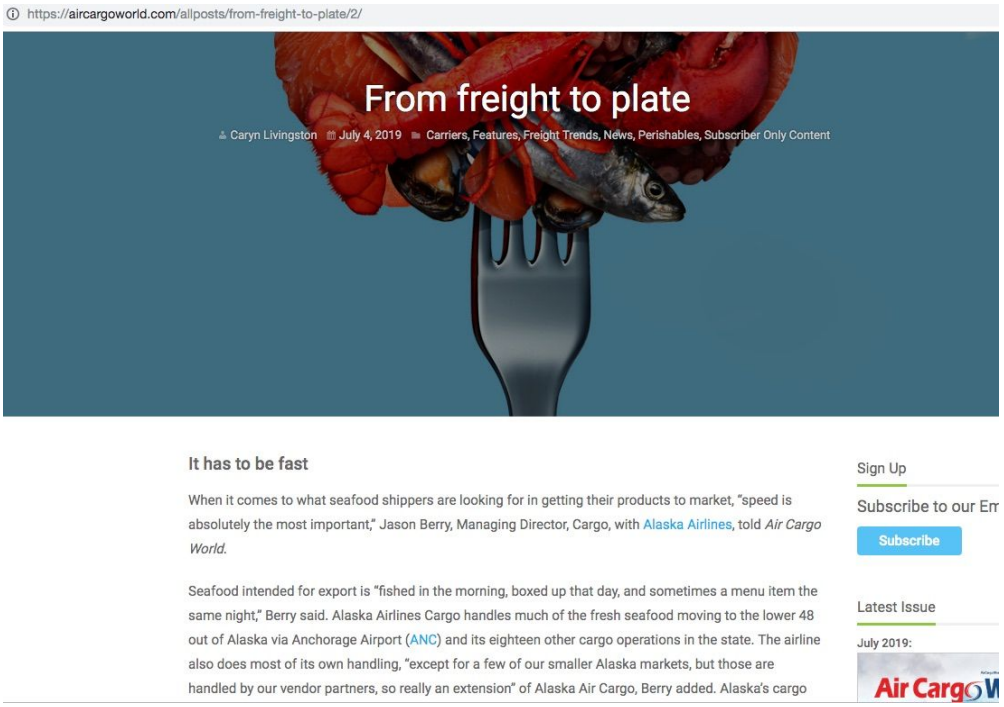
- *We are not able to comment further in relation to passenger related commercial revenues or operating costs pending provision of further information by the Applicant.*
- ***Overall, the information currently provided is inadequate to enable the realism of the overall Business Case for the proposed development to be understood and the likelihood of viability being obtained even over the longer term to be assessed. We remain of the view as set out in Section 7 of our February 2019 Report that the development of Manston is highly unlikely to be financially viable and that the claimed revenues would not be achievable even if it were to achieve its forecasts, which we do not consider credible for the reasons set out in our Reports***"

ND.4.7

- Ryanair post first loss since 2014 amid fare cuts (BBC news 4 February 2019) https://www.bbc.co.uk/news/47113639
- [Easyjet] Airline issues Brexit warning after pretax loss of £275m in the six months to 31 March (The Guardian 17 May 2019) https://www.theguardian.com/business/2019/may/17/easyjet-losses-soar-as-higher-costs-and-drone-disruption-take-toll-brexit
- Virgin Atlantic reports £28 million loss (Travel Weekly 16 March 2018) http://www.travelweekly.co.uk/articles/299938/virgin-atlantic-reports-28-million-loss
- Turkish Airlines loss quadruples as costs surge; dividend is withheld (10 May 2019) https://ahvalnews.com/turkish-airlines/turkish-airlines-loss-quadruples-costs-surge-dividend-withheld
- THOMAS COOK LOST £31 PER MINUTE IN THE LAST FINANCIAL YEAR (29 November 2018) https://www.independent.co.uk/travel/news-and-advice/thomas-cook-loss-holidays-packages-hot-summer-heatwave-brexit-a8657346.html

ND.4.8

- We respectfully note the Applicant has provided no UK based evidence
- The article the Applicant is about the Alaskan fishing market.



ND.4.9

- Irrespective of the non-evidenced answer provided by the Applicant the market has moved to sea freight for this reason save for emergency belly freight .
- Please see [REP7-007]
- The impact of loss of temperature control is huge for example: Vaccines can lose their effectiveness if they become too hot or too cold at any time during manufacturing, transportation and storage 1,2,3,4,6. The storage of vaccines at +2◦C to +8◦C will slow down the natural biodegradation process of the vaccine. Storage outside of the recommended temperature range – including during transport – may speed up loss of potency, which cannot be reversed. This may result in the failure of the vaccine to create the desired immune response and consequently provide poor protection, potentially putting the patient at risk of acquiring and transmitting infectious diseases [50].

ND.4.21

Extract From York

[50] https://www.westhampshireccg.nhs.uk/download.cfm?doc=docm93jijm4n1178.pdf&ver=1954

"*What the Securitas information (if correct) does not state is the nature of this trucked cargo. To the extent that this is trucking under bond with airline flight numbers, such cargo is more likely related to availing of bellyhold capacity, including goods being trucked into the UK to avail of bellyhold capacity at Heathrow. Other trucking is likely to relate to conventional integrator operations linked to the established integrator hubs in Europe. The overall tonnage being trucked between the UK and Europe does not provide any indication of how likely it is or not that Manston could attract any share of it sufficient to justify a number of dedicated freighter operations at Heathrow*".

ND.4.25

Extract From York

"The Applicant simply reiterates the arguments previously made. We have addressed the weakness in these arguments, sufficient to negate the existence of a compelling case, in our February 2019 Report (paras. 2.2-2.21) and in our Note of Oral Evidence at CAH2, paras. 16-19)"

ND.4.28

Extract From York

"Stansted Airport helpfully provides confirmation of the number of cargo stands that it has at

https://www.magairports.com/our-expertise/cargo-services/london-stansted-cargo/

This accords with the information previously submitted by ourselves: Stansted's dedicated cargo stands can simultaneously accommodate 4 x A380, 3 x B747-8F, 1 x B747-400F and 1 X B767-300. In relation to freight at Stansted currently, we can confirm that we have checked with the CAA and the Airport and there has been an omission in the freight statistics submitted to the CAA regarding bellyhold freight being carried by Emirates. This will be rectified in CAA statistics from July onwards".

Ns.4.1

- The noise envelope or what the Applicant calls the "*overall noise envelope*", the noise contour cap at Paragraph 1.18 of [REP8-018] is **not consistent with the regulatory**

requirements of CAA CAP 1129 Noise Envelopes[51] and therefore cannot be relied upon by the Applicant as a mitigation measure.

- The area has been set a Year 20 settings this is inappropriate and **will not act** as a mitigation measure in any way please see [TR020002-004487]

Ns.

Please see [AS-108] [AS-119] [AS-120] [AS-121] [REP4-037] [REP4-037] [REP4-051] [REP5-072] [REP5-074] [REP6-036] [REP8-063] [REP2-013] [REP5-121] [TR020002-004581] [TR020002-004487] [TR020002-004487] AND APPENDIX 9 AND APPENDIX 18

AIR SPACE CHANGE PROCESS (ACP)

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION

SUBMISSION TO DEADLINE 11:

Comments on Information requested by the ExA and received from the Applicant to Deadline 11

COMMENT ON RESPONSES TO EXA 4 WRITTEN QUESTIONS

AIR SPACE CHANGE PROCESS (ACP)

TIMING OF ACP

1. As the ExA will be aware the Applicant did not have to be the landowner to apply for airspace.
2. This was confirmed by the CAA response in answer to OP.1.5 [REP3-231] and in a letter from the CAA to the Applicant on 15 September 2017[1]
3. As the ExA will be aware the Applicant could have started the ACP process back in May 2017 at which time it was suggested that the Applicant "*could not afford to wait for a DCO decision before initiating ACP; the CAA did not disagree with this*" [REP2-013] at Page 290 and Appendix A2 Meeting with CAA Airspace Section 15 May 2017 of [APP-086]

[51] ERCD Noise Envelopes CAP 1129: **Appendix Ec.4.2**

4. As the ExA will be aware the Applicant started the ACP started on 14 January 2019 after the start of the Examination.

5. This meant that there was and is uncertainty about flight paths which form the basis of the Environmental Statement.

6. Pursuant to CAP1616, this means that airspace and flight paths will not be determined until at least 110 weeks from 14 January 2019.

7. There is a further complication to the ACP timeline as Manston is now part of FASI (S). One of the 16 Airport in the London Area.

8. All 16 Airports are to be at ACP Stage 1B (Design Principle) by July 2019[2].

FLIGHTPATHS and CAP1616

9. At 3.1.3 of the Statement of Common Ground [REP3-176] and [REP4-006] the CAA confirms that the Airspace Change Proposal shall be in accordance with CAP1616 Airspace Design Guidance on the regulatory process for changing airspace design including community engagement.

10. In addition, at 3.1.6 [REP3-176] the indicative flight paths (swathes) used in the DCO Environmental (EIA) and consultation will form the geographic scope for the airspace design options. A comprehensive list of design options will be developed and evaluated by Riveroak against set criteria and design principles (set through engagement with stakeholders) at Stage 2 of the CAP1616 process.

11. It is therefore unclear why the Applicant chose to use CAP1520 (Page 27, 68 [REP8-018] rather than CAP1616a as detailed in the Statement of Common Ground [REP3-176] and [REP4-006].

12. From December 2017, CAP1616a forms a technical annex to CAP 1616, Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements. This technical annex outlines relevant methodologies for use in environmental assessments relating to airspace change.

13. Paragraph 1.21 of CAP1616a states that: Contours should be portrayed from 51 dB LAeq, 16 hours (for daytime) and 45 dB LAeq, 8 hours (for nighttime) at 3 dB intervals. Department for Transport policy is that these values represent the Lowest Observed

Adverse Effect (LOAEL), the point at which it regards adverse effects begin to be seen on a community basis. In order to explain noise impacts, a table should be produced showing the following data for each 3 dB contour interval: area (km2) population (thousands) – rounded to the nearest hundred. Paragraph 1.22 It is sometimes useful to include the number of households within each contour, especially if issues of mitigation and compensation are relevant.

14. Clearly this has not happened.

15. We have submitted much evidence to call into question the validity of the Applicant's noise contours [REP8-XXX][3]

16. Further, we note that Natural England wrote to the ExA on 1 July 2019 submission at [REP10-XXX][4] titled Natural England's comments on the Report of the Implications for European Sites (REIS).

17. We note that at Line 9, Paragraph 2.1 of Page 2 of Technical Note Ec.4.2 [REP9-XXX][5] the Applicant states:

> "*The flight path* ***shown is very similar to the flight path previously used*** *which, based on the feedback from Natural England, would not result in disturbance of turnstone in Pegwell Bay*"

a) We respectfully reiterate that we do not believe the Applicant has provided evidence to validate its noise contours or to refute those submitted by Five10Twelve and produced by the CAA's ERCD.

b) We submitted a detailed evidence supported submission at Deadline 9 [REP9-XXX][6] to support the above statement.

c) Further evidence of the lack of validity of the Applicant's claims regarding its own noise contours and its rebuttal of those submitted by Five10Twelve is found here at Paragraph 2.1 in the Applicant's Appendix Technical Note Ec4.2 [REP9-XXX][7] submitted at Deadline 9 and Natural England's comments on the REIS submitted to Deadline 10 [REP10-XXX][8].

d) These submissions by Natural England and the Applicant confirm that an agreement has been reached between them on the basis that the Applicant's "***proposed flightpath is similar to that used by the previous Manston Airport***".

e) As the ExA will be aware, in its Technical Note ISH6-27 found at [REP8-015], Clarification Item 27, the Applicant sought to refute the noise contours submitted by

Five10Twelve and produced by the CAA/ERCD partially on its assertion that *"it is highly unlikely that the CAA would adopt the same flight paths as previously used".*

f) This therefore serves both as evidence which supports our own assertion that the previous Manston flight paths are entirely credible whilst also providing further evidence of:

- The Applicant's willingness to shape its argument and evidence according to which point it is trying to make and to which Statutory Body or stakeholder on which day;
- We respectfully remind the Examining Authority that in [AS-119], we provided evidence to refute the Applicant's assertions and confirm that the same flight paths as previously used as "*a credible option under CAP 1616 and FASI-S*" and were accepted by the CAA (ERCD) on this basis.

18. Further, in [REP10-XXX][9] it refers to the Applicant's Appendix Technical Note Ec4.2 [REP9-XXX][10] submitted at Deadline 9.

19. Natural England state at paragraphs 5/6 of [REP10-XXX][11]:

> "***Appendix Ec.4.2 demonstrates that the proposed flightpath is similar to that used by the previous Manston Airport,*** *and* ***the noisiest planes that used to fly from Manston would not be allowed at the new airport****. Therefore, although the previous airport caused fewer peak noise events, these would have been louder than would be produced by the proposed operations. As the previous disturbance study did not specifically note disturbance by commercial aircraft, even though the planes would have* caused greater peak noise events, this provides evidence for the *Applicant's assertions regarding the absence of impacts. Therefore, Natural England is* ***satisfied that Appendix Ec.4.2 provides sufficient evidence*** *to* ***resolve our uncertainty*** *over noise disturbance impacts on turnstones in Pegwell Bay. We accept that, for the reasons set out in* ***section 3 (Assessment) of the Appendix, an adverse effect on integrity can be ruled out***" (bold added for emphasis).

- The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed

development's potential adverse impacts (**including any longer term and cumulative adverse impacts**) as well as any measures to avoid, reduce or compensate for any adverse impacts (paragraph 4.4 Airport NPS).

- In this context, environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level (paragraph 4.5 Airport NPS).

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[1] Letter from CAA to applicant of 15 September 2017

[2] Manston Airport CAA Brief October 2018

[3] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR020002/TR020002-004581-Five10Twelve%20to%20RSP%20re%20Noise%20Contours_WITH_APPENDICES.pdf

[4] Natural England's comments on the Report of the Implications for European Sites of 1 July 2019 TR020002-004583

[5] *Ibid*

[6] TR020002-004581, Clarification Item 27, ERCD Noise Contour Comments

[7] Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019

[8] Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019

[9] Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019

[10] Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019

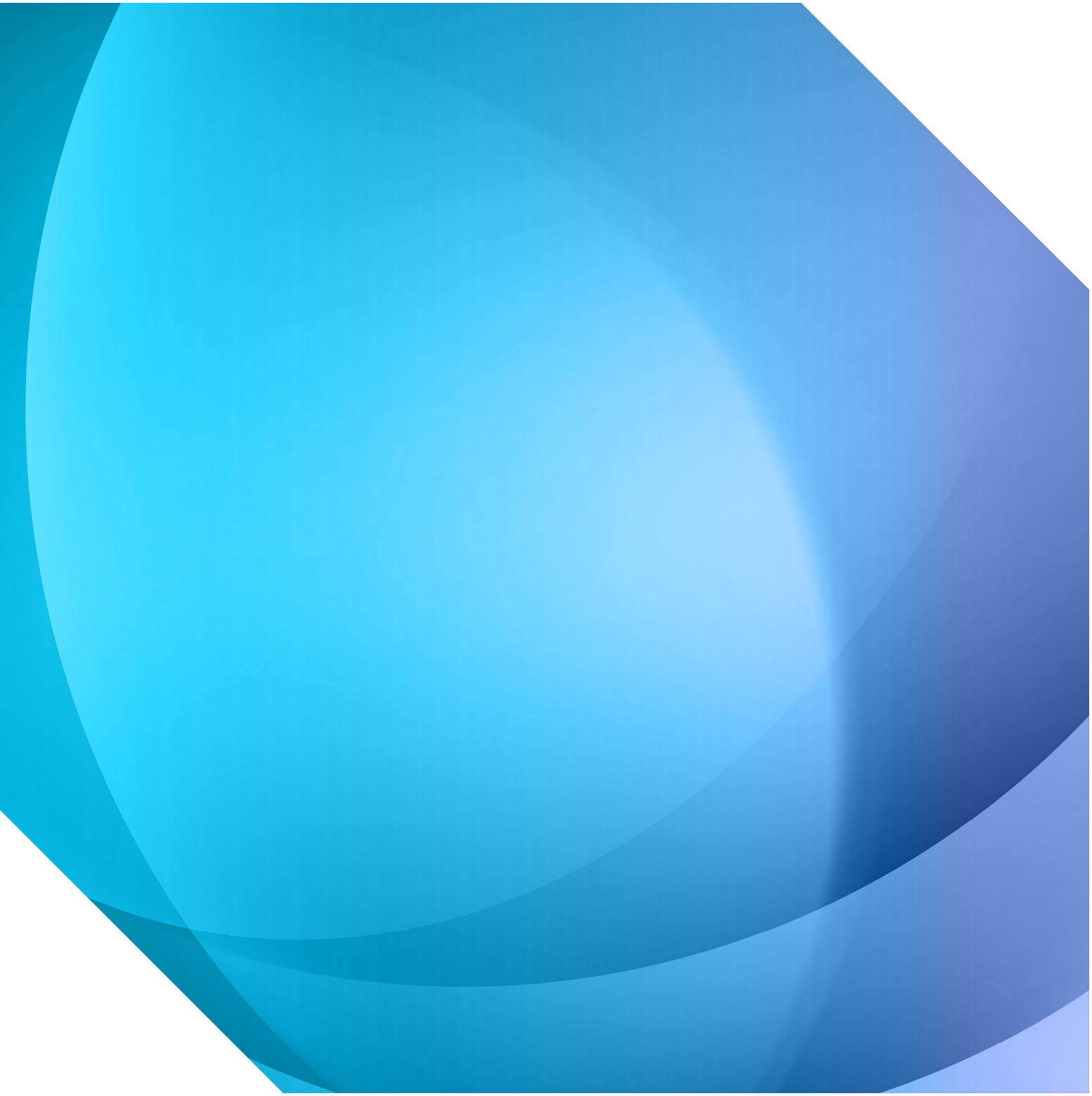
[11] Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019

Safety and Airspace Regulation Group

Civil Aviation Authority

Leeds Bradford Airport ACP2015-10

CAP 1805



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Airspace and ATM Aerodromes, Safety and Airspace Regulation Group, Aviation House, Gatwick Airport South, West Sussex, RH6 0YR

This document is available at: www.caa.co.uk/CAP1805

Contents

Executive summary

Objective of the proposal

This document details the UK Civil Aviation Authority's (CAA) decision regarding Leeds Bradford Airport's (LBA) Airspace Change Proposal (ACP) to introduce new Standard Instrument Departures (SIDs), Instrument Approach Procedures (IAPs) and to expand Controlled Airspace (CAS) around the airport. The ACP was submitted on 18th December 2018.

Summary of the decision made

1. The CAA has decided not to approve ACP 2015-10.

Next steps

2. Should the sponsor decide to address the issues identified, any future submission must follow the current ACP process as documented in Civil Aviation Publication 1616.

Decision process and analysis

Aims and objectives of the proposed change

3. LBA identified a requirement to update flight procedures and airspace around the airport as part of the Future Airspace Strategy Implementation (North) (FASI(N)) program and in response to European legislation[1] that requires airports to introduce new procedures that utilise Performance Based Navigation (PBN).

Chronology of proposal process

Framework Briefing

4. A Framework Briefing took place at CAA House, London on 23rd Sep 2016. During this briefing, LBA outlined its position. Having started the project in 2013, the sponsor highlighted that it believed that the current airspace was no longer fit for purpose, as the current procedures were not fully contained in controlled airspace. There was limited airspace for sequencing and there were issues in containing the increased volume of traffic. The sponsor confirmed that the initial conceptual design was too ambitious, too complex and would have had a significant adverse impact on other airspace users. LBA also stated it had concerns with regard to the maintenance of Doncaster Sheffield Airport's Class D airspace and how there was an assumption that this would be required to remain extant in order to progress their proposal. Other issues highlighted were the turnover of staff at the airport and the ongoing engagement with Prestwick Centre. Despite these issues, it was stated that RNAV SIDs, transitions and approach procedures had been developed in conjunction Prestwick Centre and the Prestwick Lower Airspace Systemisation team. Furthermore, due to the Section 106 Agreement granted by Leeds City Council, it was agreed to replicate the current SIDs in order to avoid changing the Noise Preferential Routes (NPRs).

Consultation

5. The consultation was started on 23rd June 2017 and was extended, through an Addendum Document, until 29th December 2017 due to some confusion regarding

[1] European Implementing Rule 2018/1048.

the details in the consultation material. An area of the proposed airspace encroached on several Parish Councils that had not been included in the initial distribution of consultation notifications. Having been advised of the omission by the CAA, the sponsor resisted further engagement until pressed. It is stated in the Consultation Feedback Report that the Consultation Document, was circulated to 408 organisations and individuals, including the MOD, airlines, aircraft operators and many national bodies representing the aviation community, such as the National Air Traffic Management Advisory Committee (NATMAC). Sixteen responses were received from these consultees and a further 429 responses were received from other individuals, members of the GA community and other organisations.

Submission of Airspace Change Proposal

6. The formal ACP was submitted to the CAA on 18th December 2018. It was published on the CAA's website to ensure process transparency. However, there were a number of associated documents (enclosures) omitted at the time of submission. As a result of this, the assessment did not commence until 21st Jan 2019. The assessment process raised the requirement for the CAA to be provided with further information and a meeting was held at CAA House on 6th February 2019 in order to raise questions with the Change Sponsor. The CAA then identified inadequacies in the consultation process because of this meeting and its ongoing assessment of the ACP.

CAA analysis of the material provided

7. As a record of our analysis to date, with regard to this ACP, the CAA has produced:

   - A Consultation Assessment.

This assessment has been published on the CAA Website.

CAA assessment in respect of operations and the environment

8. The CAA considered the airspace change proposal and all the consultation material(s) submitted. The CAA is satisfied, owing to the recommendations that have resulted from the consultation assessment, that there is no requirement to conclude an operational or an environmental assessment at this stage.

CAA assessment and decision in respect of consultation

9. The Consultation Assessment was undertaken with reference to the Gunning Principles[2] and Government Consultation Principles[3].

10. The CAA Consultation Assessment[4] details the reasons for the failings of the consultation process. The key elements that did not meet the regulatory standards are as follows:

    a) The justifications for the changes were presented ambiguously and were difficult to comprehend[5].

    b) The Operators and Owners of all classes of aircraft[6] who participated in the consultation did not have their concerns, which were raised in the consultation process, conscientiously considered and mitigated adequately.

    c) Consultations should be informative[7] and provide enough information for those participating to understand the issues. The diagrams presented in some of the submitted documents do not accurately portray the impact of the change to the communities involved.

Explanation of statutory duties

11. The CAA has a regulatory duty to assess all ACPs, against Section 70 of the Transport Act 2000.

[2] Gunning Principles (R v. London Borough of Brent ex parte Gunning [1985] 84 LGR 168)

[3] Cabinet Office Consultation Principles: Guidance 2016

[4] CAA Consultation Assessment for ACP 2015-10

[5] Second part of the Gunning Principles

[6] s70(2)(a) Transport Act 2000

[7] Cabinet Office Consultation Principles

CAA's regulatory decision

12. As a result of the inadequacies of the consultation element of this ACP and noting the anticipated impacts on the material factors we are bound to take into account, the CAA must exercise its duty in accordance with s.70 of the Transport Act 2000. The CAA has decided not to approve this ACP.

Conditions

13. None; any further application will be progressed under the CAP 1616 process.

Title of Airspace Change Proposal	**Leeds Bradford Airport (LBA) (ACP-2015-10)**
Change Sponsor	**LBA (Osprey CSL as project management)**
SARG Project Leader	[redacted]
Case Study commencement date	**08/04/2019**
Case Study report as at	**23/04/2019**
File Reference	**ACP-2010-15**

Instructions

In providing a response for each question, please ensure that the 'Status' column is completed using the following options:

- **Yes**
- **No**
- **Partially**
- **N/A**

To aid the DAP Project Leader's efficient Project Management it may be useful that each question is also highlighted accordingly to illustrate what is resolved Green **not resolved** Amber or **not compliant** Red as part of the DAP Project Leader's efficient project management.

1.	Consultation Process	Status
1.1	**Is the following information complete and satisfactory?**	
	• A copy of the original proposal upon which consultation was conducted.	YES
	• A copy of all correspondence sent by the sponsor to consultees during consultation.	YES
	• A copy of all correspondence received by the sponsor from consultees during consultation.	YES
	• A referenced tabular summary record of consultation actions.	YES
	• Details of and reasons for any changes to the original proposal as a result of the consultation.	YES
	• Details of further consultation conducted on any revised proposal.	YES

1.2	**Were reasonable steps taken to ensure all necessary consultees actually received the information e.g. postal/e-mail/meeting fora?**	**YES**
	The sponsor undertook a comprehensive set of briefings in anticipation of the consultation through the airport Consultation Committee and other fora. Whilst some stakeholders questioned the level of publicity, on balance, the sponsor achieved an acceptable level of publicity.	
1.3	**What % of all operational consultees replied? (Include actual numbers).**	**16(3.9%)**
	There were no responses to the consultation from airport operators, although that can be attributed to the relatively benign nature of the proposal for those operators. MoD responses were channelled through DAATM via NATMAC. Of the targeted stakeholders, only 2 of 19 identified Aerodromes, Clubs and Flying Clubs sent responses. Of interest, a further 10 aerodromes, Flying Schools and Flying Clubs submitted responses; that calls into question the stakeholder identification process. More significantly, other airspace users challenged the proposal on the grounds of justification, proportionality and access with GA and NATMAC organisations forming the body of response endorsed by local clubs through the Regional Airspace Users Working Group. A large number of responses were also received by private pilots (252) objecting to the proposal.	
1.4	**What % of all environmental consultees replied? (Include actual numbers).**	**4 (1.29%)**
	Of those environmental stakeholders identified, the response was extremely low. That said, a number of affected community representatives engaged strongly on behalf of their local populace and continue to do so. Only 1 MP out of 30 MPs consulted responded to the consultation. Three non-aviation bodies supported the proposal, on economic grounds whilst other responses voiced concerns over environmental impact borne from the technical nature of the information presented in the consultation document. A further 144 responses from private individuals/interested bodies were received, with the majority objecting to the proposal on environmental grounds.	
1.5	**Were reasonable steps taken to ensure as much substantive feedback was obtained from the consultees e.g. through follow-up letters/phone calls?**	**NO**
	The sponsor maintained an ongoing dialogue with the stakeholders concerned. In certain cases, however, the response time for feedback was inadequate leading to antagonism from stakeholders which slowed the progress of the proposal. Whilst the sponsor subsequently extended the response period, this occurred following pressure from the CAA.	
1.6	**Have all objections to the change proposal been resolved (or sufficiently mitigated)?**	**NO**
	The objections to the proposal fell into a number of categories:	

	- **Justification.** The sponsor explained that change was required due the current situation being unsustainable, that future growth predictions required change, and that DVOR rationalisation/PBN/FASI(N) made change inevitable. Whilst the latter justifications were entirely valid, the issues surrounding current situation/future expansion were not adequately justified and the subsequent responses to stakeholders were ambiguous and indicated a reactive approach by the sponsor. The publication of safety-related incidents did not clearly establish a causal link to airspace structure. - **Proportionality.** The sponsor chose to justify the final airspace design on the containment requirements for the IFP designs submitted, most notably for the CTAs proposed for the north and east of the area. These CTAs were considered most contentious by GA stakeholders, as they allegedly introduced barriers to operations for non-radio/non-transponder equipped. That effectively precluded cross-country gliding operations from a number of sites. The sponsor's suggested mitigation, that access was available for those who participated in ATC, was insufficient given that those GA organisations raising the objection clearly stated that the impact would be on those unable to participate in ATC. Whilst the sponsor also looked to mitigate the issue through Letters of Agreement, the issue of cross-country gliding/paragliding/hang-gliding has not been adequately addressed. It is significant that the sponsor did not appear to reassess IFP designs in order to further mitigate impact or attempt to reduce the volume of airspace requested, nor at this time have those original designs been formally validated. Consequently, if those designs fail to validate, for whatever reason, it is likely that further consultation would be required, as redesign may materially change aircraft tracks over the ground. - **Complexity.** A large number of respondents to the consultation objected to the complexity of the airspace design and the number of different CTA/CTRs proposed. That said, the complexity occurred due to the interface with the en-route airspace above the proposed airspace rather than below; consequently, this was adequately explained by the sponsor. In addition, environmental stakeholders commented on the technical complexity of the consultation material. It is notable that the consultation material contains a large number of technical IAP plates/environmental impact diagrams that have very little explanation for those without detailed subject knowledge. The inclusion of an existing turbo-prop aircraft route in the original consultation document, but then not subject to the proposal, further exacerbated the issue and, in part, lead to the addendum consultation.	

	- **Impact on other airspace users**. In addition to the issues raised by the gliding/hang-gliding/paragliding stakeholders, the issues raised by consultees of 'choke-points', funnelling and access were largely dismissed by the sponsor. Despite the offer by the sponsor of a revision to the 'Upton Corridor' and various Letters of Agreement, none of these activities have been concluded. The only firm mitigation offered by the sponsor remains that those 'participating in ATC' would not be inconvenienced by the proposal, despite the submission of the ACP some considerable time ago. Whilst the sponsor has suggested an additional radar position to facilitate access to the revised airspace, the sponsor has not submitted evidence of previous refusal rates against which future access could be judged. Accommodations for the MoD have been made, but that fails to address the concerns of non-radio/non-transponding users. - **Process.** Overall, the sponsor has attempted to follow the CAP 725 process, although a number of stakeholders objected based on the requirements of CAP 1616; the CAA authorised the project to be undertaken under CAP 725 process given its long gestation period as a legacy proposal developed under previous guidance; consequently; these objections are dismissed. Requests from stakeholders for the publication of all consultation responses (iaw CAP1616) do not accord with CAP 725 practice whereby raw responses are submitted to the CAA, but consultees are given an assurance that responses/personal data will not be published without permission in accordance with extant Data Protection legislation. A number of complaints have been raised due to the sponsor's inability to meet potential documentation publication dates for consultation material; these are administrative issues that would not compromise the conduct of the consultation in itself; the content and conduct in accordance with accepted consultation principle/Gunning is more relevant. However, a number of process issues have arisen. The proposal involves reducing the base of CAS to the East of the airport from FL125 to 3,500ft above mean sea level (amsl). The sponsor failed to identify environment stakeholders within that area and they were not included in the formal consultation. Once this omission was identified, the sponsor engaged those Councils affected. However, the stance taken by the sponsor was that the noise impact at 4,500ft amsl (the minimum altitude for aircraft in that proportion of airspace) was 'not significant'. Current Government Air Navigation Guidance specifies that aircraft noise is no longer significant at or above 7000ft amsl and it is disappointing that the sponsor chose to dismiss concerns on this basis.	

A number of diagrams within the Consultation Feedback document presented pie-charts with a number of segments that did not match the number of stakeholder groups described in the associated key. Whilst this seems a minor point and a potentially simple oversight, it does not provide an accurate synopsis of the consultation outcome that leads to the inference that the consultation was not rigorously assessed, nor were stakeholders adequately appraised of the outcome.

In assessing the consultation, the Gunning Principles apply:

- **Consultation must take place when the proposal is still at a formative stage**

The airspace design was presented to the CAA is largely as consulted upon and shows little attempt at modification. The Consultation Feedback document itself generally categorises objections as unworkable stating that sponsor will not consider modification. Whilst some mitigations are offered, they are generally aimed at those airspace users able to participate with an ATS service and does not cater those who cannot. This is specific to the loss of amenity for cross-country gliding/para-gliding activity to the North of the airport. Whilst the strategic options in the consultation were 'do nothing' etc, stakeholders were presented with one option, ostensibly the proposal presented for regulatory assessment.

- **Sufficient reasons must be put forward for the proposal to allow for intelligent consideration and response**

The justification for this proposal was presented ambiguously and has changed dependent on responses to questions by stakeholders. The initial premise was that the existing airspace was insufficient for current operations, yet these operations continue in a safe manner. The table of safety-related incidents presented does not relate to airspace issues in the majority of cases. Reference to growth and airport infrastructure issues have been challenged as unsubstantiated, and not adequately explained by the sponsor; references to FASI(N) and DVOR are entirely valid but are obscured by an emphasis on those other factors. The sponsor has failed to present a coherent and consistent justification for change.

- A**dequate time must be given for consideration and response**

In a specific case, the sponsor conducted a Q&A meeting with a local Parish Council having refused requests for a public meeting. The meeting was held on 29 November 2017 (a Wednesday). The response window for stakeholders was effectively limited to 48-hours to accord with the intention of concluding the consultation. Whilst this period was subsequently extended following pressure from stakeholder groups, the initial intentions of the sponsor did not fulfil the Principle

- **The product of consultation must be conscientiously taken into account.**

As previously stated, the proposal presented is largely as consulted upon, and does not mitigate the objections of certain GA groups, specifically the BHPA whose members are unable to participate in clearance-based access to CAS. Whilst there is reference to Letters of Agreement, these refer to the presented airspace design, rather than amending the overall proposal; that indicates that sponsor does not wish to compromise. From the evidence submitted by stakeholders and the response by the sponsor, it is apparent that the sponsor believes that the accommodation of some GA stakeholders is forfeit; whilst it may be the case when there are no alternate circumstances pursuant with s70 of the Transport Act 2000, that does not accord with the spirit of the process.

There is a large amount of raw data concerning the interaction between the airport and the two communities directly affected by departures from Runway 32. Much of the acrimony associated with this engagement regards the distribution of aircraft within the agreed s106 Noise Preferential Route (NPR); it is a longstanding concern of the communities involved and revolves around route deviation and airport expansion. Route deviation is a justified major concern in the Proposal and due to the depiction of routes in the original consultation document, led to confusion and the requirement to issue an addendum consultation document. Airport expansion is not a direct reason for airspace change in itself, but the sponsor used future expansion within its consultation material, thus confusing stakeholders.

A large number of objections associated with the consultation refer to administrative matters that do not directly compromise the consultation being assessed, and it is regrettable that these objections have consumed time and effort, when the proposal should

be assessed against s70 the Transport Act 2000. The Consultation Feedback Document refers to the overall consultation period but does not acknowledge the fact that extensions to the original period were forced rather than offered.

In respect of the Selby area, the sponsor was resistant to carrying out engagement despite advice by the Regulator at that time.

This Consultation is also assessed against 'Government Consultation Principles (2016): it is accepted that revised Consultation Guidance was re-issued in 2018; however, the proposal was consulted upon under the previous guidance

- **Consultations should be clear and concise:** In this case, the sponsor was required to conduct an addendum consultation due the lack of clarity in the original consultation material. Once submitted, technical experts required further clarification of the procedures being proposed leading to the conclusion that the layperson would have difficulty in assimilating the impact of the proposal.
- **Consultations should have a purpose.** The purpose referred to in this case is to seek feedback on a proposal when it is at a formative stage (see Gunning Principle 1), not because the process requires it. Regrettably the CAA's view of the sponsor's reticence to engage, suggests to the latter.
- **Consultations should be informative.** Informative refers to providing information to stakeholders that can be understood and can allow a clear opinion to be formed. A number of diagrams in the consultation material are unintelligible unless the reader has specific airspace/environmental knowledge.
- **Consultations are only part of a process of engagement.** The sponsor continues to engage with stakeholders.
- **Consultations should last for a proportionate amount of time.** Whilst the sponsor fulfilled the basic requirement of CAA/Gov't guidance/requirements, extensions to consultation periods required due to changing circumstances were resisted by the sponsor.
- **Consultations should be targeted**. The sponsor failed to identify a swathe of stakeholders in the Selby area who could be potentially affected by the change. Once this error was identified, the sponsor was reticent to engage. Once the sponsor did engage, the mitigation offered was that aircraft noise at 4,500ft amsl was not considered 'significant'. ANG states that aircraft noise is only no longer of significance at or above 7000ft amsl.

	• **Consultations should take account of the groups being consulted.** Whilst objections have been raised concerning the manner in which the sponsor engaged with certain communities, the is no evidence to suggest that the sponsor disadvantaged any specific group.	

Outstanding Issues		
~~Serial~~	~~Issue~~	~~Action Required~~
1		
2		

Additional Compliance Requirements (to be satisfied by Change Sponsor)	
Serial	Requirement
1	
2	

Recommendations	Yes/No
Does the Consultation Report and associated material meet SARG requirements?	NO
The consultation activity does not satisfy CAA requirements.	

General Summary

Whilst the sponsor discussed various initial options such as 'Do Nothing' etc, the consultation focused on a single proposal that, in hindsight, the sponsor did not wish to change as evidenced by its reticence to fully consider other options proposed by other airspace users. The sponsor was also resistant to guidance when it came to extending consultation or for providing addition avenues for engagement. This led to the CAA's view that the sponsor was just 'ticking boxes'. The proposal fails on a number of the Gunning Principles and so the CAA cannot approve this airspace change. Moreover, there are concerns that compliance with ANG and Gov't Consultation Principles are weak or non-compliant. Consequently, it is considered that this consultation is non-compliant.

Comments & Observations

A number of activities concerning IFP validation and draft Letters of Agreement have yet to be undertaken by the sponsor despite the proposal being submitted a significant time ago. That would also preclude approval of the proposal at this time.

Consultation Assessment Sign-off/ Approvals	Name	Signature	Date
Consultation Assessment completed by:	[redacted] **Airspace Regulator**		23/04/2019
Consultation Assessment approved by:	[redacted] **Mgr AR**	[redacted]	17/05/2019
Mgr AR Comments: The approach detailed above would not lead to a consultation that is acceptable to the CAA. The CAA requires evidence of a robust and transparent consultation exercise; this has not been provided. I support the conclusion reached by the Airspace Regulator; the consultation is not good enough to approve.			

Hd AAA Comment/ Approval	Name	Signature	Date
Consultation Assessment Conclusions approved:	[redacted] **Hd AAA**	[redacted]	21/05/2019
Hd AAA Comments: This ACP Fails as the consultation falls short of that which is required.			

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION

SUBMISSION TO DEADLINE 11:

Comments on Information requested by the ExA and received from the Applicant to Deadline 10

REGISTER OF ENVIRONMENTAL ACTIONS [REP8-018]

HEALTH & WELL BEING

1. We respectfully note that the Health & Well-Being mitigation proposed by the Applicant of *Good Quality Employment Generation* Page 87 of the Updated Register of Environmental [REP8-018] is **not anchored in any proposed plan or in the DCO** and as such these columns have been left blank.
2. A Unite the Union search for 'airport' lists a large number of industrial actions of 2018/2019 which we have attached a small selection to this submission. These evidence the low pay, long hours, shift patterns and zero hours of airports up and down the country in a wide range of positions.
3. The evidence for the conclusion reached of the post-mitigation effect in the Updated Register of Environmental Actions [REP8-018] is no longer valid as it is not supported by evidence, is without foundation and cannot be relied upon.
4. **We robustly recommend the Examining Authority recommend that the Applicant's proposed mitigation Health & Well-Being:** *Good Quality Employment Generation* **would be Negligible Beneficial**.
5. **Further, we question whether the Examining Authority can give any comfort to the Secretary of State that such benefits are secured, and the level of confidence in their delivery.**

The guards staff all the vehicle barriers into Gatwick's service areas. Any strike action will disrupt supplies, fuel and materials entering the airport as well as causing knock-on disruption to the surrounding road network.

Unite has begun a consultative ballot of the workforce today (January 21) closing on Monday 4 February. If the workforce gives their backing for industrial action, a full industrial action ballot will take place and strike action will begin this spring.

£1 an hour increase

Unite is seeking a pay increase for the workers, of a £1 an hour which would raise their pay to £9 an hour. OCS has offered the workers a 4.5 per cent pay increase but this has been rejected by the entire workforce.

Workers treated with disdain

Unite regional officer Jamie Major said: "The hardworking and dedicated staff have kept the airport secure for years, but their loyalty has been treated with disdain by management.

"As the workers have not received a rise for over a decade, they would need a 40 per cent pay increase to restore their earnings to the real terms level it was in 2007.

"All the workers are asking for is a £1 an hour rise to increase their pay to £9 an hour.

"There is absolutely no justification for OCS to refuse this very modest pay rise and it's a disgrace how these workers have been treated."

ENDS

Notes to editors:

Gatwick Airport Christmas strike off following vastly improved pay offer (https://unitetheunion.org/news-events/news/2018/december/gatwick-airport-christmas-strike-off-following-vastly-improved-pay-offer/)

Glasgow Airport ‘severely disrupted’ as more strikes scheduled

Friday 7 June 2019 **Share**

Unite the union has today (7 June) stated that the industrial action taking place between 04:00-16:00. has ‘severely disrupted’ operations at Glasgow Airport as further strike dates were announced. The action undertaken involves airport security officers, airport fire safety, airfield operations officers, and engineering technicians.

Unite confirmed another six hour stoppage on 21 June from 08.30 to 14.30. This is in addition to the following stoppages:

- 10 June between 04.00-16.00
- 14 June between 04.00 and 08.00

The union has also lambasted the false statements by Glasgow Airport alleging that Unite was not willing to enter further talks. Unite can confirm that communications to airport management on 5 June stated that the union was willing to 'discuss this and other matters relating to the dispute on pay and pensions in an attempt to find a remedy prior to the industrial action'. These overtures were ignored by Glasgow Airport management. The airport is part of AGS Airports Limited group, which also owns Aberdeen and Southampton airports.

The dispute centres on Glasgow Airport withdrawing from negotiations over its proposal to close its pension scheme to existing members. The decision broke an existing Acas agreement made in 2016, which has already saved AGS £12 million in the last three years. Glasgow Airport posted a £74 million profit after tax in 2017 up from £51 million in 2016.

Pat McIlvogue, Unite regional industrial officer, said: "The industrial action has severely disrupted Glasgow Airport's operations, despite the underhand tactics by management which included substituting fire safety officers with other staff on site who were questionably trained for the job. It's a shame that passengers' travel has been disrupted but this is 100 per cent the fault of Glasgow Airport management.

"For the avoidance of doubt, Unite has repeatedly requested meetings with management and can categorically prove that we wanted to meet any time this week to try and find a resolution to this dispute. But, our overtures have been completely ignored which is why we have added further dates for industrial action. If we continue to be ignored then we will have no option but to escalate this dispute."

ENDS

For more information contact Pat McIlvogue on (07918631805).

Notes to editors:

- Unite Scotland is the country's biggest and most diverse trade union with around 150,000 members. The union is led in Scotland by Pat Rafferty.

Further reading

Glasgow Airport strikes suspended as new offer put to workforce (/news-events/news/2019/july/glasgow-airport-strikes-suspended-as-new-offer-put-to-workforce/)

Stansted easyJet ‘check-in chaos’ moves a step closer as workers back strike action by 100 per cent (/news-events/news/2019/july/stansted-easyjet-check-in-chaos-moves-a-step-closer-as-workers-back-strike-action-by-100-per-cent/)

Unite confirms Aberdeen Airport dispute over (/news-events/news/2019/july/unite-confirms-aberdeen-airport-dispute-over/)

McCluskey: Reject Brexit division and unite for a Corbyn government (/news-events/news/2019/june/mccluskey-reject-brexit-division-and-unite-for-a-corbyn-government/)

Aberdeen Airport strike action to go ahead after pay offer rejection (/news-events/news/2019/june/aberdeen-airport-strike-action-to-go-ahead-after-pay-offer-rejection/)

Heathrow expansion ‘masterplan’ important step on the road to creating thousands of jobs, says Unite (/news-events/news/2019/june/heathrow-expansion-masterplan-important-step-on-the-road-to-creating-thousands-of-jobs-says-unite/)

Stansted easyJet ‘check-in chaos’ on cards, as workers ballot for strike action over ‘dismal’ pay (/news-events/news/2019/june/stansted-easyjet-check-in-chaos-on-cards-as-workers-ballot-for-strike-action-over-dismal-pay/)

Further industrial action dates announced for Aberdeen Airport (/news-events/news/2019/june/further-industrial-action-dates-announced-for-aberdeen-airport/)

Winning, organising, growing

This is what we do best as a union. Fight for our members, for their jobs, for their working conditions, for the future of their communities”

Len McCluskey

Low paid cleaners call for a living wage at Luton Airport

Tuesday 7 August 2018 **Share**

Over 100 low paid cleaners at Luton Airport employed by Sasse Group are calling for their pay to be brought in line with the real living wage of £8.75.

The workers who are responsible for maintaining a safe and clean environment for staff and passengers at Luton Airport are currently struggling to make ends meet on the minimum wage of £7.83. Sasse has offered to increase their pay by between 15p and 20p an hour, well below the real Living Wage.

The cleaners are the second group of workers at Luton airport to demand fair pay.

The cleaners have joined with staff at Luton Airport responsible for helping disabled passengers. The workers employed by Clece Care Services are on a toxic combination of zero hours and the minimum wage. The workers have taken a brave stand by taking two periods of strike action.

Unite regional officer Jeff Hodge said: "Growing passenger numbers at Luton mean that keeping the airport safe and clean for staff and passengers is hard work. Cleaners deserve a living wage so they can afford the day-to-day essentials.

"Profits are up for Sasse and Luton Airport. Together they must address the scourge of low pay for cleaners at the airport. The cleaners have been angered by a paltry pay offer of just 15p an hour for the day shift and 20p for night shift workers.

"Workers employed by Clece to provide services to disabled passengers at Luton are also in a battle for fair pay at Luton. They are on a toxic combination of zero hours and the minimum wage.

"With healthy profits and growing passenger numbers, Luton and its contractors have no excuse for paying workers below the real Living Wage."

ENDS

Unite is a union that campaigns for and delivers better pay and conditions for its members. Unite is winning at work based on three core values. Secure Work: fighting for jobs and job security, Strong Voice: a union which is a respected voice at work and Decent Pay: a union focused on pay and conditions.

- Unite is Britain and Ireland's largest trade union with over 1.4 million members working across all sectors of the economy. The general secretary is Len McCluskey.

For more information contact Ciaran Naidoo 07768 931 315

Winning, organising, growing

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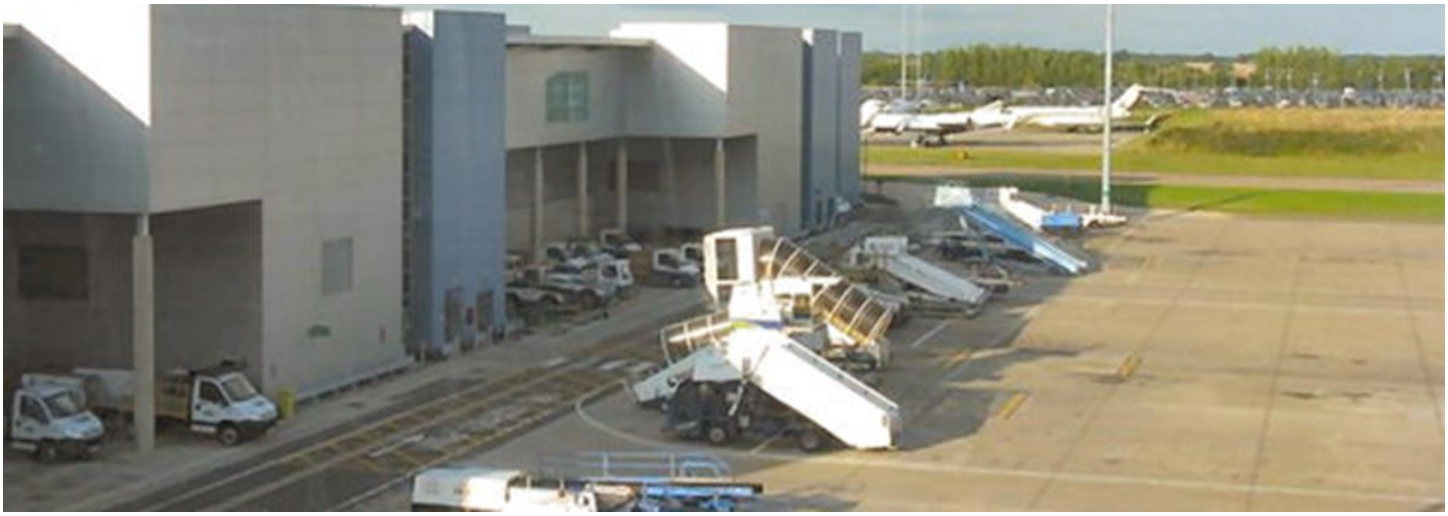

Luton Airport's baggage handlers and check-in staff in strike vote over pay freeze

Wednesday 30 January 2019 **Share**

Baggage handlers and check-in staff employed by Azzurra Ground Handling at Luton Airport will begin voting for industrial action today (Wednesday 30 January) over the company's decision to impose a pay freeze on hardworking staff.

Unite, which represents the majority of workers at Azzurra, submitted a pay claim at the beginning of 2018 but despite numerous attempts to get meaningful pay talks underway the company has refused to engage with the workforce.

Azzurra provides ground-handling services to Wizz Air at Luton Airport. Wizz Air is a low-cost airline with around 42 routes from Luton.

Unite regional officer Jeff Hodge said: "Luton Airport is one of the busiest airports in the UK and Azzurra should be recognising the contribution baggage handlers and check-in staff make by increasing pay so workers can keep up with the rising cost of living.

"The union has been calling for meaningful talks since the beginning of 2018. Azzurra's failure leaves workers with no other choice but to begin a ballot for strike action. If a strike goes ahead it will lead to considerable disruption to flights out of Luton. We hope the company will now sit down with the workers' representatives and resolve this dispute."

Cleaners at Luton Airport employed by Sasse recently voted to end their strike over pay after the workers voted to back an improved pay offer from the company. Cleaners on the day shift will receive an increase of five per cent and night shift workers will get a six per cent increase backdated to October 2018 up to April 2019, followed by a three per cent increase for the day shift and a four per cent increase for the night shift from April 2019 to April 2020.

ENDS

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Further reading

Glasgow Airport strikes suspended as new offer put to workforce (/news-events/news/2019/july/glasgow-airport-strikes-suspended-as-new-offer-put-

Luton borough council must intervene to end low pay at Luton Airport

Monday 5 November 2018 **Share**

WHAT: Protesters to urge council to intervene in Living Wage row at Luton Airport

WHEN: Tuesday 6 November 2018 between 17:00-18:00

WHERE: Outside Luton Town Hall,George St, Luton, LU1 2BQ

Workers will hold a protest to call on Luton borough council, the majority shareholder and landlord at Luton Airport, to use its influence to press the airport to become a Living Wage employer.

Low paid cleaners employed by Sasse and workers employed by Clece Care Services who help passengers with mobility difficulties are fighting for at least a real Living Wage of £9.00 an hour and dignity at work. Ahead of a meeting of the full council workers will stage a protest outside the town

hall to insist the airport's contractors pay the real Living Wage.

This week is Living Wage Week. The Living Wage Foundation has today (5 November) announced an increase in the real Living Wage by 35p an hour to £10.55 in London and by 25p to £9 outside the capital (see notes to editors).

Unite regional officer Jeff Hodge said: "The council and the airport must take responsibility now for ending the scourge of low pay at Luton Airport. As a majority shareholder and landlord Luton council must do all it can to persuade Luton Airport to become a real Living Wage employer for all workers at our airport. We have had very positive discussions with the council who fully support our objectives but our members want to see action.

"Luton Airport announced profits of almost £40 million, carried more than 16 million passengers in 2017 and is undergoing a £160 million redevelopment. Workers directly employed by the council and the airport are paid at least the real Living Wage. There is no excuse for allowing contractors at the airport to pay workers so poorly that they can't afford the day to day essentials."

Unite members employed by Clece Care Services have voted to take strike action for a second time and will take a week of strike action from Thursday 8 November beginning at 05:00 until Thursday 15 November ending 17:00. The Clece Care Services' workforce at Luton Airport, who are responsible for helping passengers with mobility restrictions, including disabled passengers, are on a toxic combination of zero hours and the minimum wage.

Cleaners began voting on strike action last week. The workers employed by Sasse who are responsible for maintaining a safe and clean environment for staff and passengers at Luton Airport are currently struggling to make ends meet on the minimum wage of £7.83. Sasse which was awarded the contract by Luton Airport in April this year has offered a three year pay deal to increase workers' pay, but by 2021 workers will still be earning below the real Living Wage.

ENDS

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The Living Wage Foundation publishes the Living Wage figure: an hourly rate, set independently every year, and updated annually in November. It is calculated according to the cost of living and gives the minimum pay rate required for a worker to provide their family with the essentials of life.

For more information contact Ciaran Naidoo 07768 931 315

Further reading

Glasgow Airport strikes suspended as new offer put to workforce (/news-events/news/2019/july/glasgow-airport-strikes-suspended-as-new-offer-put-to-workforce/)

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Mitie workers vote for industrial action in Sellafield and City airport disputes

Monday 8 April 2019 **Share**

Troubled outsourcer Mitie is facing fresh disruption as members of Unite, the UK and Ireland's largest union, have voted for industrial action in separate disputes at London City airport and at the Sellafield nuclear reprocessing centre in Cumbria.

Sellafield dispute

The Sellafield dispute concerns pay and involves workers employed as security guards, catering, vending and laundry operatives. The workers at the category one nuclear site are paid just £8.45 an hour.

Despite overwhelmingly rejecting Mitie's pay offer, the company has refused to allow Unite a seat at the negotiating table and, therefore, the union undertook an industrial action ballot.

Unite's 180 members voted by 98 per cent in favour of strike action on a 70 per cent turnout.

Two periods of 10 day strike action

Unite has announced two 10 day periods of strike action the first beginning at 00:01 on Friday 19 April, concluding at 06:00 on Monday 29 April 2019, followed by a further strike beginning at 00:01 on Saturday 4 May, concluding at 06:00 hours on Monday 13 May. This will be complimented by a discontinuous ban on overtime commencing at 00:01 on Friday 19 April 2019.

Unite regional officer Ryan Armstrong said: "Mitie is a multi-million pound company that is refusing to pay workers even the living wage, on a high security site.

"Our members are no longer going to accept poverty wages and if Mitie wants to prevent huge disruption at the complex, then it needs to make a fair pay offer."

Action at London City Airport

Unite members employed by Mitie at London City Airport are also set to take action in a dispute over pay, conditions, recognition and welfare facilities. The workers are employed as security guards and providing assistance to workers with mobility issues.

The workforce is seeking a significant pay increase, enhance rates of pay for overtime and improved sick pay. They are also demanding that Mitie recognises Unite and that adequate rest break facilities are provided. Currently workers have just a 45 minute break, but their restroom is a 15 minutes walk away from their workplace.

Workers voted 100 per cent in favour of industrial action on a 69 per cent turnout.

Unite regional officer Michelle Cook said: "Mitie is treating its workforce with complete contempt. Workers are being subjected to low pay and third rate conditions.

"Mitie is drinking in the last chance saloon and if it wants to avoid industrial action then they need to immediately enter into meaningful negotiations and properly address the workers concerns."

Meanwhile, in a further example of Mitie industrial unrest, Unite members employed at Southampton hospital as security guards held the first of eight days of industrial action last Friday (8 April) in a dispute over safety, pay and sick pay. (/news-events/news/2019/march/southampton-hospital-security-staff-strikes-to-go-ahead-as-talks-over-lack-of-correct-protective-equipment-break-down/)

Mitie has failed to provide the security guards with stab vests despite the workers coming under frequent attack from patients and hospital visitors.

The workers are paid just £8.64 an hour and only receive sick pay if they can prove that they were injured at work.

There will be seven days of strike action with further 24 hour strikes on 19 April and 24 May. There will also be a 48 hour stoppage starting on 3 May and a further 72 hour strike on 7 June. All the strikes start at 00.01.

ENDS

Notes to editors:

For more information please contact Unite senior communications officer Shaun Noble (mailto:shaun.noble@unitetheunion.org) on 020 3371 2060 or 07768 693940. Unite press office is on: 020 3371 2065

- Unite is Britain and Ireland's largest union with members working across all sectors of the economy. The general secretary is Len McCluskey.

Further reading

Glasgow Airport strikes suspended as new offer put to workforce (/news-events/news/2019/july/glasgow-airport-strikes-suspended-as-new-offer-put-to-workforce/)

Stansted easyJet 'check-in chaos' moves a step closer as workers back strike action by 100 per cent (/news-events/news/2019/july/stansted-easyjet-check-in-chaos-moves-a-step-closer-as-workers-back-strike-action-by-100-per-cent/)

Unite confirms Aberdeen Airport dispute over (/news-

More strikes planned against 'heavy–handed' management at Luton Airport

Monday 20 May 2019 **Share**

Security guards employed by London Luton Airport will step-up their campaign against 'heavy-handed' shift changes with 12 consecutive days of strike action, including the bank holiday weekend.

The security guards responsible for searches, baggage checks and general security across the airport will strike for 12 days from Thursday 23 May at 04:30 until Monday 3 June at 20:59.

London Luton Airport is attempting to push through a new shift pattern affecting around 120 security guards which forces them to work an extra 15 days a year and will only get nine free weekends a year.

The previous series of strikes at the beginning of the month caused significant delays at Britain’s fifth busiest airport. The union has called on the airport to suspend the implementation of the new shift pattern to allow further talks.

A record 16.6 million passengers used Luton airport last year. Unite believes the recruitment of security staff has not matched increasing passenger numbers; instead the airport is putting all the burden on its existing workers, forcing them to work an extra 15 days a year.

95 per cent of the workers who took part in the ballot voted for strike action.

Unite regional officer Jeff Hodge said: "Security guards at Luton Airport are preparing to step-up their campaign against management’s heavy handed changes.

“The airport is trying to force their staff to work significantly more unsocial hours. Workers will only get nine weekends a year off and will have to work an extra 15 days a year.

“Unite has notified Luton Airport that the workers are planning 12 days of strike action which include the bank holiday weekend.

“Unite believes the recruitment of security staff has not matched increasing passenger numbers and the airport is heaping the burden on its existing staff.

“The workers are standing firm and are determined to ensure the airport treats them fairly. The airport must suspend the implementation of the new shift pattern to allow further talks. It's time for management to get around the negotiating table to reach a fair deal."

ENDS

Unite is a union that campaigns for and delivers better pay and conditions for its members. Unite is winning at work based on three core values. Secure Work: fighting for jobs and job security, Strong Voice: a union which is a respected voice at work and Decent Pay: a union focused on pay and conditions.

- For more information contact Ciaran Naidoo 07768 931 315

Unite is Britain and Ireland’s largest trade union working across all sectors of the economy. The

Stansted easyJet 'check-in chaos' moves a step closer as workers back strike action by 100 per cent

Wednesday 3 July 2019 **Share**

Passenger service agents employed by Stobart Aviation Services Limited on the easyJet contract at Stansted airport have voted by 100 per cent to take strike action in a dispute over pay and union recognition, Britain and Ireland's largest union, Unite announced today (Wednesday 3 July).

The result raises the prospect of strike action and delays for easyJet passengers at the Essex airport this summer if a breakthrough in talks between Unite and Stobart Aviation Services can't be found when the two sides meet tomorrow (Thursday 4 July).

Unite represents 43 passenger service agents employed by Stobart Aviation Services Limited. The workers are angry over the company's refusal to pay wages in line with similar companies at Stansted; its refusal to recognise Unite as a trade union for collective bargaining purposes; and a breakdown in industrial relations.

The turnout in the industrial action ballot was 88.4 per cent.

Commenting Unite regional officer Mark Barter said: "This emphatic vote in favour of strike action should leave Stobart Aviation Services in no doubt of the depth of anger felt by our members.

"Our members work unpaid overtime, experience staffing issues and lack basics, such as drinking water during their long shifts, while being paid up to 20 per cent less for doing the same job as their counterparts in other companies at Stansted.

"This unacceptable situation has only been compounded by the attitude of bosses at Stobart Aviation Services who have refused to fully honour the trade union recognition agreement that carried over when our members transferred over from Menzies about a year ago.

"We hope that Stobart Aviation Services will do the right thing and avoid the possibility of strike action by engaging meaningfully with Unite to reach a deal on pay and trade union recognition."

ENDS

Further reading

Glasgow Airport strikes suspended as new offer put to workforce (/news-events/news/2019/july/glasgow-airport-strikes-suspended-as-new-offer-put-to-workforce/)

Unite confirms Aberdeen Airport dispute over (/news-events/news/2019/july/unite-confirms-aberdeen-airport-dispute-over/)

McCluskey: Reject Brexit division and unite for a Corbyn government (/news-events/news/2019/june/mccluskey-reject-brexit-division-and-unite-for-a-corbyn-government/)

Aberdeen Airport strike action to go ahead after pay offer rejection (/news-events/news/2019/june/aberdeen-airport-strike-action-to-go-ahead-after-pay-

Strikes averted at Gatwick airport as BA food drivers agree 18 per cent pay deal

Monday 25 March 2019 **Share**

Strikes scheduled for this week at Gatwick airport have been called off after Unite, the UK Ireland's largest union, secured an 18 per cent pay package on behalf of drivers employed by Alpha Flight, the sole supplier of inflight food for British Airways at Gatwick Airport.

The 55 drivers were due to stage a strike beginning on Wednesday 27 March and ending the following day (Thursday 28 March).

18 per cent pay increase

An initial six per cent increase in pay was rejected in a consultative ballot and then following further pay talks an improved offer was voted on and accepted by the drivers. The drivers will receive a pay increase worth a total of 18 per cent, a 30 minute reduction in the working week and each worker will receive an additional £420, as part of a two year pay deal with the final payments made in November 2019.

£12.70 an hour

When pay talks began the drivers were receiving £10.64 an hour and the new deal will see wage rates increase to £12.70 an hour.

The pay deal is groundbreaking, as Unite has become increasingly aware that HGV drivers at Gatwick airport, are not receiving the market rate for the job and the pay deal with Alpha Flight is the first time that a company has taken the underpayment issue seriously.

Complete unity

Unite regional officer Jamie Major said: "By displaying complete unity our members have secured an excellent pay deal, which ensures their earnings are in line with local HGV drivers' earnings.

"Alpha Flight is the first company at Gatwick airport to take the argument for paying a market rate for HGV drivers seriously.

"By introducing a market rate for drivers Alpha Flight has now established itself as the market leader for HGV driver pay on the Gatwick campus.

"Unite will now be working to ensure that other employers at Gatwick also boost drivers' pay and introduce a market rate."

ENDS

Notes to editors:

BA passengers at Gatwick still facing food shortages as pay offer rejected (https://unitetheunion.org/news-events/news/2019/march/ba-passengers-at-gatwick-still-facing-fresh-food-shortages-as-pay-offer-rejected/)

For more information please contact Unite communications officer Barckley Sumner on 020 3371 2067 or 07802 329235.

Email: barckley.sumner@unitetheunion.org (mailto:barckley.sumner@unitetheunion.org)

- Unite is Britain and Ireland's largest union with members working across all sectors of the economy. The general secretary is Len McCluskey.

Further reading

Glasgow Airport strikes suspended as new offer put to workforce (/news-events/news/2019/july/glasgow-airport-strikes-suspended-as-new-offer-put-to-workforce/)

Stansted easyJet 'check-in chaos' moves a step closer as workers back strike action by 100 per cent (/news-events/news/2019/july/stansted-easyjet-check-in-chaos-moves-a-step-closer-as-workers-back-strike-action-by-100-per-cent/)

Unite confirms Aberdeen Airport dispute over (/news-events/news/2019/july/unite-confirms-aberdeen-airport-dispute-over/)

McCluskey: Reject Brexit division and unite for a Corbyn government (/news-events/news/2019/june/mccluskey-reject-brexit-division-and-unite-for-a-corbyn-government/)

Aberdeen Airport strike action to go ahead after pay offer rejection (/news-events/news/2019/june/aberdeen-airport-strike-action-to-go-ahead-after-pay-offer-rejection/)

Heathrow expansion 'masterplan' important step on the road to creating

Unite confirms Aberdeen Airport dispute over

Tuesday 2 July 2019 **Share**

Unite can confirm today (2 July) that its membership at Aberdeen Airport has voted to accept the latest offer on a 98 per cent turnout with 60 per cent voting in acceptance. This now ends the dispute at Aberdeen Airport.

ENDS

For more information contact Shauna Wright on 07850644809.

Notes to editors:

Unite holds industrial action ballot over pay and pension dispute at Glasgow airport

Tuesday 12 March 2019 **Share**

Unite the union has today (12 March) confirmed that it is holding an imminent industrial action ballot at Glasgow Airport over a pay claim for 2019 and following proposals to close the final salary pension scheme.

In January 2019 the airport issued a 60-day consultation on closing the defined benefit pension scheme which has broken an Advisory, Conciliation and Arbitration Service (Acas) agreement made in 2016 to keep the scheme open to existing members. The airport is unilaterally proposing the scheme's closure, despite posting huge profits.

Glasgow airport's latest pay offer of 1.5 per cent, which represents a real terms pay cut, was rejected following a consultative ballot by 100 per cent on a 97 per cent turn out. The pension proposal was also rejected by a consultative ballot on the exact same figures. Glasgow airport has failed to significantly increase the pay offer despite admitting that they remain on target to increase profits for 2019 by at least six per cent.

The airport is part of AGS Airports Limited group, which also owns Aberdeen and Southampton airports, with all three airports being subject to the pension proposal. Unite represents around 500 workers at Glasgow airport. The company posted a £74 million profit after tax in 2017 up from £51 million in 2016. If the strike action ballot is successful, Unite members are expected to take action during the mid-April to mid-October period with an overtime ban scheduled to take place during the same period.

Pat McIlvogue, Unite regional industrial officer, said: "The proposal to close the final salary pension scheme at Glasgow airport breaks all existing agreements we have with the company. The company have reneged on their word as only three years ago Glasgow Airport agreed to retain its final salary pension scheme. The offer on pay is an insult to our members. Glasgow airport is asking our members to take a real terms pay cut while they enjoy pre-tax profits of £91 million. This is corporate avarice of the highest level and totally unacceptable.

"Unite has no option but to ballot our members to defend their pension scheme and to secure a decent pay rise following the company doubling its profits. If there is widespread disruption over the Easter & summer months then the public should know now that the company is fully to blame for the situation."

ENDS

For more information contact Pat McIlvogue on (07918631805).

Notes to editors:

- Unite Scotland is the country's biggest and most diverse trade union with around 150,000 members. The union is led in Scotland by Pat Rafferty.

Further reading

Unite workers at City Airport to be balloted on new pay offer

Wednesday 10 April 2019 **Share**

Unite members employed by controversial outsourcer Mitie at London's City Airport are being balloted on an offer to pay the London living wage (LLW) from 1 July.

Unite, Britain and Ireland's largest union, which represents 32 security guards and those providing assistance to workers with mobility issues, said today (Wednesday 10 April) that its members were being balloted on Mitie's new offer of paying the LLW, currently £10.55 an hour, from 1 July this year.

However, Unite warned that the offer, which came after its members had voted unanimously for industrial action, does not address all the members' concerns, which include demands for improved sick pay, adequate rest break facilities and recognition of Unite for collective bargaining purposes.

Unite regional officer Michelle Cook said: "Yesterday (Tuesday 9 April) Unite received confirmation from the Mitie regional manager at the London City Airport that the LLW would be paid to workers from 1 July, after they threatened strike action.

"We will ballot our members on this new offer as this proposal does not address all our members' legitimate concerns.

"We are aware that GMB has sole recognition at Mitie's operations based at London City Airport, however, Unite represents nearly 60 per cent of the workforce who were balloted for industrial action."

Mitie is currently embroiled in two other industrial disputes with Unite members across the UK.

At the Sellafield nuclear reprocessing centre in Cumbria, security guards, and catering, vending and laundry operatives are due to strike over pay for 10 days starting on 19 April.

At Southampton General Hospital, security guards employed by Mitie have already taken a day's strike action over lack of protective equipment as they are regularly attacked by those under the influence of drink and drugs or with mental health problems. Pay and sick pay are also issues in the Southampton dispute.

ENDS

Notes to editors:

For more information please contact Unite senior communications officer Shaun Noble on 020 3371 2060 or 07768 693940. Unite press office is on: 020 3371 2065

Email: shaun.noble@unitetheunion.org (mailto:shaun.noble@unitetheunion.org)

Further reading

Workers at Luton Airport step up action with 49 day strike

Wednesday 5 June 2019 **Share**

Security guards employed by London Luton Airport will take strike action through most of June and July in a dispute over 'heavy-handed' changes to working time.

The workers will begin their fourth period of strike action today (Wednesday 5 June) from 04:30 through to Tuesday 23 July at 20:59. Unite is meeting the airport with Acas next Wednesday (12 June) to try to resolve the dispute.

London Luton Airport is imposing a new shift pattern affecting around 120 security guards which means the workforce will have to work an extra 15 days a year. Workers say the new shift pattern is taking a heavy toll on their well-being.

The new shift pattern means:

- Working an extra 15 days and only getting 9 full weekends free a year
- Workers have less rest time between shifts
- The new shift means workers incur additional costs in childcare, and travel
- I impacts workers with caring responsibilities

95 per cent of the workers who took part in the ballot voted for strike action.

Unite regional officer Jeff Hodge said: "Security guards are determined to fight back against Luton Airport's heavy-handed and antisocial shift changes. Management are trying to force staff to work for longer, with shorter breaks, while piling extra costs on the workforce. The airport management have even callously cut the amount of free weekends workers get to spend with their friends and family.

"The airport needs to take responsibility for the staff shortages by doing what's needed to recruit new staff rather than heaping all the burden on its workforce.

"The airport now faces disruption through most of June and July. This latest strike represents a significant failure on the part of management at Luton Airport. Workers would not be taking this action unless they had genuine and serious grievances. We hope the airport listens and works with Unite to resolve this dispute."

ENDS

Notes to editors

Further reading

Glasgow Airport strikes suspended as new offer put to workforce (/news-events/news/2019/july/glasgow-airport-strikes-suspended-as-new-offer-put-to-workforce/)

Stansted easyJet 'check-in chaos' moves a step closer as workers back strike action by 100 per cent (/news-events/news/2019/july/stansted-easyjet-check-in-chaos-moves-a-step-closer-as-workers-back-strike-action-by-100-per-cent/)

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Aberdeen Airport strike action to go ahead after pay offer rejection (/news-events/news/2019/june/aberdeen-airport-strike-action-to-go-ahead-after-pay-offer-rejection/)

Heathrow expansion 'masterplan' important step on the road to creating thousands of jobs, says Unite (/news-events/news/2019/june/heathrow-expansion-masterplan-important-step-on-the-road-to-creating-thousands-of-jobs-says-unite/)

Stansted easyJet 'check-in chaos' on cards, as workers ballot for strike action over 'dismal' pay (/news-events/news/2019/june/stansted-easyjet-check-in-chaos-on-cards-as-workers-ballot-for-strike-action-over-dismal-pay/)

Further industrial action dates announced for Aberdeen Airport (/news-events/news/2019/june/further-industrial-action-dates-announced-for-aberdeen-airport/)

Winning, organising, growing

This is what we do best as a union. Fight for our members, for their jobs, for their working conditions, for the future of their communities"

Len McCluskey

Get involved

The Past We Inherit. The Future We Build.

Workers at Luton and Manchester Airports suspend industrial action

Thursday 19 July 2018 **Share**

An industrial action ballot was due to start tomorrow (Friday 20 July) involving security staff at Manchester Airport. Unions and management concluded discussions today (Thursday 19 July) which have resulted in an amended and improved roster which will be recommended for acceptance. On the basis that these are agreeable to members they will be implemented on 15 September.

ENDS

Unite is a union that campaigns for and delivers better pay and conditions for its members. Unite is winning at work based on three core values. Secure Work: fighting for jobs and job security, Strong Voice: a union which is a respected voice at work and Decent Pay: a union focussed on pay and

Workers, who assist 670,000 passengers at Gatwick Airport, to strike in pay row

Thursday 1 November 2018 **Share**

Gatwick Airport workers, looking after an estimated 670,000 passengers annually, many with disabilities, will strike for six days in the next two months in a row over a 'massive inequality' in pay.

Thousands of passengers who need assistance will be affected when more than 250 workers stage three 48 hour stoppages from 05.00 on 20 November, ending at 05.00 on 22 November. The strike action will be repeated at the same times on 26/28 November and on 21/23 December.

The workers, members of Unite the union, employed by logistics giant Wilson James, voted by 98 per cent for strike action. The union estimates that its workers look after about 14,000 passengers a week.

The dispute centres on a demand for a £1 an hour pay rise for the year starting 1 April 2018 to begin to bridge the gap with those airport staff pushing luggage trollies who earn significantly more than Wilson James staff. Those assisting disabled passengers are paid just £8.27 per hour.

Unite today (Thursday 1 November) called on the bosses at Wilson James to get around the table for constructive talks on pay, before the first strikes start to bite.

Unite regional officer Jamie Major said: "Our members have given us an overwhelming mandate for strike action in their dispute over this massive inequality in pay.

"We now have a generous window of opportunity for the management to sit down with us and negotiate a decent pay award before the six days of strike action kick in this month and in December.

"The last thing our members want is to cause inconvenience and distress to those passengers who rely on their services during their time at Gatwick Airport – but they feel they have been forced into a corner by a tight-fisted management who refuse to address the pay inequality issue.

"There is no rhyme nor reason why pushing luggage is valued more than helping people – perhaps, it's because airlines can charge more for heavy luggage to increase profits.

"It remains a mystery to our members. Gatwick Airport needs to get its priorities right, otherwise it will suffer huge reputational damage in the run-up to the Christmas holiday season.

"The current pay of £8.27 an hour for our members is less than the voluntary UK living wage which is currently £8.75 outside London – and the south east is one of the most expensive places to live in the country."

ENDS

Notes to editors:

For more information please contact Unite senior communications officer Shaun Noble (mailto:shaun.noble@unitetheunion.org) on 020 3371 2060 or 07768 693940. Unite press office is on: 020 3371 2065

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION

SUBMISSION TO DEADLINE 11:

Comments on Information requested by the ExA and received from the Applicant to Deadline 10

REGISTER OF ENVIRONMENTAL ACTIONS [REP8-018]

SOCIO- ECONOMIC (1)

1. We respectfully note that the Socio-Economic Impact and mitigation proposed by the Applicant of *Reduction in levels on unemployment within the local area* ***(local area is not defined)*** Page 79/80 of the Updated Register of Environmental [REP8-018] is **not anchored in any proposed plan or in the DCO** and as such these columns have been left blank.
2. The evidence for the conclusion reached of the post-mitigation effect in the Updated Register of Environmental Actions [REP8-018] is no longer valid as it is not supported by up-to-date evidence, is without foundation and cannot be relied upon.
3. **We robustly recommend the Examining Authority recommends that the Applicant's proposed Socio-Economic Impact and mitigation** *Reduction in levels on unemployment within the local area* **would be of Local: negligible significance** as well as Regional: negligible significance.
4. **Further, we question whether the Examining Authority can give any comfort to the Secretary of State that such benefits are secured, and the level of confidence in their delivery.**

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION

SUBMISSION TO DEADLINE 11:

Comments on Information requested by the ExA and received from the Applicant to Deadline 10

REGISTER OF ENVIRONMENTAL ACTIONS [REP8-018]

SOCIO- ECONOMIC (2)

1. We respectfully note that the Applicant has acknowledged the risk of Aircraft noise and traffic volumes during operation impacting on employees and customers of local business at Page 77 of its Updated Register of Environmental [REP8-018].
2. We respectfully draw the Examining Authority's attention to the fact that the Applicant has **not identified or considered measures to avoid, reduce or compensate for any adverse impacts Aircraft noise volumes during operation impacting on employees and customers of local businesses and the town centre of Ramsgate** as an Impact in its Updated Register of Environmental [REP8-018].
3. We respectfully draw the Examining Authority's attention to the fact that of the traditional town centres within Thanet, Ramsgate Town Centre has the largest turnover of £67m[1]. This has been identified as a **Key Sustainability issue for Thanet**[2]. Most of the town centre of Ramsgate is within the noise contour > 57 dB LAeq 16 hr[3]
4. We respectfully draw attention to the Examination Authority to the body of evidence provided by Interested Parties attesting to and providing evidence of the significant critical adverse Impact of Aircraft noise volumes during operation impacting on employees and customers of local

[1] Arup (August 2018) Thanet District Council Draft Local Plan to 2031 Sustainability Appraisal – Environmental Report Page 46, Table 13: Key Sustainability Issues for Thanet [REP3-056] and attached for ease of reference.

[2] *Ibid*

[3] MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION SUBMISSION TO DEADLINE 9: Comment on PD-018 - Requirement 9b, Noise Mitigation submitted by Five10Twelve : SUPPLEMENTARY APPENDIX Ramsgate Listed Buildings and Conservation Area within Five10Twelve's Noise Contours (produced by CAA/ERCD) Listed Buildings (black dots) and Conservation Area (grey-shaded) : National Heritage List GIS data

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION

SUBMISSION TO DEADLINE 11:

Comments on Information requested by the ExA and received from the Applicant to Deadline 10

REVISED CONSTRUCTION ENVIRONMENT MANAGEMENT PLAN [REP9-XXX].

AND

REGISTER OF ENVIRONMENTAL ACTIONS [REP8-018]

1. We respectfully note that the Socio-Economic mitigation proposed by the Applicant of *Generation of employment opportunities in the construction sector and within airport related industries; and Reduction in levels on unemployment within the local area (i.e. Thanet)* Page 34 of the Updated Register of Environmental is anchored in the proposed plan – Construction Environmental Management Plan – Requirement 6 (CEMP).
2. We respectfully note that the Applicant has submitted a Deadline 9 Submission – Revised Construction Environment Management Plan [REP9-XXX].
3. We respectfully note this revision was made publically available on 3 July with the next Deadline on 5 July (Friday) and with the Examination ending on 9 July (Tuesday).
4. In this Deadline 9 Revised Construction Environment Plan [REP9-XXX], the Applicant has now **deleted** the following mitigation from the Construction Environment Management Plan submitted at [REP7a-009] on 24 May 2019 prior to the Issue Specific Hearing 5 on 5 June 2019.

Deleted Incorporated Measures by the Applicant at Deadline 9

> "*There is further scope to employ those who are currently unemployed; assumption that approximately 1,800 jobs may be provided to those currently unemployed. Proposed initiatives are inclusive of the following: Working with East Kent College (or another party such as Canterbury Christ Church) to locate an aviation college on or close to the Proposed Development site;*

Providing practical support to the long-term unemployed (as per Stansted Airport Skills Academy) such as: Informal 'meet the employer' events, interview preparation; Help with CVs; Careers guidance; Financial support such as paying for public transport to interviews and training sessions; Working with local councils and third sector organisations to help promote job opportunities to local people, particularly to the longterm unemployed; Working with Further Education (FE) and Higher Education (HE) to promote apprenticeships at all levels; Working with FE/HE to develop courses (where not currently available) relevant to the job opportunities created by the operation of the Proposed Development; Working with other employers to provide 'hands on' training opportunities; and Working with other employers to provide equipment (such as out of service aircraft/aircraft parts) to support FE/HE delivery of courses".

5. Further, the Applicant has <u>not submitted an Updated Register of Environmental Actions at Deadline 9 (or 10) to reflect this significant reduction in Post-Mitigation Effect.</u>
6. The evidence for the conclusion reached of the post-mitigation effect in the Updated Register of Environmental Actions [REP8-018] is no longer valid as it is not supported by up-to-date evidence and is without foundation.
7. **We robustly recommend the Examining Authority recommends that the Applicant's proposed Scheme for Socio-Economic Measures to be incorporated during the Construction Phase would be of Local: negligible significance** as well as Regional: negligible significance.
8. **Further, we question whether the Examining Authority can give any comfort to the Secretary of State that such benefits are secured, and the level of confidence in their delivery.**

businesses and to the town centre of Ramsgate. These include but are not limited to:

(a) Love Ramsgate Business Survey (short summary) [REP5-075]

(b) Love Ramsgate Business Survey (Full Survey) [REP7-009]

(c) Businesses that are noise sensitive and aviation noise would materially affect the business concerned for example, Touring Park, artists, writers, recording studios and artists, designers, well-being, mental health, musicians, care-homes, holiday lets, schools, hotels, regeneration specialists and creative-hubs etc. A number of these businesses provided Relevant Representations to Planning Inspectorate including but not limited to: [RR-1153], [RR-1107], [RR-1795], [RR-0586], [RR-1843], [RR-0922], [RR-1627], [RR-0034], [RR-0286], [RR-0349], [RR-0555], [RR-1982], [RR-1983], [RR-1649], [RR-0677], [RR-0504], [RR-1163], [RR-1213], [RR-1420], [RR-0197], [RR-1047], [RR-1754], [RR-0758], [RR-0163], [RR-0643], [RR-0622], [RR-1400], [RR-0554], [RR-0612], [RR-1498], [RR-0685], [RR-1609] [RR-2035] [RR-1974] [RR-0601]

(d) A number of these businesses have also put in Written Representations including but not limited to: [REP3-022], [AS-076] [AS-152] [AS-160].

(e) As of Deadline 9, Five10Twelve and its directors have submitted 110 evidenced submissions.

(f) As of Deadline 9, Ramsgate Town Council have made 4 submissions at [AS-141], [REP1-035], [REP3-064] and [REP3-066]

(g) As of Deadline 9, Ramsgate Coastal Community Team has made one submission [RR-1625]

(h) As of Deadline 9, Ramsgate Town Team has made 3 submissions at [RR-1623] [AS-193] and [REP9-XXX]

(i) As of Deadline 9, Ramsgate Society has made 5 submissions at [RR-1948] [REP3-008] [REP4-060] [REP4-061] and [REP4-061]

(j) As of Deadline 9, Ramsgate Heritage and Design Forum has made 3 submissions at [RR-1626] [REP3-017] and [REP4-063]

(k) As of Deadline 9, Ramsgate Neighbourhood Plan has made 2 submissions at [RR-1628] and [REP3-075]

(l) Video Evidence has been submitted to evidence the noise and visual impact of planes travelling (taking off and landing) over Royal Ramsgate Harbour where many of our businesses are located and near the town centre [REP4-087] and [REP4-090]

(m) A map showing the Listed Buildings and Conservation Area which also shows Ramsgate Town Centre and other areas such as the Arches in which businesses are located was submitted at [TR020002-004480] **most of the town centre is within the noise contour > 57 dB LAeq 16 hr[4].**

(n) At submission [REP3-056] evidences the large amount of private inward investment to Ramsgate since the airport closed in May 2014 which will **all be located under the flight path at noise levels of > 57 dB LAeq 16 hr and at risk;** by way of example:

- Wetherspoons (Royal Victoria Pavillion) (2017) a UK Top Employer, £4.5m development (Number of tables just under 350 with large terrace by the beach, covers 900, staff number 200)
- Albion House (17 bed luxury hotel) (2014) built in 1791 voted The Telegraph's "The 50 Most Romantic Hotels in Europe" - in at number 15 (March 2017), The Times "20 Great hotels for a Weekend away" in at Number 10 (March 2017), The Times "Best Places by the Sea" (Number 26) (May 2016) and Voted No. 1 in Kent in Tripadvisor UK.
- £27 million development of old Ramsgate police station Cavendish Street and former Magistrate's House (2017/8)
- A number of restaurants and cafes and shops have opened since the airport closed.

[4] MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION SUBMISSION TO DEADLINE 9: Comment on PD-018 - Requirement 9b, Noise Mitigation submitted by Five10Twelve : SUPPLEMENTARY APPENDIX Ramsgate Listed Buildings and Conservation Area within Five10Twelve's Noise Contours (produced by CAA/ERCD) Listed Buildings (black dots) and Conservation Area (grey-shaded) : National Heritage List GIS data

5. From the evidence submitted it is clear that a) there will be an Impact; and b) that Impact will be significant and critical jeopardizing the sustainability of Ramsgate and the wider Thanet[5].

6. In its Updated Register of Environmental [REP8-018] the Applicant has not identified or considered measures to avoid, reduce or compensate for any adverse impacts Aircraft noise volumes during operation impacting on employees and customers of local businesses and the town centre of Ramsgate.

7. Pursuant to Section 104(3) of the Planning Act 2008 the Secretary of State must decide the application in accordance with any relevant national policy statement, except to the extent that one or more of subsections (4) to (8) applies.

8. The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (including any longer term and cumulative adverse impacts) as well as any measures to avoid, reduce or compensate for any adverse impacts (paragraph 4.4 Airport NPS).

9. In this context, environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level (paragraph 4.5 Airport NPS).

10. We respectfully submit on this basis the Application must be refused.

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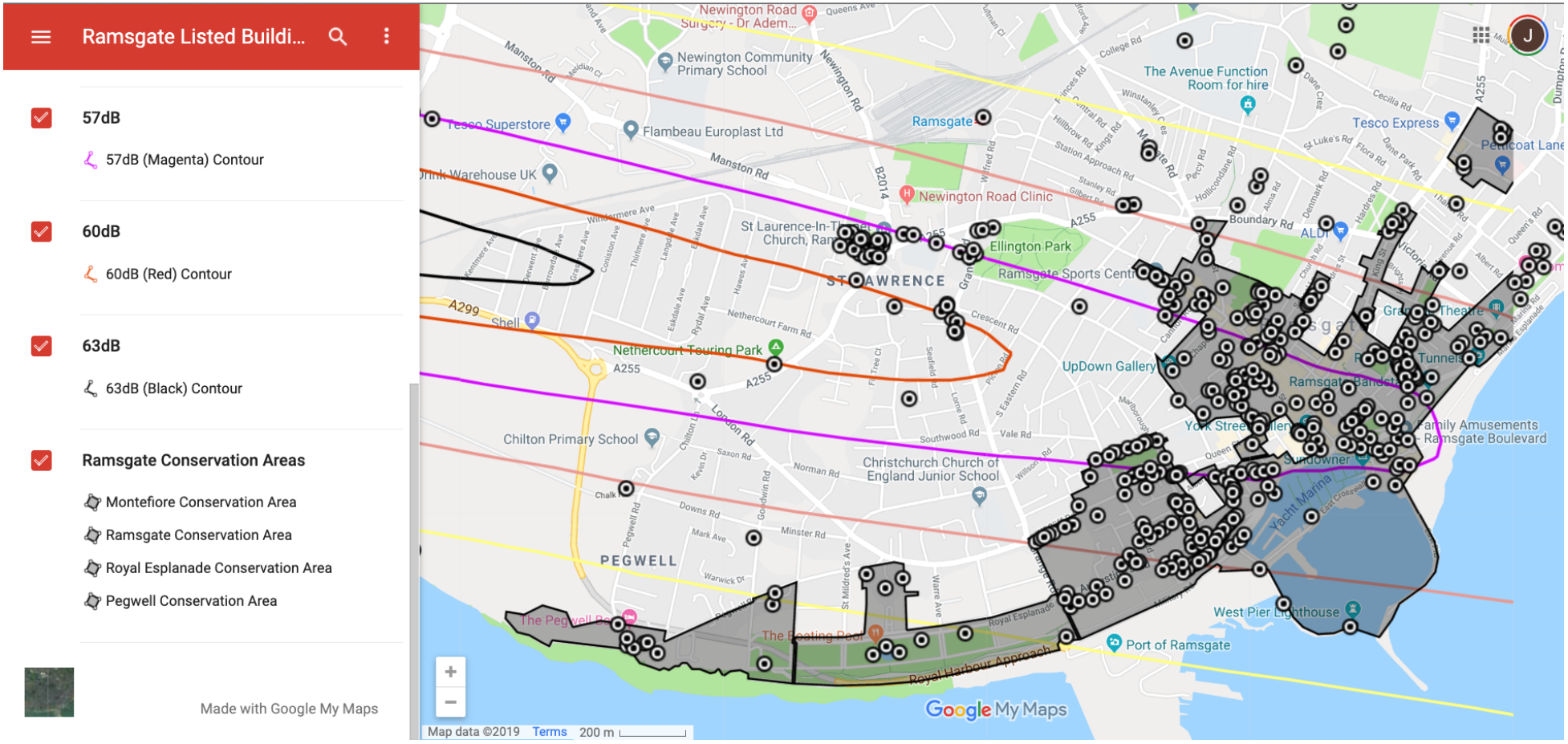
[5] *Ibid*

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION SUBMISSION TO DEADLINE 9:

Comment on PD-018 - Requirement 9b, Noise Mitigation submitted by Five10Twelve : SUPPLEMENTARY APPENDIX

Ramsgate Listed Buildings and Conservation Area within Five10Twelve's Noise Contours (produced by CAA/ERCD)

Listed Buildings (black dots) **and Conservation Area** (grey-shaded)**: National Heritage List GIS data**



Thanet District Council

Draft Local Plan to 2031

Sustainability Appraisal - Environmental Report

REP/228764/003

Issue | August 2018

Job number 258960-00

Ove Arup & Partners Ltd
13 Fitzroy Street
London
W1T 4BQ
United Kingdom
www.arup.com

ARUP

8 Key Sustainability Issues for Thanet

The SEA Directive confirms that the Environmental Report should include the following information:

> *'any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC'*[54].

The examination of policy and baseline characteristics, has allowed sustainability issues to be identified which may influence the emerging Local Plan.

Presented in Table 13 are the Key Sustainability Issues for Thanet. It should be noted that to assist in transparency, sub issues have been included for each of the key issues. These provide an indicator of the particular facet of economic, environmental and societal (the three core elements of sustainability) that the issue is most relevant to. The table proved useful in developing relevant objectives and indicators during SA Stage A4.

54 Annex I (c)

Table 13: Key Sustainability Issues for Thanet.

Key Sustainability Issue	Sub Issue	Description	Validation	Source
ECONOMY	Economic Development	Support for industrial and employment development at key sites within the District.	Existing evidence suggests that Thanet is a net exporter of labour with a workplace ratio of 1.19. Bearing in mind the limitations of the data, further analysis suggests that the workplace ratio could be closer to 1.10. Currently Thanet has significant out migration of the 16-39 age groups. Our forecasts promisingly suggest that more roles are likely to be created which align with the occupation profile of this younger age group which help to reduce the level of out-migration. Economic development at business Parks such as Manston Park, Eurokent and Thanet Reach along with economic development at employment sites adjacent to the Sandwich corridor expected to be available as services employment land within the Local Plan. The main demand and growth is coming out of the local market, and therefore should be supported. There is insufficient supply of property to meet this demand. Relatively little interest from companies wishing to relocate to Thanet, or large inward investors. Priority should be given to allocating land for delivering economic development, protecting sites for industrial and commercial uses where there is a good prospect of employment use, consider upgrading or improving existing sites and working to overcome barriers to delivering sites, including identifying infrastructure planned and necessary to support economic growth. In particular relation to employment land provision, sufficient employment land must be provided through the redevelopment of brownfield land and refurbishment of existing stock, to provide new and flexible employment space.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan Employment Land Review Experian Economic and Employment Assessment – Thanet District Council, 2012
		Create and maintain local employment opportunities centred on fairly paid jobs.	Thanet has relatively high levels of unemployment, and social and economic deprivation. Thanet's history of economic problems is reflected in a persistently high unemployment rate. Total, unemployment rates increased since 2009, and peaked at 6.4% in February 2012. Figures for 2012 show unemployment to have slightly decreased to 5.6%. There is a significant and increasing gap between the rates of unemployment in Thanet compared to Kent (3.2%), the South East (2.4%) and National (3.75%)[55] averages remains. There are fewer people with professional jobs in Thanet than in Kent and England. Skilled trades, caring, leisure and customer service, and other service occupations are more dominant in Thanet than in Kent and South east.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan Local Futures 2004 Draft Employment Topic Paper
		Development of grant funding packages for firms investing in Thanet.	Thanet is part of the Grow East Kent initiative which includes funding for existing and new start businesses as well as businesses looking to move to area. Thanet is also part of the East Kent Priority Area for Regeneration	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan
		Ensuring that the strategic future of retail centres supports commercial diversification and capital investment as well as providing a strong revenue stream for Thanet District Council.	Thanet retail centres are considered unattractive investment areas for major retailers due to relative isolation, limited catchment and the current high dependence ion larger retail centres outside the Thanet region. However, major changes have occurred since 2000 to the provision of retail floor space in Kent and this has had an impact on expenditure spent outside the Thanet region. Of the traditional centres. Ramsgate has the largest turnover at £67million	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan
		Supporting regeneration of key areas within the District.	South East Local Economic Partnership (SE LEP) implemented in April 2011 to promote strategic economic priorities and make investments activities to drive growth and local jobs. Investment from the Governments Growing Places Fund includes first round projects across Kent and in Thanet such as 'Live Margate, Kent	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan
	Economic Structure	Ensuring that improving economic prosperity provides benefits to the whole of Thanet focussing regeneration on key wards.	Kent County Council's 'Grow for it East Kent' scheme which is aiming to attract new businesses to locate within the sub-region as well as supporting the start up and growth of indigenous and pre-existing businesses. It is doing this by promoting the area to businesses and also providing support to new businesses and funding to support businesses looking to locate in East Kent. The Thanet Local Plan identifies four key areas in need of special attention: Margate Old Town Area, King Street in Ramsgate, Upper High Street in Ramsgate and Cliftonville West. Thanet has poor housing stock with a high proportion of semi-derelict, vacant or homes in a state of poor repair. In addition, there are a high proportion of multiple occupation premises which leads to pressure on parking, nuisance, noise and visual deterioration of houses and gardens.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan Experian Economic and Employment Assessment – Thanet District Council, 2012

55 Thanet District Council Local Plan 2006

Key Sustainability Issue	Sub Issue	Description	Validation	Source
		Ensuring that existing building stock (particularly redundant buildings) is brought into use for employment where appropriate.	Create and maintain local employment opportunities centred on fairly paid jobs. There is also a dominance of employment in the public sector and whilst this has an important role to play in any economy, it is not a strong driver of growth and wealth creation. With over a third of employees working in the public sector there is a need to balance this to ensure that there is scope for the economy to grow. At 1st April 2011 there were 3,456 empty homes in Thanet. (Source Research & Evaluation Statistical Bulletin "Vacant and empty dwellings - Annual 2010/11" Kent County Council)	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan
		The protection and enhancement of natural assets including Blue Flag status of beaches in support of tourist economy.	Tourism provides a significant contribution to the Thanet local economy and so efforts to maintain natural assets and improve its desirability as a coastal destination are required to strengthen and support future economic growth. Visit Kent data for 2009 indicates that there were 57 million visitors to Kent, with an economic impact of £3.2 billion as well as supporting an estimated 63,000 jobs.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan Town Centre Retail, Leisure, Tourism and Culture Assessment, 2012
		The protection and enhancement of historic assets.	Scheduled monuments in Thanet include Anglo Saxon Cemeteries and remains at Monkton and Dane Valley, Salinestone Grange, Quex Park Settlements, and various ring ditches and enclosures. There are also significant amounts of listed buildings and conservation areas throughout the district.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan
		Mobility and access to employment opportunities through provision of sustainable public modes of transport.	Compared to a national average of 25.8% the proportion of Thanet households not in possession of a car or van is 29.8%, the 5th highest in the region. In some of the more deprived wards this is almost double this such as Margate Central (52.4%). Of the working age population 40% travel by private, car, van or motorbike to work. 6% travel by public transport, 9% walk or cycle and 3% work from home. These percentages are all lower than the regional and national (England) averages.	Census 2011.
SOCIAL	Safety	Initiatives leading to greater public safety including appropriate strategies for intervention (Community Wardens, Police Community Support and Secured by Design).	Approximately 91% of the Thanet population feel safe in their homes – the main focus of interest is in Margate Central Ward and Cliftonville West Ward. Local analysis has shown that the streets of Thanet are extremely safe – large areas of Thanet have had no reported crime in two years with only nine of 446 output areas reporting one crime per month. All three town centres are awarded the National ‘Safer Shopping Award’ with shoplifting and commercial burglary falling year on year.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan Thanet Crime and Disorder Police Audit 2005-2008
	Housing	Responding the needs and requirements of the current and future housing market. Support the viability of existing residential developments now and in the future.	Over the last decade the housing market and mix of tenure has changed due to the recession and the impacts this has had on house prices. The proportion of households that are rented instead of owned or mortgaged has increased. Likewise, the annual number of housing sales has fallen to a level lower than 1996. This means that because there is currently less demand for housing the potential future requirements may be less than previously anticipated. However, given the long timeframe over which the Local Plan will operate (to 2031) it is quite likely that the housing market will have changed again. Therefore, the Local Plan needs to consider how it can allow flexibility to address potential changes in the future and this flexibility is something that the SA will also consider during the assessment of options and alternatives. The Thanet Private Sector Housing Strategy indicates that the standard of the existing stock is an issue, with the private rented sector being poor in some areas, particularly in Cliftonville.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan Urban Housing Capacity Study (Kent District council) 2002 Local Housing Needs Study Strategic Housing Land Availability Assessment Strategic Housing Market Assessment
	Mobility	Access to key services and employment opportunities through public transport provision.	The Channel Tunnel Rail Link has benefited the UK as a whole but has led to substantial job losses in the in the cross channel ferry industry. Transport links in Thanet have been historically poor however in recent years a number of transport connections have improved significantly. The recently completed East Kent Access Road (A256) provides a fast connection to the A20/M20 at Dover and to the Port of Dover and Channel Tunnel. The Access Road also links Thanet with other major economic assets such as the Port of Ramsgate and Discovery Park to the UK’s main arterial road network in less than 60 minutes. Additionally, the introduction of High Speed 1 rail services in 2009 has reduced commuting from central London to Ramsgate to 76 minutes and Margate to 88 minutes. The local population is well served with public transport connections. Access throughout the district is possible via the Thanet Loop bus service. This covers Margate - Broadstairs - Ramsgate – Margate i.e. all towns/centres of commercial activity	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan

Key Sustainability Issue	Sub Issue	Description	Validation	Source
	Deprivation	Levels of economic disparity within the region and need to maximise opportunities for all sectors of society. Access to employment opportunities identified as an issue in limiting the realisation of Thanet's potential.	The 2010 Office of National Statistics Indices of Deprivation indicates that Thanet is ranked the most deprived District in Kent and 65th in England (out of 354), moving it within England's top 20% deprived Districts in England in all 6 deprivation categories (employment, health deprivation, disability, educational skills and training, housing, geographical access to services and income). Per ward Margate is ranked the most deprived Ward Thanet is within the top 20% most deprived areas of Kent. 15.2% of the District's population are separated or divorced in comparison to the England and Wales average being 11.7% - this is the highest rate in Kent.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan
	Health	Maintenance of high levels of healthcare provision including dependent sectors of the community. Population demand on healthcare and support services (PCT initiatives).	The poor health of Thanet cannot just be attributed to the number of older residents of people suffering a limiting long term illness. This ranks highest in the region (of 67) and is 37th of the 376 Districts in England and Wales.	Census 2011.
	Education and Skills	Access to skills development for all sectors of society. Particular demand associated with transient and dependent sectors of society.	39% of East Kent's children's homes providing care for socially excluded children are located in Thanet. A large proportion of children remain in the area through to adulthood compounding a dependency culture. Within Thanet 15.9% of 16-60 year olds have low or very low literacy (15% nationally) and 35.1% have low or very low numeracy (33% nationally) It is well evidenced that the district has a number of skills gaps. Thanet's qualification profile is skewed towards NVQ1, 2 and 3, with all three above the county, region and UK. Promisingly it has proportionally fewer individuals with no qualifications (8.6%) this is compared to Kent at 11.4 per cent and the UK as a whole 12.2 per cent. However, in terms of NVQ level 4, which is equivalent to degree level qualification, the district has proportionally far fewer residents that hold this qualification than the county, region and UK. In the South East over a third (39.7 per cent) are NVQ level 4 or above compared to 31.4 per cent in Thanet.	Thanet DC Corporate Themes, Plans, Policies and Programmes review and baseline, South East Regional Integrated Regional Framework, Thanet Statement of Community Involvement Experian Economic and Employment Assessment – Thanet District Council, 2012
ENVIRONMENT	Perceptions and Image	Need to maintain the appearance, vitality and safety of the street scene within Thanet particularly associated with town centres and coastal areas.	With their competing catchment areas Thanet's towns have struggled to retain a vital commercial core and have lost many visitor attractions resulting in the stock of guest house and hotels being reduced and converted to private residential multiple user accommodation. However, this is starting to change particularly within Old Town in Margate and Marina in Ramsgate, but in some areas of public realm the main high streets are of a poor standard.	Thanet DC Corporate Themes, Plans, Policies and Programmes review and baseline, South East Regional Integrated Regional Framework, Thanet Statement of Community Involvement NLP Report
	Biodiversity	Protection of designated sites including; SSSIs, SPA and Ramsar site.	The Thanet coast is protected by a number of international and national conservation and biodiversity designations. These include Special Protected Areas, a Ramsar Site and Sites of Special Scientific Interest. A full list of designations made on biodiversity grounds are given in Appendix C. Threats to rare species of birds and the Chalk Reefs are a particular concern.	Thanet DC Corporate Themes, Plans, Policies and Programmes review and baseline, South East Regional Integrated Regional Framework, Thanet Statement of Community Involvement, Kent Biodiversity Action Plan.
	Development Pressure	Threat to areas of high wildlife, conservation and biodiversity importance from economic and social development	Development within the Thanet District presents areas of conservation and wildlife importance at threat. This is particularly evident in areas of 'coastal squeeze' where space for development is at a premium. Also the need for open space for recreational needs places additional pressures on designated areas. The impact of changes to air quality resulting from this development should also be considered. Where possible opportunities to link and extend wildlife habitats to reduce the impact of inappropriate development should be supported. In doing so it is important to make provisions for general green space and green infrastructure in association with development needs	Thanet DC Corporate Themes, Plans, Policies and Programmes review and baseline, South East Regional Integrated Regional Framework, Thanet Statement of Community Involvement, Kent Biodiversity Action Plan.
	Coastal Management	The coastal areas of Thanet have a high conservation and landscape value and should be afforded appropriate protection.	The chalk reefs in themselves justify the need to afford significant management in the protection of the coastal area. In particular threats include; increasing pressure on coastal resources from recreational use, the potential impact of coastal flood defence construction, the impact of coastal erosion, impact from urbanisation and the threat to species of regional, national and international importance, such as the turnstone. Groundwater Source Protection Zones exist across the district.	Thanet DC Corporate Themes, Plans, Policies and Programmes review and baseline, South East Regional Integrated Regional Framework, Thanet Statement of Community Involvement, Kent Biodiversity Action Plan.

Key Sustainability Issue	Sub Issue	Description	Validation	Source
	Water Quality	Risk to water quality	The whole of the Thanet area is classified as a Nitrate Vulnerable Zone. Furthermore nutrient runoffs may impact on inter tidal chalk reefs.	Thanet DC Corporate Themes, Plans, Policies and Programmes review and baseline, South East Regional Integrated Regional Framework, Thanet Statement of Community Involvement, Kent Biodiversity Action Plan. Environment Agency mapping
	Climate Change and Flood Risk	Nation need to consider impacts associated with climate change and particular imperative within coastal locale. Risk of flooding must be considered in Local Plan development.	Thanet has a key advantage as flood risk does not pose a constraint to identifying sufficient housing site, commercial or industrial site opportunities.	Thanet DC Corporate Themes, Plans, Policies and Programmes review and baseline, South East Regional Integrated Regional Framework, Thanet Statement of Community Involvement, Kent Biodiversity Action Plan, Environment Agency

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION

SUBMISSION TO DEADLINE 11:

Comments on Information requested by the ExA and received from the Applicant to Deadline 10

THANET DISTRICT COUNCIL LOCAL IMPACT REPORT

Additional Evidence- Impact definition Local Labour

1. The Applicant at Page 34 of the Updated Register of Environmental Actions (REAC) [REP8-018] has at Deadline 8 defined "*local labour*" as "*those living within a 90-minute commute of Manston Airport*" at Footnote 15 (underlined for emphasis).

2. According to the Strategic Commissioning - Analytics of Kent County Council department:

   "*Footnote 15: Refers to "Local Labour" which they define as anyone of working age who lives within a 90 minute commuting distance from the site. So this will include more than just the residents of working age from Thanet.*

   For example it is feasible for people living in west Kent and outer London to commute to work at the site within 90 minutes[1]*"* (underlined for emphasis).

3. We respectfully submit this would have a material and significant impact on all comments provided by Thanet District Council because in its comments Thanet District Council has made the assumption that 'local' means Thanet not those living within a 90-minute commute of Manston Airport.

4. We respectfully draw the Examining Authority's attention to our evidenced submission [REP9-XXX][2] attached for ease of reference.

---

[1] Email received from Strategic Commissioning - Analytics of Kent County Council department 2 July 2019 (attached)

5. We again respectfully strongly state that the Applicant cannot claim a "*Local: major beneficial significance*" when the Applicant's population reach of Local fits within the population reach of *beyond* Regional in relation to the impact Socio-Economic and the Mitigation Proposed at Page 34 of the Updated Register of Environmental Actions (REAC)[REP8-018] these being:

(1) Generation of employment opportunities in the construction sector and within airport related industries; and
(2) Reduction in levels on unemployment within the local area (i.e. Thanet)

6. We robustly recommend the Examining Authority recommends that the Applicant's proposed Scheme for Socio-Economic Measures to be incorporated during the Construction Phase *Generation of employment opportunities in the construction sector and within airport related industries; and Reduction in levels on unemployment within the local area (i.e. Thanet)* **would be of:**

(1) Local: negligible significance
(2) Regional: negligible significance.

7. We again respectfully strongly state that it is unclear how the Applicant can claim a "*Local: major beneficial significance*" but of "*Regional negligible/minor significance*" when the Applicant's population reach of Local fits within the population reach of *beyond* Regional in relation to the impact Socio-Economic and the Mitigation Proposed at Page 70/80 of the Updated Register of Environmental Actions (REAC)[REP8-018] being:

(1) Reduction in levels on unemployment within the local area

8. We respectfully draw the Examining Authority's attention to the fact that 'local area' is not defined or quantified in any way.

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[2] TR020002-004587-Five10Twelve Ltd - SUBMISSION TO DEADLINE 10- REP3-010 and REP8-018 EMPLOYMENT_

9. **We robustly recommend the Examining Authority recommends that the Applicant's proposed Scheme for Socio-Economic Measures Operational** *Reduction in levels on unemployment within the local area* **would be of:**

   (1) Local: negligible significance

   (2) Regional: negligible significance.

10. **Further, we question whether the Examining Authority can give any comfort to the Secretary of State that such benefits are secured, and the level of confidence in their delivery.**

Appendix

Gmail [redacted]

Query

research@kent.gov.uk <research@kent.gov.uk> Tue, Jul 2, 2019 at 2:10 PM
To: [redacted]

Hi Samara,

Footnote15 The Applicant would define local labour as those living within a 90-minute commute of Manston Airport, this is based on research by the Impact Assessment Unit at Oxford Brookes University which defined home-based workers as living within a 90-minute commute zone

Refers to “Local Labour” which they define as anyone of working age who lives within a 90 minute commuting distance from the site. So this will include more than just the residents of working age from Thanet.

For example it is feasible for people living in west Kent and outer London to commute to work at the site within 90 minutes.

Does this make sense?

To look into how the 90 minute commute distance has been arrived, you would nee to contact the Impact assessment unit as Oxford Brookes University.

I hope that this helps.

Best regards

[redacted]

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION

SUBMISSION TO DEADLINE 10:

Comments on Information requested by the ExA and received from the Applicant to Deadline 9

and

Thanet District Council Local Impact Report [REP3-010]

and

Updated Register of Environmental Actions (REAC) [REP8-018]

EMPLOYMENT

1. We respectfully point out that in the Applicants' answer at S.E.3.1 [REP7a-002] in its response to a question from the Examining Authority about "*jobs to be filled by people from the local area*", the Applicant has answered using the term "local labour".

2. The Applicant at Page 33 of the Updated Register of Environmental Actions (REAC) [REP8-018] has at Deadline 8 defined "*local labour*" as "*those living within a 90-minute commute of Manston Airport*" (underlined for emphasis).

3. **We respectfully submit this would have a material and significant impact on all comments provided by Thanet District Council because in its comments Thanet District Council has made the assumption that 'local' means Thanet not those living within a 90-minute commute of Manston Airport.**

4. For example Thanet District Council's comment on the Applicant's answer to question SE.2.6 at [REP7a-045] it comments that:

> *"However, the ES does not consider the impact of the job creation against the total number of jobs/employment in Thanet. Therefore, the creation of 71.1% of jobs at year 20 only equates to the creation of 8.3% jobs overall at the local level of Thanet. Whilst the impact on*

the jobs created within the airport industry sectors should be considered, it should be considered against the total number of jobs at the local level: Thanet. Given the context of Thanet, an increase in jobs by 8.3% would still be considered of beneficial significance but it remains to be confirmed whether this would be of a minor, moderate or major beneficial significance" (underlined for emphasis).

5. We respectfully draw the Examining Authority's attention to Paragraphs 4.2.20-4.2.23 of [REP3-010] in which Thanet District Council had previously raised concerns in its Local Impact Report stating:

'This suggests that over two thirds of residents across Kent, Kent and Medway and Thanet only travel up to 20km to work" (underlined for emphasis).

'Therefore, the inclusion of distances up to 40km would appear to skew the data and exaggerate the economic impacts. The 40km benchmark implies that almost half of Kent would be affected by Manston Airport given that Tunbridge Wells, Tonbridge, Sevenoaks, Dartford, Maidstone and the Medway Towns are all within 80km of Manston Airport" (underlined for emphasis).

6. We respectfully draw the Examining Authority's attention to Paragraphs 4.2.25 of [REP3-010] which states that:

"*Point 2 of paragraph 1.13 states that a modelled 40km distance from the airport equates to approximately to a 45 minute drive…*"

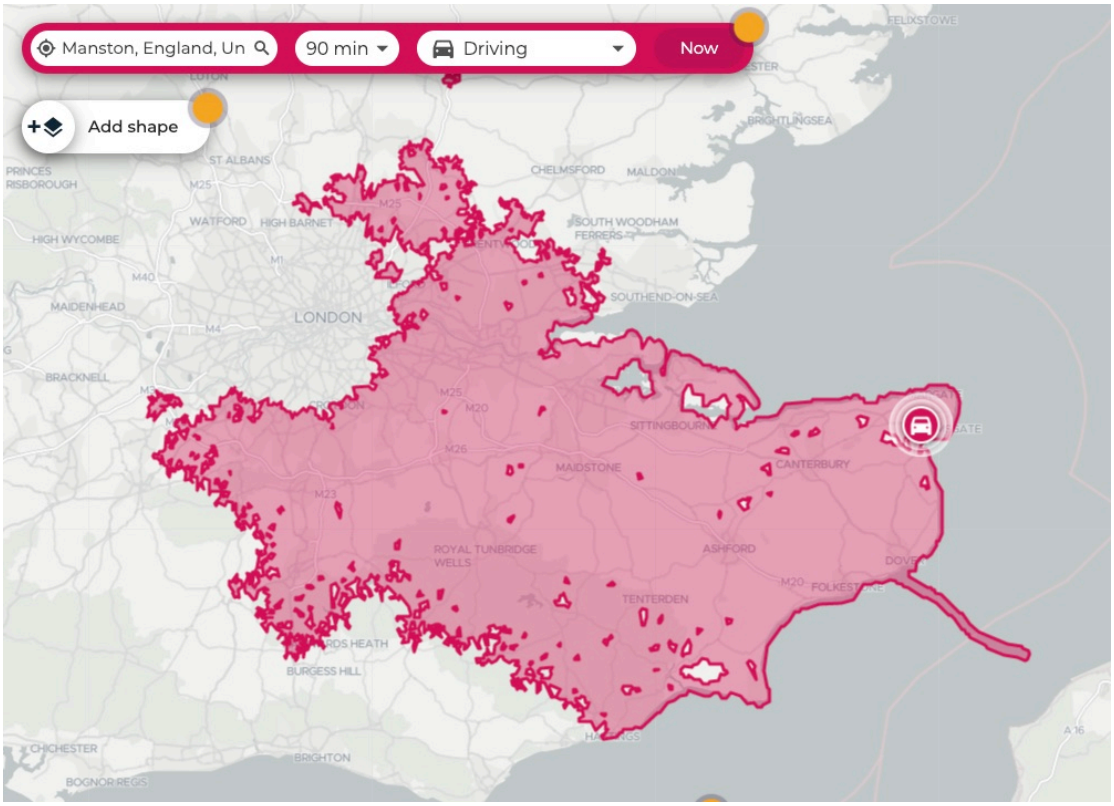
7. This does not marry with the Applicant's Deadline 8 definition of "*local labour*" as "*those living within a 90-minute commute of Manston Airport*" or with Thanet being the local area.

8. We respectfully strongly request of the Examining Authority that the Applicant must be held to a standard.

9. **There must be a robust and disciplined approach to the preparation, collation and dissemination of evidence by the Applicant for Examination. For example by using clear transparent definitions that each party understands and by not skewing data to exaggerate the economic impacts. Without such rigour, comments on jobs/employment in the Thanet District Council Local Impact Report are Applicant biased and deeply flawed.**

10. As the Examining Authority will be aware a 90-minute commute by train will take you to London St Pancras and therefore would include London up to and including Stratford, Ebbsfleet and Kings Cross.

11. Further, we respectfully draw your attention to the following map showing 90 minute commute by car to and from Manston airport.



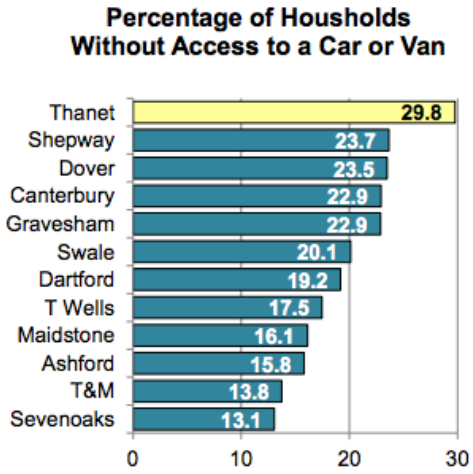
12. It is therefore unclear how the Applicant can claim a "*Local: major beneficial significance"* but of *"Regional: negligible significance*" when the Applicant's population reach of Local fits within the population reach of *beyond* Regional.

13. We robustly recommend the Examining Authority recommends that the Applicant's proposed Scheme would therefore be of Local: negligible significance as well as Regional: negligible significance in relation to socio-economic impact.

14. Further, it is still unclear what type of jobs will be created as a result of the proposed Scheme. If the majority of jobs are lower skilled and low paid jobs then people are less likely to travel beyond 20km as this may not be economically viable[1].

15. The draft Thanet Transport Strategy 2015-2031 of July 2018[2] at paragraph 5.2.2 states that:

> "*This data suggests that 30% of the district's population live in households with no cars/vans compared to just 20% for the whole KCC area. The average car ownership across the district is the lowest in the county*" (underline added for emphasis).



[1] [REP3-010]

[2] https://consult.thanet.gov.uk/gf2.ti/-/875394/39880005.1/PDF/-/INDraft_Thanet_Transport_Strategy_July_18.pdf

16. When viewed across Kent let alone within the Applicant's definition of 'Local' which extends far beyond Kent the accessibility implications and barriers for job-seekers in Thanet compared to those outside of the district to work at the former Manston site (if the Applicant scheme is granted) is clear.

17. This is of particular concern in light of the socio-economic demographic of Ramsgate and perhaps engages the Equality Act 2010.

18. The draft Thanet Transport Strategy 2015-2031 of July 2018[3] at paragraph 5.2.3 states that:

> "*This can have accessibility implications for particular groups as when the car is being used (for example during the working day) other household members do not have access to the car and must rely on Public Transport. Likewise, where households have no car/van reliance on other forms of transport is high*" (underline added for emphasis).

19. We respectfully remind the Examining Authority that the Applicant has submitted at Page 81 of the REAC merely a proposal to enhance as 'appropriate' local bus services to accommodate increase staff in the area.

20. This proposal by the Applicant is not enshrined in the draft DCO.

21. The Applicant does not appear to have made any cost provisions for local bus services within RSP Business Plan for Manston submitted at Appendix CAH2 – 15 to the Summary of Applicant's Oral Submissions at the Compulsory Acquisition Hearing on 4 June 2019 and associated appendices [REP8-011].

[3] https://consult.thanet.gov.uk/gf2.ti/-/875394/39880005.1/PDF/-/INDraft_Thanet_Transport_Strategy_July_18.pdf

Cumulative Impacts

22. We respectfully draw the Examining Authority's attention to Paragraphs 4.2.29 of [REP3-010] which states that:

> "*The study area for Lydd Airport as defined in their ES overlaps with the study area of Manston Airport. Therefore, there may be some conflict regarding the socioeconomic impacts associated between Manston Airport and the development permitted at Lydd Airport. Despite this potential issue, it appears that Lydd Airport has not been considered in the application or within the ES as a potential cumulative effect particularly for the socio-economic impacts*".

23. As the Examining Authority will be aware London Biggin Hill Airport that is also located within the Applicant's definition of 'Local' has future plans. These include the creation of new jobs at the airport within the next twenty years as part of its LoCATE strategy[4]. LoCATE (London Centre for Aviation, Technology and Enterprise) is a partnership of public and private sector organisations promoting London Biggin Hill Airport as a primary centre for the aerospace industry in the capital. It sets out London Biggin Hill's vision for a sustainable future for both the airport and the local community by investing in infrastructure, skills development, training and job creation[5].

24. London Biggin Hill Airport is some 79 minutes/ 98 minutes commute to the Spitfire & Hurricane Memorial Museum. Therefore, there may be some conflict regarding the socioeconomic impacts associated between Manston Airport and the development permitted at London Biggin Hill Airport (in addition to Lydd Airport). Despite this potential issue, it appears that London Biggin Hill Airport (in addition to Lydd Airport) has not been considered in the application or within the ES as a potential cumulative effect particularly for the socio-economic impacts.

[4] https://www.bigginhillairport.com/2018/01/london-biggin-hill-sets-out-ambitions-for-2018-and-beyond/
[5] *Ibid*

25. As the Examining Authority will be aware the Applicant stated in its response to the first written questions at SE.1.1 at [REP3-195] that:

> "*There are a wide range of national and international destinations accessible to residents in Thanet, via existing airports...Gatwick ([90 minutes] 1.5 hours drive time from Margate), Heathrow (circa 2 hours [drive time]) and to a lesser extent London City Airport (circa 2 hours [drive time]".*

26. As the Examining Authority will be aware Gatwick, Heathrow and London City Airport all have significant expansion plans. For example the owners of Gatwick (Vinci Airports) plan to spend £1.1bn on a range of passenger improvements by 2023 and to increase by almost a half to 70 million passengers annually[6]. Heathrow's plans are well known as are London City.

27. Therefore, there may be some conflict regarding the socioeconomic impacts associated between Manston Airport and the developments planned at Gatwick, Heathrow and London City (in addition to Lydd Airport and London Biggin Hill Airport). Despite this potential issue, it appears that expansion plans at Gatwick, Heathrow and London City (in addition to Lydd Airport and London Biggin Hill Airport) all in the SE have not been considered in the application or within the ES as a potential cumulative effect particularly for the socio-economic impacts.

28. Currently, in London and South East: Heathrow, Southampton, Gatwick, Bournemouth, London Biggin Hill, London City Airport, Luton, Southend all have expansion plans.

29. **The Applicant has not considered the expansion plans of airports within a 90-minute commute of Manston Airport (or the wider London and South East region) in its application or within the ES** .

[6] https://www.independent.co.uk/travel/news-and-advice/gatwick-airport-heathrow-vinci-lyon-lisbon-kansai-robot-car-parking-a8912661.html

30. **The Applicant has not considered the expansion plans of airports within a 90-minute commute of Manston Airport (or the wider London and South East region) in its application or within the ES as a potential cumulative effect particularly for the socio-economic impacts. Therefore it cannot rule out cumulative effects and it cannot be determined whether there is any socio-economic beneficial significance, whether minor, major or moderate.**

31. **We robustly recommend the Examining Authority recommend that it cannot be determined whether there is any socio-economic beneficial significance, and whether minor, major or moderate.**

32. Employment Jobs

33. As the Examining Authority will be aware **since the closure of the former airport**, the total number of jobs supported by tourism rose by 8.7% to 7,950, with the industry accounting for an impressive 19% of total employment across Thanet[7].

34. Thanet's job density remains below the national and regional averages. According to the latest ONS figures, however, the gap has closed in recent years. The ratio of total jobs to the 16-64 year-old population has risen by 23% since the airport closed[8] compared to a 2% rise for the South East and a rise in 6% in Great Britain[9] [REP6-034].

[7] *Economic Impact of Tourism Thanet – 2017 Results November 2018*, Commissioned by Visit Kent and Produced by Destination Research

[8] The ratio of total jobs to the 16-64 year-old Thanet population has risen from 0.57 in 2014 to 0.7 in 2017. The figures for the South East/Great Britain were 0.84/0.81 in 2014, and 0.87/0.86 in 2017. Source http://www.nomisweb.co.uk/reports/lmp/la/1946157320/subreports/jd_time_series/report.aspx?

[9] The ratio of total jobs to the 16-64 year-old Thanet population has risen from 0.57 in 2014 to 0.7 in 2017. The figures for the South East/Great Britain were 0.84/0.81 in 2014, and 0.87/0.86 in 2017. Source http://www.nomisweb.co.uk/reports/lmp/la/1946157320/subreports/jd_time_series/report.aspx?

Economically Inactive

35. We respectfully make an overall comment that at Pages 33 and 79 of REAC [REP8-018] have been based on "*assumption(s) taken from E&H 2017*". It is unclear what E&H 2017 is and it is had not been correctly referenced here or anywhere else in the document. Therefore it has not been possible to verify this assumption(s).

36. At Page 33 of REAC [REP8-018] the Applicant alleges for **construction** jobs that:

> "*There is further scope to employ those who are currently unemployed; assumption that approximately 1,800 jobs may be provided to those currently unemployed*".

37. We draw the Examining's Authority to an analysis of the Economically Inactive in Thanet submitted at [REP6-034]. The share of economically inactive in Thanet who report that they do not want a job has risen substantially[10] with the long-term sick accounting for the largest share of economically inactive[11], displacing those who look after the family/home according to the latest statistics.

38. Last year in Thanet the total number of economically inactive was 20,900[12]. Out of this number 18,800 (90.2%)[13] did not want a job [REP6-034]. This number can be broken down even further into the number of long-term sick and looking after family totalling 13,200[14].

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10 http://www.nomisweb.co.uk/reports/lmp/la/1946157320/subreports/einact_time_series/report.aspx?

11 http://www.nomisweb.co.uk/reports/lmp/la/1946157320/subreports/einact_time_series/report.aspx?

12 http://www.nomisweb.co.uk/reports/lmp/la/1946157320/subreports/einact_time_series/report.aspx?

13 http://www.nomisweb.co.uk/reports/lmp/la/1946157320/subreports/einact_time_series/report.aspx?

14 Look after Family/home 5,500 and Long-term sick 7,700. Source > http://www.nomisweb.co.uk/reports/lmp/la/1946157320/subreports/einact_time_series/report.aspx? [REP6-034]

39. Therefore last year a total of 2100 people in Thanet (20,900-18,800) were economically inactive *and* wanting a job.

40. The assumption by the Applicant that 86% (1800/2100) of all those in 1) Thanet; 2) economically inactive; and 3) wanting a job would be not only employed by the Applicant; but 4) employed in construction jobs (At Page 35 of REAC [REP8-018]) is a very high percentage.

41. We note that the number submitted by the Applicant is unsubstantiated and is without supporting evidence or evidence-backed rationale.

42. We further note that the Applicant has not proposed to provide any training or skills or support as part of this proposed mitigation.

43. Further, at Page 79 of REAC [REP8-018] the Applicant double counts this benefit again alleging the exact same number but this time for **operational** jobs:

> "*There is further scope to employ those who are currently unemployed; assumption that approximately 1,800 jobs may be provided to those currently unemployed"*.

44. The assumption by the Applicant that 86% (1800/2100) of all those in 1) Thanet; 2) economically inactive; and 3) wanting a job would be not only employed by the Applicant; but 4) employed in operational jobs (At Page 79 of REAC [REP8-018]) is a very high percentage.

45. We, again, note that the number submitted by the Applicant is unsubstantiated and is without supporting evidence or evidence-backed rationale.

46. On current figures (2018) Thanet did not have 3600 (1800+1800) people who were economically inactive *and* wanting a job.

47. The Applicant is either forecasting that the number of unemployed people in Thanet will **rise** during the operation of the airport which essentially supports reports by Falcon, AviaSolutions (two) and York Aviation etc that an airport on the former Manston site is not viable.

48. Or, the Applicant assumes the same unemployed people will work both in construction and operational jobs. This is highly improbable.

49. Or, that proposed scheme negatively impacts the tourism industry in which 1 person in 5 in Thanet[15] are currently employed (ie tourism jobs drop due to planes impact). This is highly probable.

50. We robustly recommend the Examining Authority recommend that it cannot be determined whether there is any post mitigation effect from the mitigation proposal at Page 33 of REAC [REP8-018] **- *There is further scope to employ those who are currently unemployed; assumption that approximately 1,800 jobs may be provided to those currently unemployed* – and whether minor, major or moderate.**

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15 https://www.visitkentbusiness.co.uk/library/Cambridge_Model_2018/Thanets_Visitor_Economy.pdfThanet's tourism economy now worth £319m as visitor numbers rise to 4.2 million in 2017

Visits to Thanet increased by 8.6% in 2017 with the district welcoming a record 4.2 million visitors, according to research released this week.The value of Thanet's visitor economy grew by 9.2% in 2017 and is now worth over £319 million.Independent research commissioned by Visit Kent showed that the number of day trips to the Thanet district leapt by 9.9% in 2017, meanwhile the total number of nights stayed in the district increased by 4.9%.The total number of jobs supported by tourism rose by 8.7% to 7,950, with the industry accounting for an impressive 19% of total employment across Thanet. Source https://www.thanet.gov.uk/thanets-tourism-economy-now-worth-319m-as-visitor-numbers-rise-to-4-2-million-in-2017/

51. **We robustly recommend the Examining Authority recommend that it cannot be determined whether there is any post mitigation effect from the mitigation proposal at Page 79** of REAC [REP8-018] **-** ***There is further scope to employ those who are currently unemployed; assumption that approximately 1,800 jobs may be provided to those currently unemployed*** **– and whether minor, major or moderate.**

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION SUBMISSION TO DEADLINE 11:

ALL PEOPLE – ECONOMICALLY ACTIVE –UNEMPLOYED (MODEL BASED) THANET

1. We respectfully draw the Examining Authority's attention to an excerpt from the Nomis Official Labour Market Statistics[1]. The full report is attached as an attachment.

		THANET %	SOUTH-EAST %	GB %
Apr 13-Mar 14	6,500	10.5	5.4	7.2
Jul 13-Jun 14	6,000	9.7	5.1	6.9
Oct 13-Sep 14	5,900	9.8	4.8	6.5
Jan 14-Dec 14	6,100	10.1	4.8	6.2

Apr 14-Mar 15	5,900	9.1	4.6	6.0
Jul 14-Jun 15	5,700	8.8	4.5	5.6
Oct 14-Sep 15	5,100	8.2	4.3	5.4
Jan 15-Dec 15	4,600	7.3	4.2	5.2
Apr 15-Mar 2016	4,500	7.0	4.1	5.1
Jul 15-Jun 2016	4,500	6.9	4.1	5.1
Oct 15-Sep 2016	4,900	7.2	4.2	4.9
Jan 2016-Dec 2016	4,400	6.4	4.0	4.8
Apr 2016-Mar 2017	3,800	5.8	3.8	4.7
Jul 2016-Jun 2017	3,600	5.1	3.5	4.6
Oct 2016-Sep 2017	3,500	4.6	3.4	4.5
Jan 2017-Dec 2017	3,400	4.5	3.2	4.4
Apr 2017-Mar 2018	3,700	5.1	3.4	4.3
Jul 2017-Jun 2018	3,900	5.6	3.5	4.2
Oct 2017-Sep 2018	3,200	5.0	3.4	4.2
Jan 2018-Dec 2018	2,900	4.5	3.4	4.2

Source: ONS Annual Population Survey

Note: numbers and % are for those aged 16 and over. % is a proportion of economically active

2. As the Examining Authority will be aware the former airport closed in or around May 2014.

[1] Nomis Official Labour Market Statistics: All People – Economically Active – Unemployed (Model Based) Thanet report run as of today's date 4 July 2019.

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION

SUBMISSION TO DEADLINE 11:

Comments on Information requested by the ExA and received from the Applicant to Deadline 10

REGISTER OF ENVIRONMENTAL ACTIONS [REP8-018]

SOCIO- ECONOMIC (3): Tourism

1. We respectfully note that the Applicant has acknowledged the risk of Aircraft noise during operation impacting on amenity and tourism Page 80 of its Updated Register of Environmental [REP8-018].
2. We respectfully draw the Examining Authority's attention to the fact that the Applicant has **not identified or considered measures to avoid, reduce or compensate for any adverse impacts on tourism** as an Impact in its Updated Register of Environmental [REP8-018].
3. Thanet District Council confirmed at [REP9-XXX] at SE.4 Socio-Economic Effects that:

   "*The Thanet Visitor Study 2018 does not affect TDC's stance in that whilst the proposed development may bring further tourists to the area, the amenity impacts from the construction and operation of the proposed development* ***may adversely affect the tourism industry in Ramsgate and the wider Thanet area and weigh against any proposed benefit***".

4. As the Examining Authority will be aware we have submitted a number of submissions evidencing the importance of the tourism industry to Ramsgate and the wider Thanet both in terms of revenue and employment at [AS-205], [REP4-052] [REP3-056], [REP7-010], [REP7-011].
5. As the Examining Authority will be aware Thanet is part of Kent's bigger tourism picture and Thanet brings in 10% of the county's total visitor economy[1].

[1] Kent welcomed 65 million visitors in 2017, and the visitor economy's value leapt by 7% to £3.8 billion. The county saw a record 64,970,000 visitors throughout 2017, with tourism

6. According to Chief executive of Visit Kent Deirdre Wells OBE: "*Tourism is the UK's fastest growing service sector and* ***these figures*** [2] ***demonstrate the contribution which our vital industry makes to the economy of Kent***[3]" and "*The challenge going forward will be to turn more of our day visits* ***into overnight stays and short breaks, bringing even further growth to the county***[4]."

7. Breaking down overnight visits in Thanet by Town (Source Visit Britain latest data (2017)) Ramsgate had 20,000 overnight visitors, Broadstairs 15,000 overnight visitors and Margate had 13,000 overnight visitors[5].

8. The top 2 key influencers for visitors to Ramsgate and wider Thanet as evidenced at [AS-205], are coastline/beaches and recreational activities.

9. Ramsgate's tourist offer is centred on these 2 key influencers as well as a strong heritage and maritime offer:

    - Ramsgate's visitors currently enjoy kitesurfing, sailing, kayaking, canoeing, diving, seal boat trips, bird watching, tennis (open air tennis courts are at Spencer Square), swimming, football, croquet, bowls, walking, cycling, golfing, and horse riding
    - Ramsgate will hold the British Kitesurfing championships in 2019 (its second year)
    - Ramsgate was voted in the Top 100 ITV British walks (2018)
    - Active Ramsgate[6] was awarded GOLD in the Community Care Award (2017)
    - Explore Kent awarded Ramsgate in 2016 with the first "We Love Walkers and Cyclists" accreditation status and is part of the 28-mile circular Viking Coastal Trail (one of the most attractive

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industry accounting for 76,828 jobs. Thanet's tourism economy is now worth £319 million thanks to a spike in visitor numbers, new figures show. The district welcomed a record 4.2 million visits in 2017, meaning the value of Thanet's visitor economy grew by 9.2% since 2015 (the former airport closed May 2014).
https://www.kentonline.co.uk/thanet/news/districts-tourism-worth-319m-thanks-to-visitor-spike-196648/

[2] *Ibid*

[3] *Ibid*

[4] *Ibid*

[5] https://www.visitbritain.org/town-data

[6] Active Ramsgate Map Showing Recreational Activities: Source Ramsgate Town Council

leisure cycle routes in Kent) which links up with Regional Route 15 of the National Cycle Network

- It holds the second largest international regatta in the UK from the marina Ramsgate Week and the Regatta
- Winter Wassail, May Fayre, Great Bucket and Spade Run, Looping the Loop, Ramsgate Festival of Sound (outside and indoors), Adventures in Performance, Ramsgate Carnival, and the Christmas laser light show over the Royal Harbour
- Ramsgate has a designated park and non-designated parks[7] as well as Grade II Royal harbor[8].
- Ramsgate has Seaside awards for its sandy beaches at Ramsgate Western Undercliff and Ramsgate Main Sands. It has a further sandy beach at Eastcliff beach. It's unclear why the Applicant determined that these beaches were next to a busy road for their noise baseline data.
- All our beaches have a cliff drop and/or promenade separating them from the road.

[7] TR020002-004471 (attached)
[8] *Ibid*

10. Further, we respectfully draw the Examining Authority's attention to the fact that of the traditional town centres within Thanet, Ramsgate Town Centre has the largest turnover of £67m[9]. This has been identified as a **Key Sustainability issue for Thanet**[10]. Most of the town centre of Ramsgate is within the noise contour > 57 dB LAeq 16 hr[11] which is a significant part of the tourist offer.

[9] Arup (August 2018) Thanet District Council Draft Local Plan to 2031 Sustainability Appraisal – Environmental Report Page 46, Table 13: Key Sustainability Issues for Thanet [REP3-056] and attached for ease of reference.

[10] *Ibid*

[11] MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION SUBMISSION TO DEADLINE 9: Comment on PD-018 - Requirement 9b, Noise Mitigation submitted by Five10Twelve : SUPPLEMENTARY APPENDIX Ramsgate Listed Buildings and Conservation Area

11. We respectfully draw attention to the Examination Authority to the body of evidence provided by Interested Parties attesting to and providing evidence of the significant critical adverse Impact of Aircraft noise volumes during operation impacting on employees and customers of local businesses and to the town centre of Ramsgate. These include but are not limited to:

(a) All of the Community spaces, parks and recreational areas[12]

(b) All of the Churches and places of worship[13]

(c) Love Ramsgate Business Survey (short summary) [REP5-075]

(d) Love Ramsgate Business Survey (Full Survey) [REP7-009]

(e) Businesses that are noise sensitive and aviation noise would materially affect the business concerned for example, Touring Park, holiday lets, hotels. A number of these businesses provided Relevant Representations to Planning Inspectorate including but not limited to: [RR-0586], [RR-1843], [RR-0034], [RR-0349], [RR-1649], [RR-0677], [RR-1420],

(f) Two of the most successful hospitality businesses in Ramsgate have also put in Written Representation including but not limited to: [AS-076]

(g) As of Deadline 9, Five10Twelve and its directors have submitted 110 evidenced submissions.

(h) As of Deadline 9, Ramsgate Town Council have made 4 submissions at [AS-141], [REP1-035], [REP3-064] and [REP3-066]

(i) As of Deadline 9, Ramsgate Coastal Community Team has made one submission [RR-1625]

(j) As of Deadline 9, Ramsgate Town Team has made 3 submissions at [RR-1623] [AS-193] and [REP9-XXX]

(k) As of Deadline 9, Ramsgate Society has made 5 submissions at [RR-1948] [REP3-008] [REP4-060] [REP4-061] and [REP4-061]

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within Five10Twelve's Noise Contours (produced by CAA/ERCD) Listed Buildings (black dots) and Conservation Area (grey-shaded) : National Heritage List GIS data

[12] TR020002-004471 (attached)

[13] TR020002-004477 (attached)

(l) As of Deadline 9, Ramsgate Heritage and Design Forum has made 3 submissions at [RR-1626] [REP3-017] and [REP4-063]

(m) As of Deadline 9, Ramsgate Neighbourhood Plan has made 2 submissions at [RR-1628] and [REP3-075]

(n) Video Evidence has been submitted to evidence the noise and visual impact of planes travelling (taking off and landing) over Royal Ramsgate Harbour where many of our businesses are located and near the town centre [REP4-087] and [REP4-090]

(o) A map showing the Listed Buildings and Conservation Area which also shows Ramsgate Town Centre and other areas such as the Arches in which businesses are located was submitted at [TR020002-004480] **most of the town centre is within the noise contour > 57 dB LAeq 16 hr[14].**

(p) At submission [REP3-056] evidences the large amount of private inward investment to Ramsgate since the airport closed in May 2014 which will **all be located under the flight path at noise levels of > 57 dB LAeq 16 hr and at risk;** by way of example:

- Wetherspoons (Royal Victoria Pavillion) (2017) a UK Top Employer, £4.5m development (Number of tables just under 350 with large terrace by the beach, covers 900, staff number 200)
- Albion House (17 bed luxury hotel) (2014) built in 1791 voted The Telegraph's "The 50 Most Romantic Hotels in Europe" - in at number 15 (March 2017), The Times "20 Great hotels for a Weekend away" in at Number 10 (March 2017), The Times "Best Places by the Sea" (Number 26) (May 2016) and Voted No. 1 in Kent in Tripadvisor UK.
- A number of restaurants and cafes and shops have opened since the airport closed.

[14] MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION SUBMISSION TO DEADLINE 9: Comment on PD-018 - Requirement 9b, Noise Mitigation submitted by Five10Twelve : SUPPLEMENTARY APPENDIX Ramsgate Listed Buildings and Conservation Area within Five10Twelve's Noise Contours (produced by CAA/ERCD) Listed Buildings (black dots) and Conservation Area (grey-shaded) : National Heritage List GIS data

12. From the evidence submitted it is clear that a) there will be an Impact; and b) that Impact will be significant and critical jeopardizing the Tourism economy of Ramsgate and the wider Thanet[15].

13. In its Updated Register of Environmental [REP8-018] the Applicant has not identified or considered measures to avoid, reduce or compensate for any adverse impacts Aircraft noise volumes during operation impacting on tourism of Ramsgate an the wider Thanet.

14. Pursuant to Section 104(3) of the Planning Act 2008 the Secretary of State must decide the application in accordance with any relevant national policy statement, except to the extent that one or more of subsections (4) to (8) applies.

15. The Applicant has not provided significant and material information to enable the Examining Authority and the Secretary of State to take into account the proposed development's potential adverse impacts (including any longer term and cumulative adverse impacts) as well as any measures to avoid, reduce or compensate for any adverse impacts (paragraph 4.4 Airport NPS).

16. In this context, environmental safety, social and economic adverse impacts have not been considered at the national, regional and local level (paragraph 4.5 Airport NPS).

17. We respectfully submit on this basis the Application must be refused.

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[15] *Ibid*

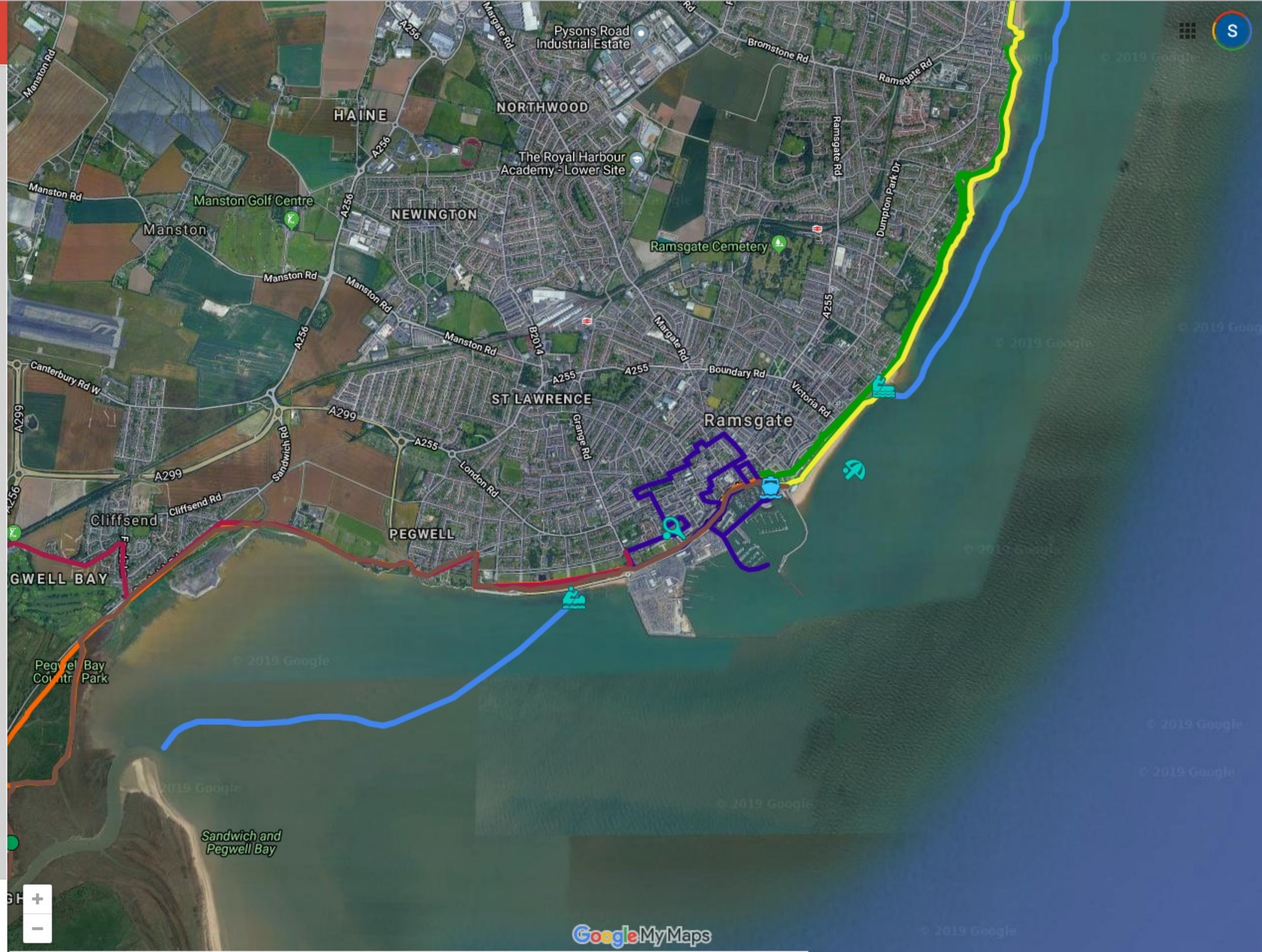
Appendix

Active Ramsgate Map

Map of Ramsgate Walks
10,307 views
SHARE

Untitled layer

- Sea It All: Coast, Cliffs & Café Culture
- The Contra Trail: Boats, Birds & Bays
- Town Rounders: Regency, Royal & Riviera
- The Beach Roamer: Botany, Bays and Be...
- The Way of St. Augustine
- Guided Canoe Trail
- Canoe Trail
- Kitesurfing
- Guided Canoe Trail
- Canoe Trail
- Pickleball and Tennis
- Boat Trips
- Ramsgate to Camber
- Start of Ramsgate to Camber Alternative...
- Ramsgate to Camber Alternative Route 1
- End of Ramsgate to Camber Alternative ...
- Ramsgate to Camber
- Start of Ramsgate to Camber Alternative...
- Ramsgate to Camber Alternative Route 2
- End of Ramsgate to Camber Alternative ...
- Start of Ramsgate to Camber Alternative...
- Ramsgate to Camber Alternative Route 3
- End of Ramsgate to Camber Alternative ...



MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION
SUBMISSION TO DEADLINE 9:
Comments on Information requested by the ExA and received from the Applicant to Deadline 8 and Comment on PD-018

Thanet District Council and Ramsgate Town Council Properties for use by the Community (designated as Communities, Museums & Theatres, Recreational Parks) that Fall within Each of the Noise Contours

1. We respectfully submit the Table below for the attention of the Examining Authority with supporting evidence to show that **all of the Thanet District Council and Ramsgate Town Council Properties for use by the Community** (designated as Communities, Museums & Theatres, Recreational Parks) that are identifiable by a desktop search[1] (together the "**Communities, Museums & Theatres, Recreational Parks**") as well as our beaches are predicted to exceed the 51 dB LAeq 16 hr noise contour.
2. As you will be aware this Table evidences clearly a very high level of community areas materially impacted by noise **with a majority of these Communities, Museums & Theatres, Recreational Parks impacted at levels >57 dB LAeq 16 hr noise contour** including a 13 acre park and beaches all with disabled access**.**
3. This is of particular concern in light of the socio-economic demographic of Ramsgate and perhaps engages the Equality Act 2010. We note that an Equality Assessment was untaken as part of the Airports National Policy Statement in relation to other proposed airport developments at LGW-2R, LHR-ENR and LHR-NWR[2].
4. We note that the Applicant has not engaged with or contributed to the Thanet District Council Playing Pitch Strategy[3], Ramsgate Football Club[4],

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[1] https://www.thanet.gov.uk/info-pages/parks-and-open-spaces/
https://www.thanet.gov.uk/wp-content/uploads/2019/01/Transparency-Asset-Report-January-2019-Transparency.pdf
[2]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/713315/airports-nps-equality-assessment.pdf
[3] https://www.thanet.gov.uk/wp-content/uploads/2018/08/Playing-Pitch-Strategy.pdf
[4] https://www.ramsgate-fc.co.uk/

Beach within Reach[5] or Ellington Park Regeneration Project[6] (by way of example only).

5. Ellington Park will be within the >57 dB LAeq 16 hour noise contour if the DCO is granted. The National Lottery Heritage Fund have funded the Ellington Park Project and unlocked £2m (two million pounds) investment in Ellington Park. This investment is at significant risk (if the DCO is granted) as it is linked to Key Performance Indicators (KPIs) including the number of visitors to the park. Ellington Park is expected to attract 120,000 visitors a year as a KPI of the £2m investment.

6. As the Examining Authority will be aware under Section 6 of the Appraisal of Sustainability: Airports National Policy Statement Non-Technical Summary of June 2018 the proposed scheme must:

   (a) **avoid or minimise negative effects** on community viability, including housing, **facilities and indirect effects**,

   (b) avoid or minimise **disproportionate impacts of any social group**,

   (c) maintain and where possible **improve the quality of life for local residents** and the wider population,

   (d) **minimise and where possible reduce noise impact** on human receptors,

   (e) **conserve and where appropriate enhance heritage assets** and the wider **historic environment** including **buildings, structures, landscapes, townscapes** and archaeological remains, and

   (f) **promote the protection and improvement of landscapes, townscapes, waterscapes** and the **natural features** including areas of tranquility and dark skies**.**

7. The Applicant's proposed scheme fails on all of the above counts (bold added for emphasis.

8. There are no feasible means of mitigation for the above Community (designated as Communities, Museums & Theatres, Recreational Parks) and beaches which are spread throughout Ramsgate.

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[5] https://www.beachwithinreach.org.uk/

[6] https://www.thanet.gov.uk/info-pages/ellington-park-regeneration-scheme/

9. We therefore respectfully request the Examining Authority to make a **robust recommendation** to the Secretary of State to **refuse to grant the Applicant's DCO**.

10. We respectfully remind the Examining Authority that in every single case over these past twenty-six years and numerous reports, Manston Airport has been fairly considered and has consistently been rejected by the Government, largely on the grounds of poor geographical location with regards to distance from sources of demand **and proximity to Ramsgate.** Needless to say, the geography has not changed in the past twenty-six years, nor is it likely to in the period to 2050[7].

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[7] **Runway Capacity to Serve the South East (RUCATSE) report for the Department of Transport (*"DfT"*) (1993)**, which concluded that Manston *"did not merit detailed assessment"*

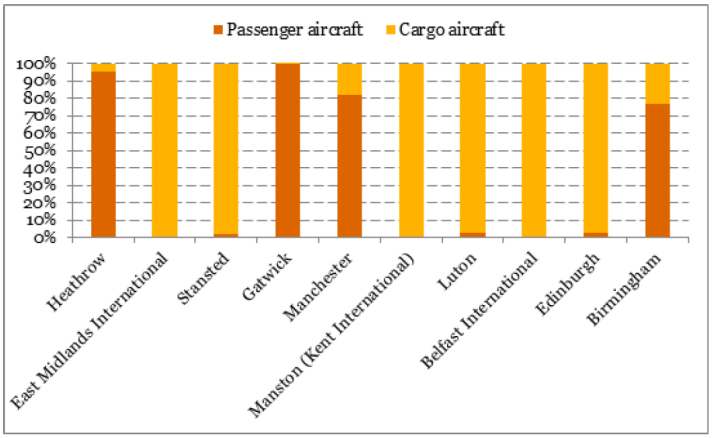
The Future Development of Air Transport in the UK - South East (DfT, 2002) which concluded with regards to Manston that *"key constraints are its geographic position in relation to the major sources of demand and noise impacts over the nearby town of Ramsgate"*

Sir Howard Davies' Airports Commission Interim Report (2013) which reviewed the case for Manston as one of 52 proposals received in its shortlisting process and dismissed it as an option for further consideration in the final report since it *"did not fit with the Commission's remit or offer a solution to the key question of providing additional long-term capacity and connectivity for the UK".*

Airports Commission Interim Report : The Air Freight Industry in the UK (PwC, 2013)
Of particular note is that Manston was rejected for any further consideration after being considered by the Airports Commission ("AC") in context as a dedicated cargo-only carrier in this report, which formed part of the AC's suite of Economics Analysis Consultants Reports.

The first of the two diagrams taken directly from this report, clearly shows Manston was taken into account and duly considered as part of this report. During this period, Manston was operating (unsuccessfully) as a pure freight airport - as per the current proposal by the Applicant.

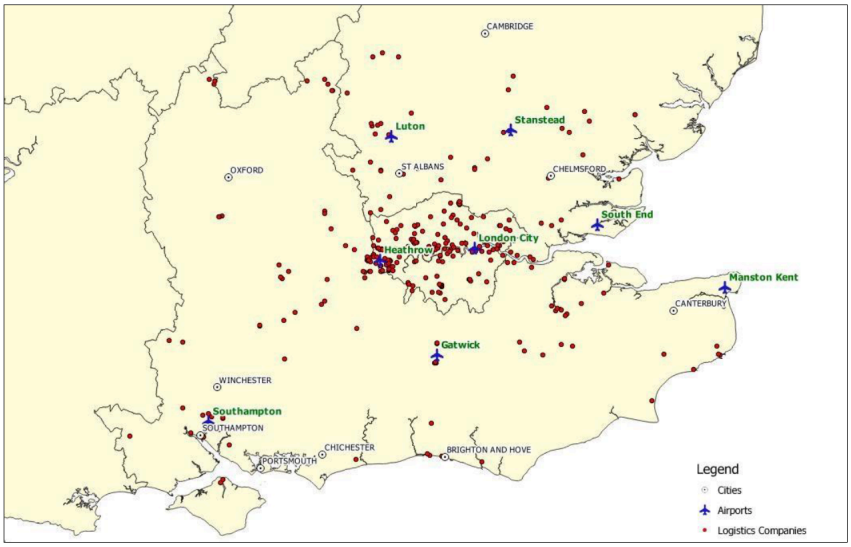
Figure 31: Percentage of freight by aircraft configuration – 2012



Source: The Air Freight Industry in the UK, (AC/PwC 2013), Page 34

The second diagram gives some indication as to one of the many reasons why Manston struggles to compete in the air freight market in the UK and consistently failed to achieve viability.

The map below highlights the presence of third party logistics companies in South East England, with a clustering around Heathrow:



Source: The Air Freight Industry in the UK, (AC/PwC 2013), Page 43

Airports Commission Final Report (2015)

After being duly and fairly considered as both a passenger airport and in PwCs accompanying economic analysis in the context of a freight-only operator - as per the Applicant's current proposal - Manston was deemed unworthy of even a single mention in the Airports Commission Final Report of 2015.

Airports National Policy Statement (June 2018)

The ANPS confirms the significant role of the Airports Commission and its reports in establishing the evidence base for the ANPS and evaluating *"how any need for additional capacity should be met in the medium and long term".*

The ANPS confirms that the shortlisting process of the Airports Commission reviewed 52 proposals, which - as evidenced above - included Manston in its capacity as both a passenger airport and as a freight-only operator, and concludes that:

"The Government believes that the Airports Commission has analysed all the options put forward to the appropriate degree of detail, and discounted shortlisted schemes fairly and objectively"

Table

Thanet District Council and Ramsgate Town Council Properties for use by the Community (designated as Communities, Museums & Theatres, Recreational Parks) that Fall within Each of the Noise Contours

No.	Noise Contour[8]	Name of Public Parks and Open Spaces such as recreation grounds churchyards and memorial gardens	Size, Child Facilities and access	UPRN[9] and Thanet District Council Number[10] and Ramsgate Town Council
1	> 60 dB LAeq (orange)	Nethercourt Touring Park	Campground	10022966759 22
2	> 57 dB LAeq (purple)	Ellington Park Municipal site for general public use Public park laid out in 1892 Recipient of £2 million refurbishment fund[11] Expected to attract 120,000 visitors a year	13 acre park Grass 390 established large trees Flowers Fenced play area for younger children and a physical activity areas for both children and adults Benches Well surfaced access routes suitable for visitors with	10022964393 70

[8] [8] Map showing noise contours commissioned by Five10Twelve Limited and produced by the ERCD of CAA overlayed onto a google map

[9] https://www.thanet.gov.uk/wp-content/uploads/2019/01/Transparency-Asset-Report-January-2019-Transparency.pdf

[10] https://www.thanet.gov.uk/wp-content/uploads/2019/01/Transparency-Asset-Report-January-2019-Transparency.pdf

[11] https://www.kentonline.co.uk/thanet/news/park-restoration-works-step-up-207023/

			pushchairs and/or wheelchairs	
3	> 57 dB LAeq (purple)	ST LAWRENCE BOWLS CLUB Ellington Park		10022964371 296
4	> 57 dB LAeq (purple)	Ellington Park Land		100062100490 73
5	> 57 dB LAeq (purple)	Ellington Park Model Club		1001336769 25
6	> 57 dB LAeq (purple)	Edwardian Ellington Park Bandstand 1892		1001336769 25
7	> 57 dB LAeq (purple)	Ramsgate FC Southwood Stadium Owned by Ramsgate FC(85) Limited Founded in 1886	Grounds maximum capacity of 2,500 Grass	100062281844 572
8	> 57 dB LAeq (purple)	Liverpool Lawn Gardens		10013307478 76
	> 57 dB LAeq (purple)	Foresters Hall Listed building 1811 EastKent Mencap	Provides services for people with a learning disability and their families	100062282959 628

9	> 57 dB LAeq 16 hr (purple)	Spencer Square Gardens Van Gogh sculpture Two blue plaques where Van Gogh lodged and worked when he lived in the town	Public Tennis Courts Well surfaced access routes suitable for visitors with pushchairs and/or wheelchairs Flowers	10006268153 75
10	> 57 dB LAeq 16 hr (purple)	Vale Square Community Gardens	Public Events Grass Established large trees	10013308111 80
11	> 57 dB LAeq 16 hr (purple)	Royal Harbour Marina Royal Harbour (designated 1821 by HM King George IV) Grade II and Grade II* listed buildings and structures ranging from the Customs House and Clock tower, harbor inner basin walls, Jacob's ladder and Edwardian Eastcliff lift.	Four Gold Anchor Award complex 700 finger moorings Well surfaced access routes suitable for visitors with pushchairs and/or wheelchairs	
12	> 57 dB LAeq 16 hr (purple)	Effingham Fire Station Grade II listed status C18 house converted and extended in 1905 under the direction of Borough Engineer T G Taylor to serve as Ramsgate Fire Station Purchased by Ramsgate Town Council in 2019 for use by the community		Ramsgate Town Council
13	> 57 dB	Albion Place Gardens	Benches looking	10022962383

	LAeq 16 hr (purple)	A designated Registered Park and Garden presence of significant historical technical innovation Albion Place Garden Grade II Five Pulhmite structures on Albion Hill constructed between 1893 and 1936 (Grade II listed status)[12]	out to sea Grass Established large trees	77
14	> 57 dB LAeq 16 hr (purple)	MADEIRA WALK WATERFALL		10013308127 101
15	> 57 dB LAeq 16 hr (purple)	Albion Gardens War Memorial to the Great War Memorial is protected and listed on the National Heritage list for England[13]		10013308166 111
16	> 57 dB LAeq 16 hr (purple)	Ramsgate Sports Centre		200002882279 582
17	> 57 dB LAeq 16 hr (purple)	ALBERT COURT		200003080360 88
18	> 57 dB LAeq 16 hr (purple)	La Belle Alliance Square	Play area for younger children	
19	> 57 dB LAeq 16 hr	Ramsgate Skatepark[14]	Council skatepark	

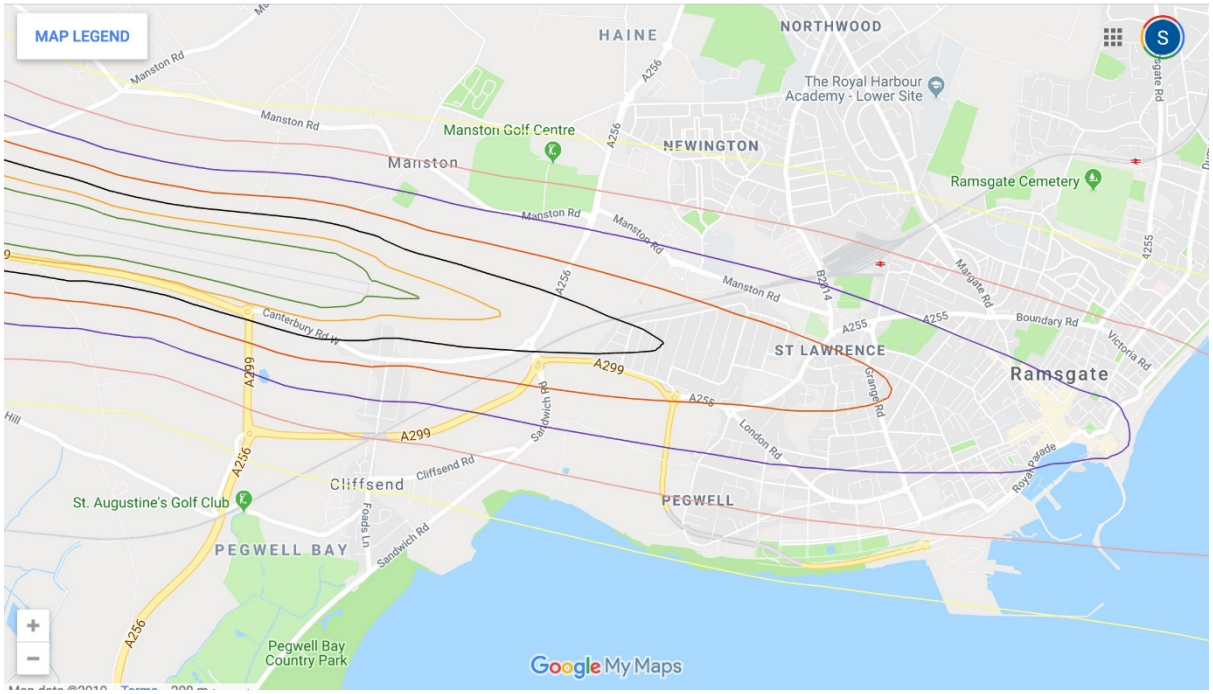
[12] https://www.kentonline.co.uk/thanet/news/nine-historic-buildings-granted-listed-status-205635/
[13] https://historicengland.org.uk/listing/the-list/list-entry/1085348
[14] https://www.skateparks.co.uk/kent/ramsgate-bowl/

	(purple)			
20	> 57 dB LAeq 16 hr (purple)	Ramsgate Main Sands	Disabled toilets Disabled access to the beach Seaside Award 2019	
21	> 54 dB LAeq 16 hr (pink)	Boundary Park	Play area for younger children and children Public Basketball courts Grass Established large trees	
22	> 54 dB LAeq 16 hr (pink)	MARINA ESP - FIRST AID OFFICE		10022963904 91
23	> 54 dB LAeq 16 hr (pink)	Arklow Square	Grass Established large trees	
24	> 54 dB LAeq 16 hr (pink)	Grange Road – Amenity Land		10071164837 87
25	> 54 dB LAeq 16 hr (pink)	Victoria Gardens Festival of Britain Fountain Grade II listed status Tollgate kiosk Grade II listed (1876)	Benches looking out to sea Grass Flowers Seafront Shelters looking out to the sea	
26	> 54 dB LAeq 16 hr (pink)	Eastcliff Bandstand (surrounding which is the only open-aired polished dance floor on a cliff top in the world)		10022964393 70

27	> 54 dB LAeq 16 hr (pink)	Warre Recreation Ground Part of the Playing Pitch Strategy[15] and is protected as a playing field site in the Local Plan	Grass Established large trees Grass Pitches for Adult football Changing Rooms Disabled access	1001336769 25
28	> 54 dB LAeq 16 hr (pink)	GRANVILLE MARINA FOUNTAIN		10013308125 100
29	> 54 dB LAeq 16 hr (pink)	Granville Theatre 1947	Town's sole multi-purpose entertainment venue	100062282470 276
30	> 54 dB LAeq 16 hr (pink)	Royal Esplanade Gardens Ramsgate Croquet Club	Benches looking out to sea Grass Flowers Seafront Shelters looking out to the sea	
31	> 51 dB LAeq 16 hr (yellow)	Westerncliff /Courtstairs		10022966754 64
32	> 51 dB LAeq 16 hr (yellow)	PEGWELL RD - COURTSTAIRS PARK		10013307499 78
33	> 51 dB LAeq 16 hr (yellow)	WESTERN UNDERCLIFF TIDAL POOL		10013308110 98
34	> 51 dB LAeq 16 hr (yellow)	ROYAL ESP - MINIATURE GOLF		10071164952 573
35	> 51 dB LAeq 16 hr	ROYAL ESP - PUTTING GREENS		10071164952

[15] https://www.thanet.gov.uk/wp-content/uploads/2018/08/Playing-Pitch-Strategy.pdf

	(yellow)			574
36	> 51 dB LAeq 16 hr (yellow)	ROYAL ESP - BOWLING GREEN		100062628138 575
37	> 51 dB LAeq 16 hr (yellow)	ROYAL ESP - CROQUET CLUB (four excellent full-sized lawns and a clubhouse)		100062628137 576
38	> 51 dB LAeq 16 hr (yellow	Western Undercliff Beach	Seaside Award 2019 Disabled parking	
39	> 51 dB LAeq 16 hr (yellow	Eastcliff Promenade and Beach	Disabled parking Disabled access to the beach	


MAP LEGEND
HAINE
NORTHWOOD
The Royal Harbour Academy - Lower Site
Manston Golf Centre
NEWINGTON
Manston
Ramsgate Cemetery
Manston Rd
A256
B2214
A255
Boundary Rd
Victoria Rd
Margate Rd
ST LAWRENCE
Ramsgate
A299
Canterbury Rd W
Sandwich Rd
Grange Rd
London Rd
Royal Parade
Cliffsend Rd
Cliffsend
PEGWELL
St. Augustine's Golf Club
Foads Ln
PEGWELL BAY
Pegwell Bay Country Park
Google My Maps

Thanet District Council

Draft Local Plan to 2031

Sustainability Appraisal - Environmental Report

REP/228764/003

Issue | August 2018

Job number 258960-00

Ove Arup & Partners Ltd
13 Fitzroy Street
London
W1T 4BQ
United Kingdom
www.arup.com

ARUP

8 Key Sustainability Issues for Thanet

The SEA Directive confirms that the Environmental Report should include the following information:

> *'any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC'*[54].

The examination of policy and baseline characteristics, has allowed sustainability issues to be identified which may influence the emerging Local Plan.

Presented in Table 13 are the Key Sustainability Issues for Thanet. It should be noted that to assist in transparency, sub issues have been included for each of the key issues. These provide an indicator of the particular facet of economic, environmental and societal (the three core elements of sustainability) that the issue is most relevant to. The table proved useful in developing relevant objectives and indicators during SA Stage A4.

54 Annex I (c)

Table 13: Key Sustainability Issues for Thanet.

Key Sustainability Issue	Sub Issue	Description	Validation	Source
ECONOMY	Economic Development	Support for industrial and employment development at key sites within the District.	Existing evidence suggests that Thanet is a net exporter of labour with a workplace ratio of 1.19. Bearing in mind the limitations of the data, further analysis suggests that the workplace ratio could be closer to 1.10. Currently Thanet has significant out migration of the 16-39 age groups. Our forecasts promisingly suggest that more roles are likely to be created which align with the occupation profile of this younger age group which help to reduce the level of out-migration. Economic development at business Parks such as Manston Park, Eurokent and Thanet Reach along with economic development at employment sites adjacent to the Sandwich corridor expected to be available as services employment land within the Local Plan. The main demand and growth is coming out of the local market, and therefore should be supported. There is insufficient supply of property to meet this demand. Relatively little interest from companies wishing to relocate to Thanet, or large inward investors. Priority should be given to allocating land for delivering economic development, protecting sites for industrial and commercial uses where there is a good prospect of employment use, consider upgrading or improving existing sites and working to overcome barriers to delivering sites, including identifying infrastructure planned and necessary to support economic growth. In particular relation to employment land provision, sufficient employment land must be provided through the redevelopment of brownfield land and refurbishment of existing stock, to provide new and flexible employment space.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan Employment Land Review Experian Economic and Employment Assessment – Thanet District Council, 2012
		Create and maintain local employment opportunities centred on fairly paid jobs.	Thanet has relatively high levels of unemployment, and social and economic deprivation. Thanet's history of economic problems is reflected in a persistently high unemployment rate. Total, unemployment rates increased since 2009, and peaked at 6.4% in February 2012. Figures for 2012 show unemployment to have slightly decreased to 5.6%. There is a significant and increasing gap between the rates of unemployment in Thanet compared to Kent (3.2%), the South East (2.4%) and National (3.75%)[55] averages remains. There are fewer people with professional jobs in Thanet than in Kent and England. Skilled trades, caring, leisure and customer service, and other service occupations are more dominant in Thanet than in Kent and South east.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan Local Futures 2004 Draft Employment Topic Paper
		Development of grant funding packages for firms investing in Thanet.	Thanet is part of the Grow East Kent initiative which includes funding for existing and new start businesses as well as businesses looking to move to area. Thanet is also part of the East Kent Priority Area for Regeneration	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan
		Ensuring that the strategic future of retail centres supports commercial diversification and capital investment as well as providing a strong revenue stream for Thanet District Council.	Thanet retail centres are considered unattractive investment areas for major retailers due to relative isolation, limited catchment and the current high dependence ion larger retail centres outside the Thanet region. However, major changes have occurred since 2000 to the provision of retail floor space in Kent and this has had an impact on expenditure spent outside the Thanet region. Of the traditional centres. Ramsgate has the largest turnover at £67million	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan
		Supporting regeneration of key areas within the District.	South East Local Economic Partnership (SE LEP) implemented in April 2011 to promote strategic economic priorities and make investments activities to drive growth and local jobs. Investment from the Governments Growing Places Fund includes first round projects across Kent and in Thanet such as 'Live Margate, Kent	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan
	Economic Structure	Ensuring that improving economic prosperity provides benefits to the whole of Thanet focussing regeneration on key wards.	Kent County Council's 'Grow for it East Kent' scheme which is aiming to attract new businesses to locate within the sub-region as well as supporting the start up and growth of indigenous and pre-existing businesses. It is doing this by promoting the area to businesses and also providing support to new businesses and funding to support businesses looking to locate in East Kent. The Thanet Local Plan identifies four key areas in need of special attention: Margate Old Town Area, King Street in Ramsgate, Upper High Street in Ramsgate and Cliftonville West. Thanet has poor housing stock with a high proportion of semi-derelict, vacant or homes in a state of poor repair. In addition, there are a high proportion of multiple occupation premises which leads to pressure on parking, nuisance, noise and visual deterioration of houses and gardens.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan Experian Economic and Employment Assessment – Thanet District Council, 2012

55 Thanet District Council Local Plan 2006

Key Sustainability Issue	Sub Issue	Description	Validation	Source
		Ensuring that existing building stock (particularly redundant buildings) is brought into use for employment where appropriate.	Create and maintain local employment opportunities centred on fairly paid jobs. There is also a dominance of employment in the public sector and whilst this has an important role to play in any economy, it is not a strong driver of growth and wealth creation. With over a third of employees working in the public sector there is a need to balance this to ensure that there is scope for the economy to grow. At 1st April 2011 there were 3,456 empty homes in Thanet. (Source Research & Evaluation Statistical Bulletin "Vacant and empty dwellings - Annual 2010/11" Kent County Council)	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan
		The protection and enhancement of natural assets including Blue Flag status of beaches in support of tourist economy.	Tourism provides a significant contribution to the Thanet local economy and so efforts to maintain natural assets and improve its desirability as a coastal destination are required to strengthen and support future economic growth. Visit Kent data for 2009 indicates that there were 57 million visitors to Kent, with an economic impact of £3.2 billion as well as supporting an estimated 63,000 jobs.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan Town Centre Retail, Leisure, Tourism and Culture Assessment, 2012
		The protection and enhancement of historic assets.	Scheduled monuments in Thanet include Anglo Saxon Cemeteries and remains at Monkton and Dane Valley, Salinestone Grange, Quex Park Settlements, and various ring ditches and enclosures. There are also significant amounts of listed buildings and conservation areas throughout the district.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan
		Mobility and access to employment opportunities through provision of sustainable public modes of transport.	Compared to a national average of 25.8% the proportion of Thanet households not in possession of a car or van is 29.8%, the 5th highest in the region. In some of the more deprived wards this is almost double this such as Margate Central (52.4%). Of the working age population 40% travel by private, car, van or motorbike to work. 6% travel by public transport, 9% walk or cycle and 3% work from home. These percentages are all lower than the regional and national (England) averages.	Census 2011.
SOCIAL	Safety	Initiatives leading to greater public safety including appropriate strategies for intervention (Community Wardens, Police Community Support and Secured by Design).	Approximately 91% of the Thanet population feel safe in their homes – the main focus of interest is in Margate Central Ward and Cliftonville West Ward. Local analysis has shown that the streets of Thanet are extremely safe – large areas of Thanet have had no reported crime in two years with only nine of 446 output areas reporting one crime per month. All three town centres are awarded the National ‘Safer Shopping Award’ with shoplifting and commercial burglary falling year on year.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan Thanet Crime and Disorder Police Audit 2005-2008
	Housing	Responding the needs and requirements of the current and future housing market. Support the viability of existing residential developments now and in the future.	Over the last decade the housing market and mix of tenure has changed due to the recession and the impacts this has had on house prices. The proportion of households that are rented instead of owned or mortgaged has increased. Likewise, the annual number of housing sales has fallen to a level lower than 1996. This means that because there is currently less demand for housing the potential future requirements may be less than previously anticipated. However, given the long timeframe over which the Local Plan will operate (to 2031) it is quite likely that the housing market will have changed again. Therefore, the Local Plan needs to consider how it can allow flexibility to address potential changes in the future and this flexibility is something that the SA will also consider during the assessment of options and alternatives. The Thanet Private Sector Housing Strategy indicates that the standard of the existing stock is an issue, with the private rented sector being poor in some areas, particularly in Cliftonville.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan Urban Housing Capacity Study (Kent District council) 2002 Local Housing Needs Study Strategic Housing Land Availability Assessment Strategic Housing Market Assessment
	Mobility	Access to key services and employment opportunities through public transport provision.	The Channel Tunnel Rail Link has benefited the UK as a whole but has led to substantial job losses in the in the cross channel ferry industry. Transport links in Thanet have been historically poor however in recent years a number of transport connections have improved significantly. The recently completed East Kent Access Road (A256) provides a fast connection to the A20/M20 at Dover and to the Port of Dover and Channel Tunnel. The Access Road also links Thanet with other major economic assets such as the Port of Ramsgate and Discovery Park to the UK’s main arterial road network in less than 60 minutes. Additionally, the introduction of High Speed 1 rail services in 2009 has reduced commuting from central London to Ramsgate to 76 minutes and Margate to 88 minutes. The local population is well served with public transport connections. Access throughout the district is possible via the Thanet Loop bus service. This covers Margate - Broadstairs - Ramsgate – Margate i.e. all towns/centres of commercial activity	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan

Key Sustainability Issue	Sub Issue	Description	Validation	Source
	Deprivation	Levels of economic disparity within the region and need to maximise opportunities for all sectors of society. Access to employment opportunities identified as an issue in limiting the realisation of Thanet's potential.	The 2010 Office of National Statistics Indices of Deprivation indicates that Thanet is ranked the most deprived District in Kent and 65th in England (out of 354), moving it within England's top 20% deprived Districts in England in all 6 deprivation categories (employment, health deprivation, disability, educational skills and training, housing, geographical access to services and income). Per ward Margate is ranked the most deprived Ward Thanet is within the top 20% most deprived areas of Kent. 15.2% of the District's population are separated or divorced in comparison to the England and Wales average being 11.7% - this is the highest rate in Kent.	Thanet DC Corporate Themes, Plans, Policies and Programmes Thanet Local Plan
	Health	Maintenance of high levels of healthcare provision including dependent sectors of the community. Population demand on healthcare and support services (PCT initiatives).	The poor health of Thanet cannot just be attributed to the number of older residents of people suffering a limiting long term illness. This ranks highest in the region (of 67) and is 37th of the 376 Districts in England and Wales.	Census 2011.
	Education and Skills	Access to skills development for all sectors of society. Particular demand associated with transient and dependent sectors of society.	39% of East Kent's children's homes providing care for socially excluded children are located in Thanet. A large proportion of children remain in the area through to adulthood compounding a dependency culture. Within Thanet 15.9% of 16-60 year olds have low or very low literacy (15% nationally) and 35.1% have low or very low numeracy (33% nationally) It is well evidenced that the district has a number of skills gaps. Thanet's qualification profile is skewed towards NVQ1, 2 and 3, with all three above the county, region and UK. Promisingly it has proportionally fewer individuals with no qualifications (8.6%) this is compared to Kent at 11.4 per cent and the UK as a whole 12.2 per cent. However, in terms of NVQ level 4, which is equivalent to degree level qualification, the district has proportionally far fewer residents that hold this qualification than the county, region and UK. In the South East over a third (39.7 per cent) are NVQ level 4 or above compared to 31.4 per cent in Thanet.	Thanet DC Corporate Themes, Plans, Policies and Programmes review and baseline, South East Regional Integrated Regional Framework, Thanet Statement of Community Involvement Experian Economic and Employment Assessment – Thanet District Council, 2012
ENVIRONMENT	Perceptions and Image	Need to maintain the appearance, vitality and safety of the street scene within Thanet particularly associated with town centres and coastal areas.	With their competing catchment areas Thanet's towns have struggled to retain a vital commercial core and have lost many visitor attractions resulting in the stock of guest house and hotels being reduced and converted to private residential multiple user accommodation. However, this is starting to change particularly within Old Town in Margate and Marina in Ramsgate, but in some areas of public realm the main high streets are of a poor standard.	Thanet DC Corporate Themes, Plans, Policies and Programmes review and baseline, South East Regional Integrated Regional Framework, Thanet Statement of Community Involvement NLP Report
	Biodiversity	Protection of designated sites including; SSSIs, SPA and Ramsar site.	The Thanet coast is protected by a number of international and national conservation and biodiversity designations. These include Special Protected Areas, a Ramsar Site and Sites of Special Scientific Interest. A full list of designations made on biodiversity grounds are given in Appendix C. Threats to rare species of birds and the Chalk Reefs are a particular concern.	Thanet DC Corporate Themes, Plans, Policies and Programmes review and baseline, South East Regional Integrated Regional Framework, Thanet Statement of Community Involvement, Kent Biodiversity Action Plan.
	Development Pressure	Threat to areas of high wildlife, conservation and biodiversity importance from economic and social development	Development within the Thanet District presents areas of conservation and wildlife importance at threat. This is particularly evident in areas of 'coastal squeeze' where space for development is at a premium. Also the need for open space for recreational needs places additional pressures on designated areas. The impact of changes to air quality resulting from this development should also be considered. Where possible opportunities to link and extend wildlife habitats to reduce the impact of inappropriate development should be supported. In doing so it is important to make provisions for general green space and green infrastructure in association with development needs	Thanet DC Corporate Themes, Plans, Policies and Programmes review and baseline, South East Regional Integrated Regional Framework, Thanet Statement of Community Involvement, Kent Biodiversity Action Plan.
	Coastal Management	The coastal areas of Thanet have a high conservation and landscape value and should be afforded appropriate protection.	The chalk reefs in themselves justify the need to afford significant management in the protection of the coastal area. In particular threats include; increasing pressure on coastal resources from recreational use, the potential impact of coastal flood defence construction, the impact of coastal erosion, impact from urbanisation and the threat to species of regional, national and international importance, such as the turnstone. Groundwater Source Protection Zones exist across the district.	Thanet DC Corporate Themes, Plans, Policies and Programmes review and baseline, South East Regional Integrated Regional Framework, Thanet Statement of Community Involvement, Kent Biodiversity Action Plan.

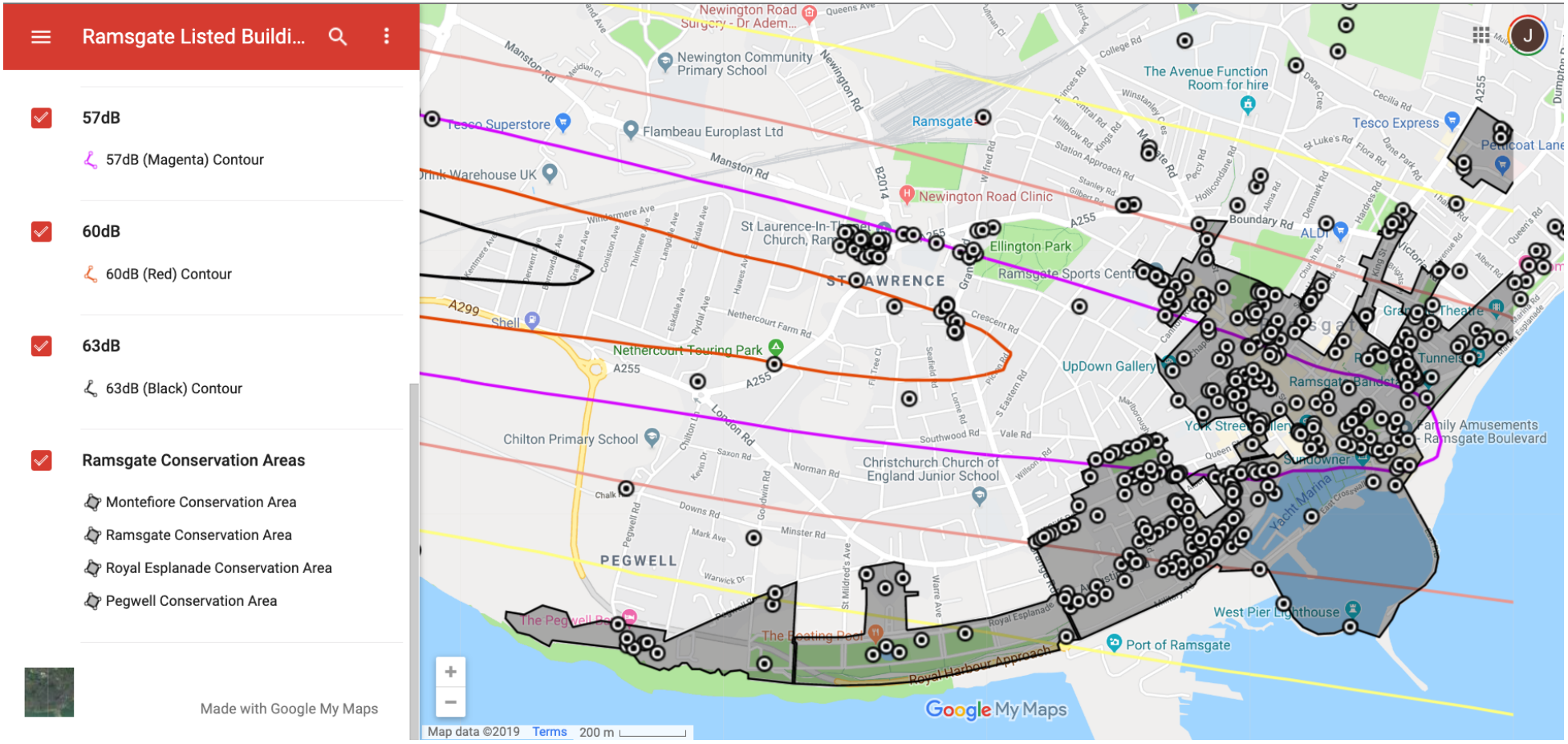
Key Sustainability Issue	Sub Issue	Description	Validation	Source
	Water Quality	Risk to water quality	The whole of the Thanet area is classified as a Nitrate Vulnerable Zone. Furthermore nutrient runoffs may impact on inter tidal chalk reefs.	Thanet DC Corporate Themes, Plans, Policies and Programmes review and baseline, South East Regional Integrated Regional Framework, Thanet Statement of Community Involvement, Kent Biodiversity Action Plan. Environment Agency mapping
	Climate Change and Flood Risk	Nation need to consider impacts associated with climate change and particular imperative within coastal locale. Risk of flooding must be considered in Local Plan development.	Thanet has a key advantage as flood risk does not pose a constraint to identifying sufficient housing site, commercial or industrial site opportunities.	Thanet DC Corporate Themes, Plans, Policies and Programmes review and baseline, South East Regional Integrated Regional Framework, Thanet Statement of Community Involvement, Kent Biodiversity Action Plan, Environment Agency

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION SUBMISSION TO DEADLINE 9:

Comment on PD-018 - Requirement 9b, Noise Mitigation submitted by Five10Twelve : SUPPLEMENTARY APPENDIX

Ramsgate Listed Buildings and Conservation Area within Five10Twelve's Noise Contours (produced by CAA/ERCD)

Listed Buildings (black dots) **and Conservation Area** (grey-shaded)**: National Heritage List GIS data**



MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION
SUBMISSION TO DEADLINE 9:
Comments on Information requested by the ExA and received from the Applicant to Deadline 8 and Comment on PD-018

Community – Churches, places of Worship and/or Remembrance

1. We respectfully submit the Table below for the attention of the Examining Authority with supporting evidence to show that **a great number of Ramsgate's working Churches, places of Worship and/or Remembrance** that are identifiable by a desktop search (together the ("**Churches, places of Worship and/or Remembrance"**) are predicted to exceed the 51 dB LAeq 16 hr noise contour.
2. As you will be aware this Table evidences clearly a very high level of community areas materially impacted by noise **with a majority of these Churches, places of Worship and/or Remembrance impacted at levels >57 dB LAeq 16 hr noise contour** including ones of great historical importance.
3. Our Churches, places of Worship and/or Remembrance cater for many religions – Catholic, Methodist, Anglican, Church of England, Judaism as well as Hindu – dating from 1062 to 1957 as well as offering community services such as Narcotics Anonymous.
4. Many of our Churches, places of Worship and/or Remembrance are Grade I and/or Grade II listed buildings and of historical importance.
5. In addition, the majority are working Churches, places of Worship and/or Remembrance with services for the public.
6. This is of particular concern in light of the socio-economic demographic of Ramsgate and perhaps engages the Equality Act 2010. We note that an Equality Assessment was untaken as part of the Airports National Policy Statement in relation to other proposed airport developments at LGW-2R, LHR-ENR and LHR-NWR[1].

[1]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/713315/airports-nps-equality-assessment.pdf

7. As the Examining Authority will be aware under Section 6 of the Appraisal of Sustainability: Airports National Policy Statement Non-Technical Summary of June 2018 the proposed scheme must:
   (a) **avoid or minimise negative effects** on community viability, including housing, **facilities and indirect effects**,
   (b) avoid or minimise **disproportionate impacts of any social group**,
   (c) maintain and where possible **improve the quality of life for local residents** and the wider population,
   (d) **minimise and where possible reduce noise impact** on human receptors,
   (e) **conserve and enhance undesignated habitats,** species, valuable ecological networks and ecosystem functionality,
   (f) **conserve and where appropriate enhance heritage assets** and the wider **historic environment** including **buildings, structures, landscapes, townscapes** and archaeological remains.
8. The Applicant's proposed scheme fails on all of the above counts (bold added for emphasis.
9. There are no feasible means of mitigation for the above Churches, places of Worship and/or Remembrance which are spread throughout Ramsgate.
10. We therefore respectfully request the Examining Authority to make a **robust recommendation** to the Secretary of State to **refuse to grant the Applicant's DCO**.

Table

Community – Churches, places of Worship and/or Remembrance that Fall within Each of the Noise Contours

No.	Noise Contour[2]	Community – Churches, places of	Open to Public for Services	Year Built

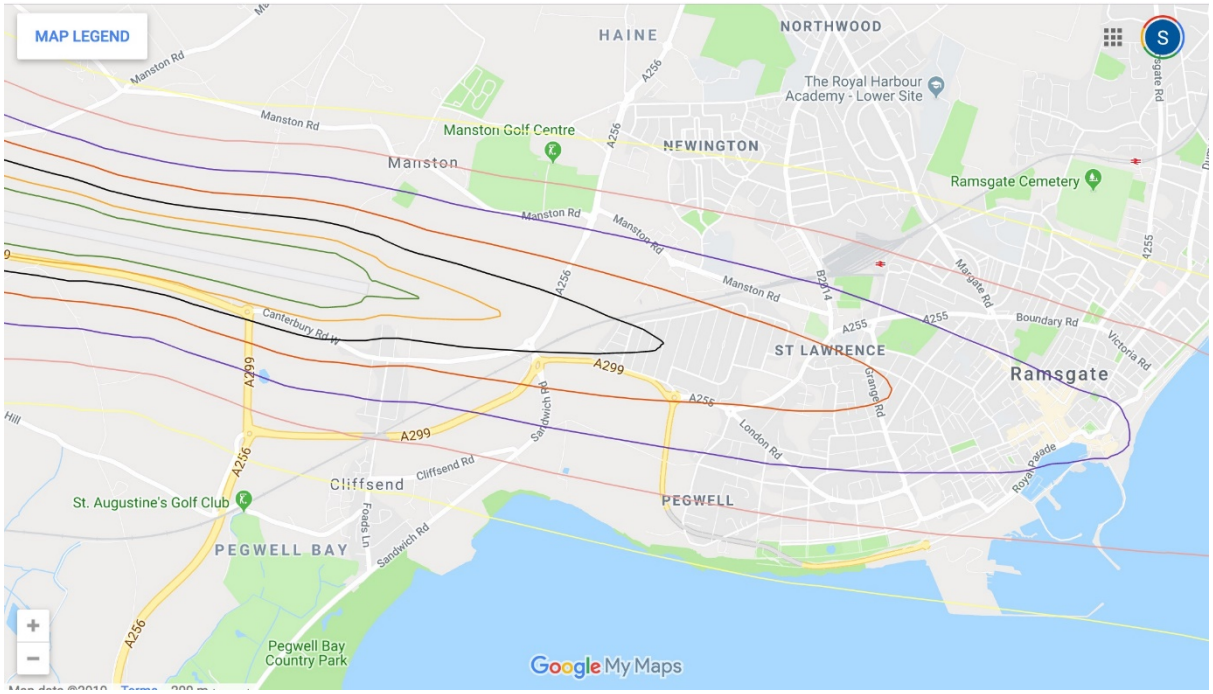
[2] [2] Map showing noise contours commissioned by Five10Twelve Limited and produced by the ERCD of CAA overlayed onto a google map

		Worship and/or Remembrance		
	> 57 dB LAeq (purple)	Christ Church Grade II Listed building Status	Working church with services (Anglican)	1847
	> 57 dB LAeq (purple)	St Laurence-In-Thanet Church[3]	Working church with services (Church of	Founded in 1062 and is the oldest church

[3] St. Laurence-In-Thanet Churchyard, you walk in the footsteps of Elizabeth I, William Pitt, the Duke of Wellington, William IV, Queen Victoria and many other well-known dignitaries. Consecrated in 1275, the churchyard covers three and a half acres and contains over 1,400 graves. Before stone memorials became common in the 17th century the churchyard was used to graze sheep and pardoners used the space to preach in the open air. More recently the churchyard was closed to burials and a Memorial Garden was created for the interment of ashes. As well as the valuable social history, the churchyard is an oasis for flora and fauna. Managed for the benefit of wildlife, the grass is not cut regularly and certain areas are left uncut to encourage wild flowers and food for wild creatures. Blackbirds, Wrens, Blue Tits, Robins, Jays and Green Woodpeckers are regular visitors. Butterflies include Speckled Wood, Red Admiral, Small Copper, Painted Lady and Common Blue. There are also Ladybirds, Dragonflies and several types of Bee and Spider. Following the burst of colour from Crocuses and Primroses in the Spring, Summer Flowers include Bluebells, Cow Parsley, Ox-Eye Daisies, Spear Thistles, Greater Knapweed and Arum Maculatum ('Lords and Ladies'). The churchyard is home to mature Oask, Yews, Populars, Sycamores, Fir Trees and Holly. Ivy grows over old boundary walls providing important nesting sites for the birds and a food source in the Winter. As many species of bird and butterfly become endangered the environmental potential of St. Laurence-In-Thanet Churchyard is clear. There are over 1,400 graves in the churchyard. One of the earliest graves is of George Skinner, born in 1594, buried in 1656 who was alive during the time of Oliver Cromwell. Several luminaries rest their bones here; SIR WILLIAM GARROW: 1760 – 1840 The eminent Lawyer, Barrister and Politican; recently the subject of a TV series 'Garrow's Law', who was responsible for that cornerstone of British law – 'Innocent until proven guilty'. JOHN COLLIS BROWNE: 1819 – 1884 The doctor who invented Chlorodyne, originally a treatment for Chloera but which became a 'miracle cure' for everything from colds and diarrhoea to whooping cough, neuralgia and rheumatism. COLONEL CROMWELL MASSEY: 1742 – 1845 Who died in 1845 ages 103. Having fought for the East Indie Company against the Sultan of Mysore, he was captured and thrown into a dungeon for three years and nine months. After retirement he sepnt his last 11 years in Ramsgate. CAPTIAN JOHN WOOLWARD: 1780 – 1836 Having fought with Nelson at Aboukir he then became Harbour Master at Ramsgate for 26 years. D'ESTE MAUSOLEUM The resting place of two grandchildren of George III. Grandson Augustus Frederick had the mausoleum built for this mother, Lady Augusta Murray. She married the sixth son of George III in 1973 who became the Duke of Sussex and a favourite Uncle of Queen Victoria. Under the Royal Marriages Act of 1772, the marriage was rules invalid and the couple parted in 1801. In the mausoleum are Lady Augusta, her parents – the Earl of Dunmore and his Countess, Lady Augusta's son, daughter and son-in-law – Baron Truro. Ramsgate road names remember the family – Augusta Road, Augusta Steps, Truro Road and D'este Road. http://www.stlaurenceparish-ramsgate.org.uk/stl_church-tours/

		Grade I Listed building Status	England)	in Ramsgate
	> 57 dB LAeq (purple)	Hadres Street United Church	(Working church with services Methodist/United Reformed)	1957
	> 57 dB LAeq (purple)	Kent Thanet Amman Temple	Hindu temple	
	> 54 dB LAeq 16 hr (pink)	St Augustine Church and Shrine. It became St Augustine's official shrine on March 1, 2012, recognising the Saint's arrival near Ramsgate in 597AD. Heritage Lottery funded Visitor Centre was completed in 2017 Grade I Listed building Status	Pilgrims are welcome each day at the Shrine Mass Working Catholic church with services every day, to which all are welcome	In 597 AD Saint Augustine landed in Ramsgate Thanet. A shrine existed in Ramsgate from 604 AD until 1538 AD. Augustus Pugin designed and built the church in 1848
	> 54 dB LAeq 16 hr (pink)	St George's Church and churchyard Grade I Listed building Status	Key Ramsgate community services throughout the year	1824
	> 54 dB LAeq 16 hr (pink)	Sailor's Church Grade II Listed building Status	Open to public	1878
	> 51 dB	St Ethelbert's RC	Open 8:30am-4:00	1902

	LAeq 16 hr (yellow	Church	pm Weekdays and 8:30am -1:00pm Weekends	
	> 51 dB LAeq 16 hr (yellow	St Luke's Church	Working church with services	1876
	> 51 dB LAeq 16 hr (yellow	Montefiore Synagogue & Mausoleum Both buildings are now Listed Grade 2* and the Synagogue has been designated by Jewish Heritage UK as one of the Top Ten Synagogues of Britain. Ramsgate Jewish Cemetery (1872)	Access to the synagogue for prayer or for interested visitors may be arranged by appointment through the Executive Director of the Montefiore Endowment: it may also be booked for weddings and other events.	1833


MAP LEGEND
HAINE
NORTHWOOD
The Royal Harbour Academy - Lower Site
Manston Golf Centre
NEWINGTON
Manston
Ramsgate Cemetery
Manston Rd
A256
B2214
A255
Boundary Rd
Victoria Rd
Margate Rd
ST LAWRENCE
Ramsgate
A299
Canterbury Rd W
Sandwich Rd
Grange Rd
London Rd
Royal Parade
Cliffsend Rd
Cliffsend
PEGWELL
St. Augustine's Golf Club
Foads Ln
PEGWELL BAY
Pegwell Bay Country Park
Google My Maps

Graph[2] showing All people- Economically active – Unemployed (Model Based) Thanet

3. It is clear from the Nomis Official Labour Market Statistics that Thanet's percentage of Economically Active and Unemployed has significantly reduced since the closure of the former airport and is in line with the rest of Great Britain.
4. A comparison has been drawn with the South East.
5. As the Examining Authority will be aware the South East is one of the comparators in the graph and table above.
6. A comparison has been made of Thanet's progress against the rest of the South East during the Examination.
7. As the Examining Authority will be aware the South East holds its position as the UK's second-most prosperous region[3], with the second-highest GDP per capita at £27,847, and household expenditure at £612 per week – second only to London.

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[2] Source of Graph: https://www.nomisweb.co.uk/reports/lmp/la/1946157320/subreports/ea_time_series/report.aspx?

[3] https://wealth.barclays.com/en_gb/home/research/research-centre/uk-prosperity-map/south-east.html
PDF attached

8. It is therefore a measure of success that Thanet is closing the gap with the South East[4].

9. This is in part, down to the rise in tourism in Thanet with 1 in 5 people in Thanet working in the tourism industry[5].

10. Thanet District Council confirmed at [REP9-XXX] at SE.4 Socio-Economic Effects that:

"*The Thanet Visitor Study 2018 does not affect TDC's stance in that whilst the proposed development may bring further tourists to the area, the amenity impacts from the construction and operation of the proposed development* ***may adversely affect the tourism industry in Ramsgate and the wider Thanet area and weigh against any proposed benefit***".

[4] Nomis Official Labour Market Statistics: All People – Economically Active – Unemployed (Model Based) Thanet report run as of today's date 4 July 2019.

[5] Economic Impact of Tourism, Thanet – 2017 results, Commissioned by Visit Kent and Produced by Destination Research, November 2018 Page 6

All people - Economically active - Unemployed (Model Based)
Thanet

Date	Thanet	Thanet (%)	South East (%)	Great Britain (%)
Jan 04-Dec 04	3,100	5.2	3.7	4.8
Apr 04-Mar 05	3,300	5.7	3.6	4.7
Jul 04-Jun 05	3,800	6.4	3.7	4.8
Oct 04-Sep 05	3,800	6.4	3.7	4.8
Jan 05-Dec 05	3,900	6.4	3.7	4.9
Apr 05-Mar 06	3,900	6.6	3.9	5.1
Jul 05-Jun 06	4,000	7.0	4.3	5.3
Oct 05-Sep 06	4,600	8.2	4.4	5.4
Jan 06-Dec 06	4,200	7.4	4.5	5.4
Apr 06-Mar 07	3,800	6.8	4.4	5.3
Jul 06-Jun 07	3,700	6.7	4.2	5.3
Oct 06-Sep 07	3,700	6.5	4.1	5.2
Jan 07-Dec 07	3,800	7.1	4.2	5.2
Apr 07-Mar 08	3,800	6.7	4.1	5.2
Jul 07-Jun 08	4,000	6.7	4.2	5.2
Oct 07-Sep 08	4,000	6.5	4.2	5.3
Jan 08-Dec 08	4,500	7.3	4.4	5.7
Apr 08-Mar 09	4,700	7.3	4.6	6.2
Jul 08-Jun 09	4,900	7.9	5.0	6.8
Oct 08-Sep 09	5,300	8.5	5.6	7.3
Jan 09-Dec 09	5,200	8.0	5.9	7.7
Apr 09-Mar 10	5,500	8.8	6.3	7.9
Jul 09-Jun 10	5,500	8.7	6.1	7.7
Oct 09-Sep 10	5,700	8.9	6.0	7.7
Jan 10-Dec 10	6,100	9.7	6.0	7.6
Apr 10-Mar 11	6,400	10.5	5.8	7.6
Jul 10-Jun 11	7,000	11.6	5.9	7.8
Oct 10-Sep 11	7,200	12.1	5.9	7.9
Jan 11-Dec 11	7,600	13.4	5.9	8.0
Apr 11-Mar 12	7,200	12.3	6.0	8.1
Jul 11-Jun 12	6,800	11.2	5.9	8.1
Oct 11-Sep 12	6,500	12.0	5.8	8.0
Jan 12-Dec 12	6,500	11.1	6.0	7.9
Apr 12-Mar 13	7,100	12.4	6.1	7.8
Jul 12-Jun 13	7,200	12.4	6.2	7.8
Oct 12-Sep 13	7,100	12.0	6.2	7.8
Jan 13-Dec 13	6,700	11.0	5.7	7.5
Apr 13-Mar 14	6,500	10.5	5.4	7.2
Jul 13-Jun 14	6,000	9.7	5.1	6.9
Oct 13-Sep 14	5,900	9.8	4.8	6.5
Jan 14-Dec 14	6,100	10.1	4.8	6.2

Apr 14-Mar 15	5,900	9.1	4.6	6.0
Jul 14-Jun 15	5,700	8.8	4.5	5.6
Oct 14-Sep 15	5,100	8.2	4.3	5.4
Jan 15-Dec 15	4,600	7.3	4.2	5.2
Apr 15-Mar 2016	4,500	7.0	4.1	5.1
Jul 15-Jun 2016	4,500	6.9	4.1	5.1
Oct 15-Sep 2016	4,900	7.2	4.2	4.9
Jan 2016-Dec 2016	4,400	6.4	4.0	4.8
Apr 2016-Mar 2017	3,800	5.8	3.8	4.7
Jul 2016-Jun 2017	3,600	5.1	3.5	4.6
Oct 2016-Sep 2017	3,500	4.6	3.4	4.5
Jan 2017-Dec 2017	3,400	4.5	3.2	4.4
Apr 2017-Mar 2018	3,700	5.1	3.4	4.3
Jul 2017-Jun 2018	3,900	5.6	3.5	4.2
Oct 2017-Sep 2018	3,200	5.0	3.4	4.2
Jan 2018-Dec 2018	2,900	4.5	3.4	4.2

Source: ONS Annual Population Survey

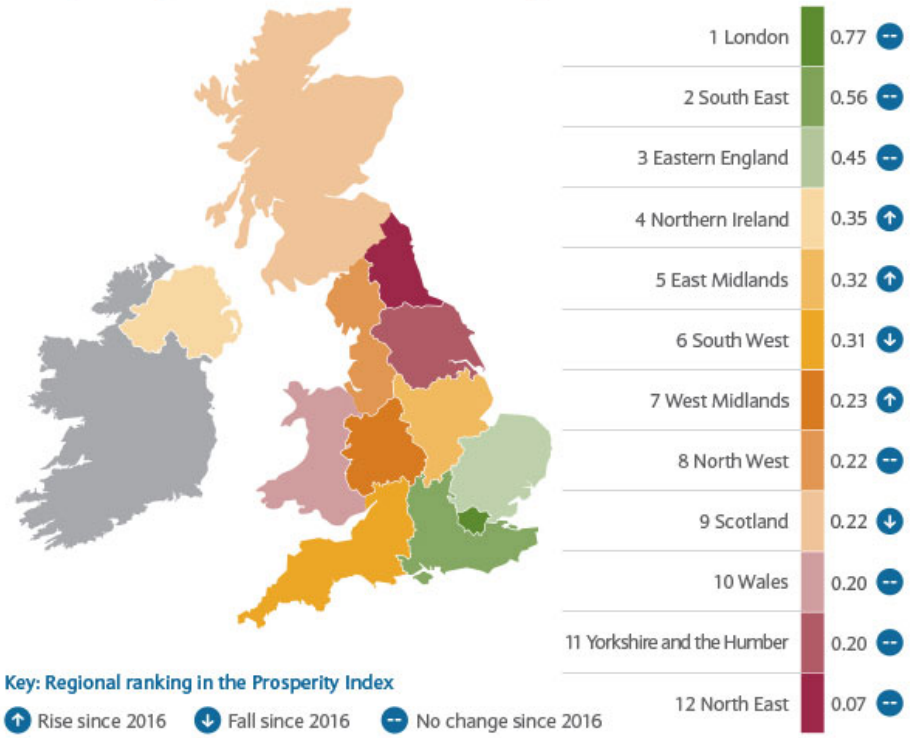
Note: numbers and % are for those aged 16 and over. % is a proportion of economically active

Copyright

UK Prosperity Map 2017

The UK Prosperity Map from Barclays Wealth & Investments is an in-depth view of the different prosperity drivers across the UK regions. The map compiles a series of different measures gleaned from official data – including GDP, employment, enterprise figures, household expenditure and number of millionaires – to give an overall Index score for each region.

Prosperity Index scores – region



UK cities

Cities are outpacing their wider region, with clear disparities opening up when it comes to GDP per capita and earnings.

London

London remains in 1st place with expenditure growth of 5.9% and the highest GDP per capita, despite only growing by 1.6%.

South East

South East remains in 2nd place, with the second-lowest level of unemployment at 4% and a 6.1% increase in millionaires.

East of England

The East of England keeps its third-place spot with a 7% increase in house prices and a 9.3% increase in the number of millionaires, the UK's greatest increase.

Northern Ireland

Northern Ireland is up one place to 4th, with a 3.8% increase in household expenditure and an 8.7% growth in millionaires.

East Midlands

East Midlands is prospering and has moved up to 5th place, with a 2.7% growth in wages and a 6% increase in house prices.

South West

South West falls two places to 6th but has a healthy housing market that saw an increase of 5% and a 2% increase in GDP per capita.

West Midlands

West Midlands climbs two places to 7th, thanks to a 3.9% increase in average earnings and a 6% rise in house prices.

North West

North West remains in 8th place with GDP per capita up 3% and house prices increasing by 5%.

Scotland

Scotland drops two places to 9th but GDP per capita rose by 1.8% while average earnings saw a 2.5% increase – the third highest in the UK.

Wales

Wales stays in 10th place but sees a 2.8% increase in GDP per capita and a 4% increase in house prices.

Yorkshire & Humberside

Yorkshire and Humberside stays in 11th place but enjoys a 4% boost in house prices and a 2.4% increase in GDP per capita.

North East

North East keeps its 12th place position but saw a 4% rise in house prices and a 2.8% rise in GDP.

destinationresearch
delivering results : measuring what matters

Commissioned by:

Visit Kent

VISIT KENT GARDEN of ENGLAND

Economic Impact of Tourism

Thanet - 2017 Results

November 2018

Produced by:

Destination Research
www.destinationresearch.co.uk

Introduction

This report examines the volume and value of tourism and the impact of visitor expenditure on the local economy in 2017 and provides comparative data against the previously published data for Kent (2015).

Destination Research was commissioned by Visit Kent to produce 2017 results based on the latest data from national tourism surveys and regionally/locally based data. The results are derived using the Cambridge Economic Impact Model.

In its basic form, the model distributes regional activity as measured in national surveys to local areas using 'drivers' such as the accommodation stock and occupancy which influence the distribution of tourism activity at local level. Whenever possible, results have been enhanced by building in additional local-level data gathered by the district (e.g. local attractions data, boat moorings, language schools in the area, accommodation stock, etc.). See Appendix I for further details.

Contextual analysis

Domestic tourism

In 2017, British residents took 100.6 million overnight trips in England, totalling 299 million nights away from home, with an expenditure of £19.05 billion. £189.31 was spent per trip, and with an average trip length of 2.97 nights, the average spend per night was £63.62. The number of domestic trips was 2% up on 2015, and the amount spent was also up by 2%.

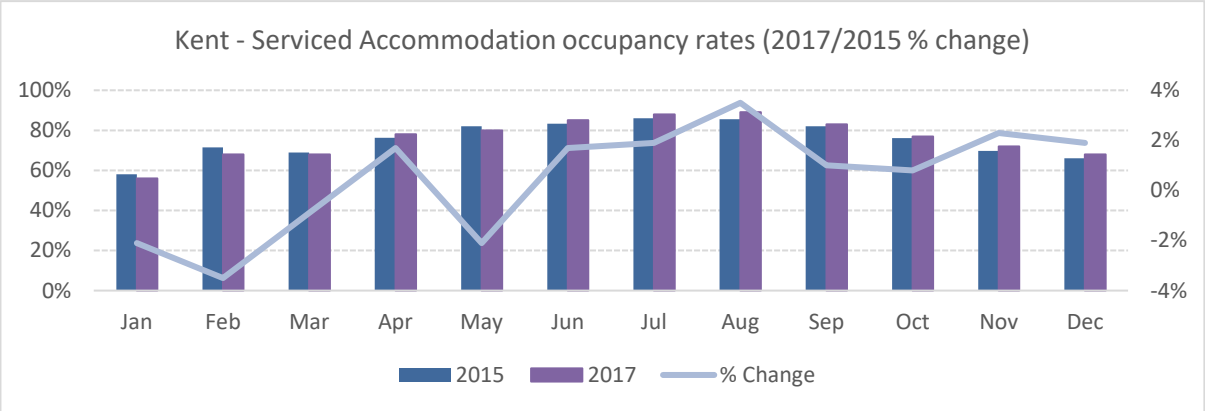
The South East region experienced a 1% increase in overnight trips between 2015 and 2017. Bednights were up 2% on 2015 and expenditure was up by 3%. The region received slightly more visitors in 2017 than in 2015 and visitors spent slightly more per night than in 2015. The average spend per night was up from £56.53 per night in 2015 to £59.01 in 2017.

Domestic visits to Kent

The domestic tourism results for Kent used in this model combine a mixture of supply and demand data. We do this because extracting county level data from national surveys can sometimes lead to inaccurate results due to low sample sizes. According to the GB Tourism Survey (demand side), Kent experienced a 1% decrease in the volume of trips between 2015 and 2017. Nights were down 2% and expenditure was also down by 1%.

In 2017, serviced accommodation providers saw an average occupancy of 76%, compared to the 75.5% witnessed in 2015, an increase of 0.5%. By combining the supply and demand results we estimate that trips to Kent were down by a marginal rate of 0.3%, nights per trip were up by 1.9% and expenditure increased by 2.9%.

Please note that the Cambridge Model uses three year rolling averages to reduce some of the more extreme fluctuations which are due to small sample sizes and high margins or error.



Visits from overseas

As with domestic tourism, the Cambridge Model uses three year averages to estimate changes in overseas tourism to reduce some of the more extreme fluctuations which can be attributed to small sample sizes and high margins or error. At national level, the number of visits in 2017 grew by 10% reaching 33 million. The number of visitor nights spent in the UK increased by 7% between 2015 and 2017 to reach 245.7 million, with the average number of nights per visit standing at 7.4.

Overseas trips to the South England region were 9% up on 2015 to reach 5.2 million overnight trips. The total number of nights was up by 8% to reach 37.4 million in 2017. Spend was unchanged from the levels achieved in 2015.

Kent also experienced growth between 2015 and 2017. Trips were up 4%, nights per trip went up 11% and expenditure was also up by 4%.

The International Passenger Survey (IPS) is conducted by Office for National Statistics and is based on face- to-face interviews with a sample of passengers travelling via the principal airports, sea routes and the Channel Tunnel, together with visitors crossing the land border into Northern Ireland. The number of interviews conducted in England in 2017 was around 35,628.

Day visitors

During 2017, GB residents took a total of 1.5 billion tourism day trip to destinations in England. Around £51 billion was spent during these trips. At national level, the volume of day trips was down by 1% and the expenditure levels were unchanged between 2015 and 2017.

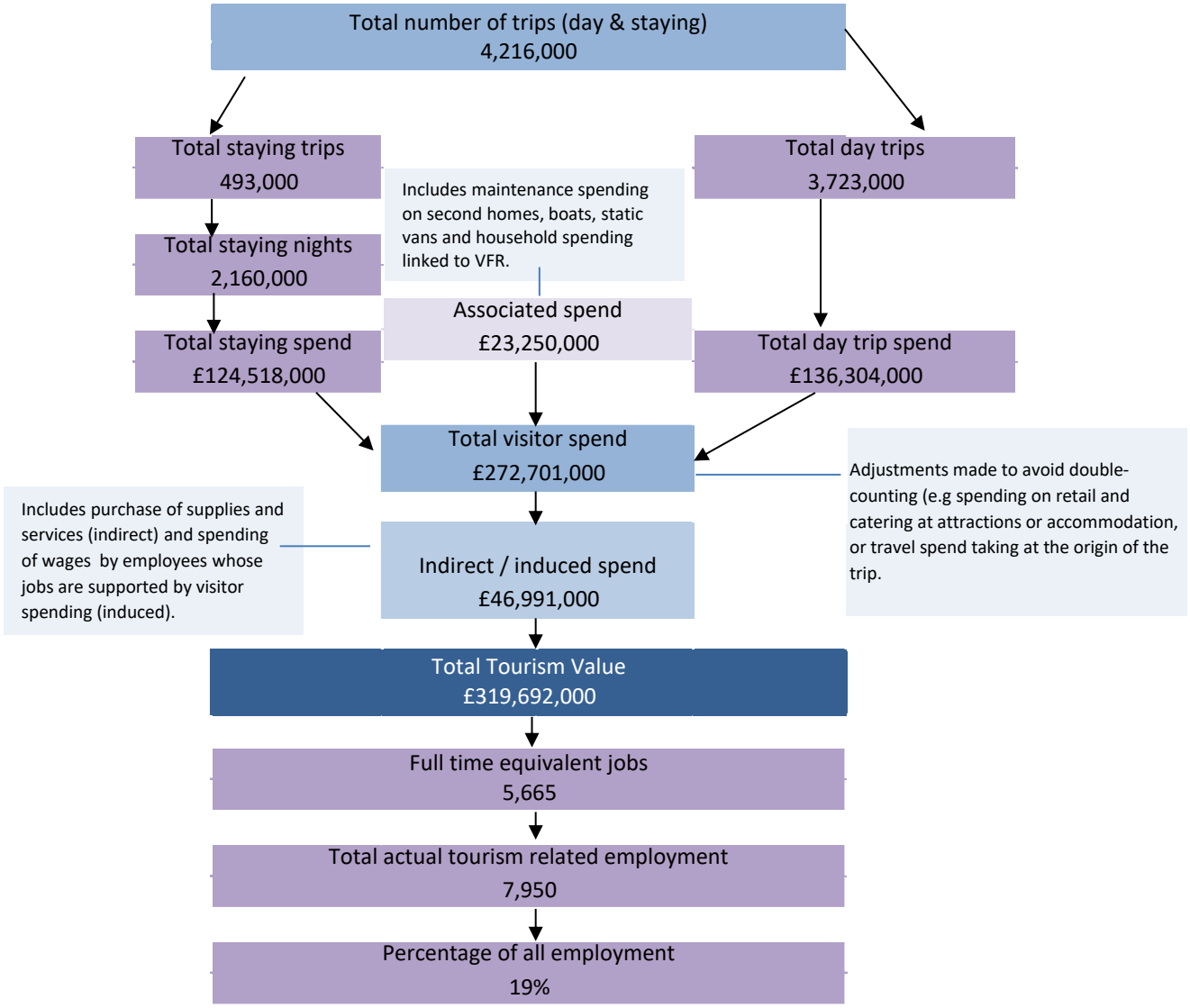
The volume and value of tourism day visits in the South East of England increased by 4% between 2015 and 2017, from 221 million to 230 million. Expenditure levels were up by 5% to £7.4 billion in 2017.

The results for Kent are based on a combination of results from the GB Day Visitor Survey, admissions data from the Visits to Visitor Attractions Survey, the ALVA (Association of Leading Visitor Attractions) Survey and attractions visitor numbers from the Visit Kent Business Barometer.

The GB Day Visitor Survey shows a 15% increase in volume of trips to Kent between 2015 and 2017 and a 20% increase in value for the same period. However, data from the Visits to Visitor Attractions Survey looking at attractions based in Kent shows that the admissions to attractions were up by 5% between 2015 and 2017 and admission charges were also up by 5%. Results from the Visit Kent Business Barometer report an increase of 4% in visitor numbers for the same period.

Based on these results the model assumes that the volume of day trips was up 8% between 2015 and 2017 and expenditure up by 9%.

Economic Impact of Tourism – Headline Figures Thanet - 2017 Results

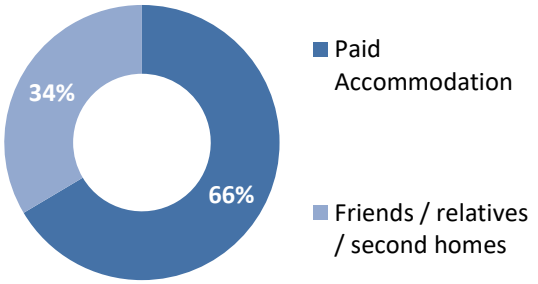


Economic Impact of Tourism – Year on year comparisons **Thanet**

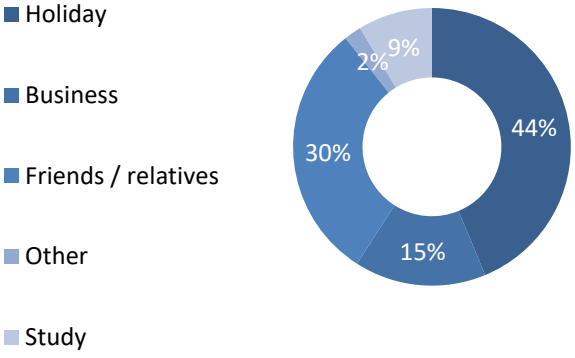
Day Trips	2015	2017	Annual variation
Day trips Volume	3,386,900	3,723,000	9.9%
Day trips Value	£119,391,494	£136,304,000	14.2%
Overnight trips			
Number of trips	494,000	493,000	-0.2%
Number of nights	2,059,000	2,160,000	4.9%
Trip value	£122,087,000	£124,518,000	2.0%
Total Value	£292,877,400	£319,692,000	9.2%
Actual Jobs	7,312	7,950	8.7%

Thanet	2015	2017	Variation
Average length stay (nights x trip)	4.17	4.38	5.1%
Spend x overnight trip	£ 247.14	£ 252.57	2.2%
Spend x night	£ 59.29	£ 57.65	-2.8%
Spend x day trip	£ 35.25	£ 36.61	3.9%

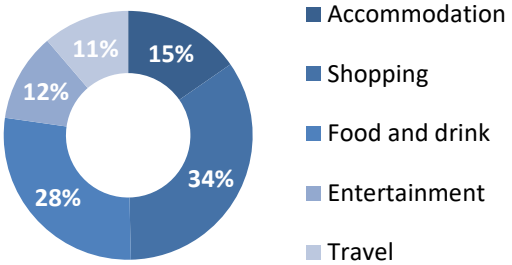
Trips by type of accommodation



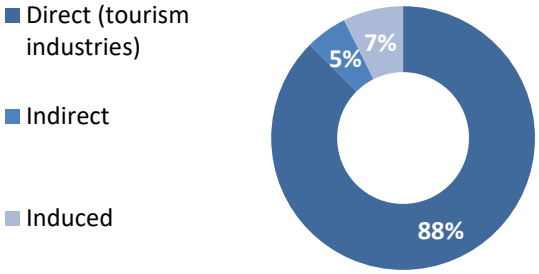
Trips by Purpose



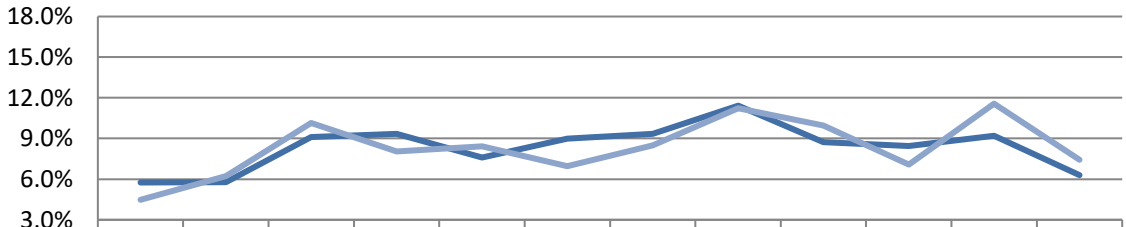
Breakdown of expenditure



Type of employment

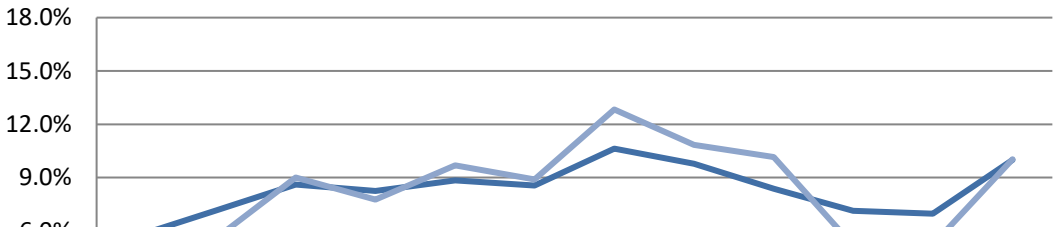


Seasonality - Day visitors (County level)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Day trips	5.8%	5.8%	9.1%	9.3%	7.6%	9.0%	9.3%	11.4%	8.7%	8.5%	9.2%	6.3%
Day spend	4.5%	6.2%	10.2%	8.0%	8.4%	7.0%	8.5%	11.2%	9.9%	7.1%	11.6%	7.4%

Seasonality - Overnight visitors (County level)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Overnight trips	5.7%	7.2%	8.6%	8.3%	8.8%	8.6%	10.6%	9.8%	8.4%	7.1%	7.0%	10.0%
Overnight spend	4.8%	5.6%	9.0%	7.8%	9.7%	8.9%	12.8%	10.8%	10.2%	5.2%	5.2%	10.0%

Volume of Tourism

Staying visits in the county context

Thanet - 2017 Results

Staying trips in the county context	Domestic trips ('000)	Overseas trips ('000)
Ashford	281	110
Canterbury	461	186
Dartford	135	46
Dover	336	86
Gravesham	149	40
Maidstone	288	83
Medway	423	101
Sevenoaks	168	63
Folkestone & Hythe	395	75
Swale	355	43
Thanet	345	148
Tonbridge&Malling	193	49
Tunbridge Wells	246	65
Kent	**3,775**	**1,095**

Staying nights in the county context	Domestic nights ('000)	Overseas nights ('000)
Ashford	753	504
Canterbury	1,411	1,322
Dartford	386	239
Dover	952	487
Gravesham	389	243
Maidstone	746	525
Medway	1,251	686
Sevenoaks	434	353
Folkestone & Hythe	991	434
Swale	1,244	324
Thanet	1,040	1,120
Tonbridge&Malling	553	300
Tunbridge Wells	748	446
Kent	**10,898**	**6,983**

Expenditure in the county context	Domestic spend (millions)	Overseas spend (millions)
Ashford	£44	£29
Canterbury	£76	£73
Dartford	£19	£12
Dover	£63	£26
Gravesham	£16	£10
Maidstone	£38	£28
Medway	£60	£30
Sevenoaks	£23	£18
Folkestone & Hythe	£62	£20
Swale	£45	£12
Thanet	£54	£70
Tonbridge&Malling	£26	£13
Tunbridge Wells	£41	£21
Kent	**£568**	**£361**

Staying Visitors - Accommodation Type Thanet - 2017 Results

Trips by Accommodation

	UK		Overseas		Total	
Serviced	132,000	38%	73,000	50%	205,000	42%
Self catering	16,000	5%	11,000	7%	27,000	5%
Camping	23,000	7%	5,000	4%	28,000	6%
Static caravans	35,000	10%	0	0%	35,000	7%
Group/campus	2,000	1%	9,000	6%	11,000	2%
Paying guest	0	0%	0	0%	0	0%
Second homes	8,000	2%	1,000	1%	9,000	2%
Boat moorings	6,000	2%	0	0%	6,000	1%
Other	3,000	1%	12,000	8%	15,000	3%
Friends & relatives	120,000	34%	36,000	24%	156,000	32%
Total 2017	**345,000**		**148,000**		**493,000**	
Comparison 2015	**351,000**		**143,000**		**494,000**	
Difference	**-2%**		**3%**		**0%**	

Nights by Accommodation

	UK		Overseas		Total	
Serviced	302,000	29%	328,000	29%	630,000	29%
Self catering	85,000	8%	86,000	8%	171,000	8%
Camping	86,000	8%	44,000	4%	130,000	6%
Static caravans	156,000	15%	0	0%	156,000	7%
Group/campus	8,000	1%	84,000	8%	92,000	4%
Paying guest	0	0%	0	0%	0	0%
Second homes	27,000	3%	2,000	0%	29,000	1%
Boat moorings	28,000	3%	0	0%	28,000	1%
Other	9,000	1%	37,000	3%	46,000	2%
Friends & relatives	339,000	33%	539,000	48%	878,000	42%
Total 2017	**1,040,000**		**1,120,000**		**2,160,000**	
Comparison 2015	**993,000**		**1,066,000**		**2,059,000**	
Difference	**5%**		**5%**		**5%**	

Spend by Accommodation Type

	UK		Overseas		Total	
Serviced	£31,328,000	58%	£39,229,000	56%	£70,557,000	57%
Self catering	£4,356,000	8%	£3,563,000	5%	£7,919,000	6%
Camping	£2,191,000	4%	£1,947,000	3%	£4,138,000	3%
Static caravans	£4,097,000	8%	£0	0%	£4,097,000	3%
Group/campus	£82,000	0%	£5,012,000	7%	£5,094,000	4%
Paying guest	£0	0%	£0	0%	£0	0%
Second homes	£483,000	1%	£98,000	0%	£581,000	0%
Boat moorings	£500,000	1%	£0	0%	£500,000	0%
Other	£497,000	1%	£749,000	1%	£1,246,000	1%
Friends & relatives	£10,588,000	19%	£19,798,000	28%	£30,386,000	25%
Total 2017	**£54,122,000**		**£70,396,000**		**£124,518,000**	
Comparison 2015	**£54,237,000**		**£67,850,000**		**£122,087,000**	
Difference	**0%**		**4%**		**2%**	

Serviced accommodation includes hotels, guesthouses, inns, B&B and serviced farmhouse accommodation. Paying guest refers to overseas visitors staying in private houses, primarily language school students. Other trips includes nights spent in transit, in lorry cabs and other temporary accommodation.

Staying Visitors - Purpose of Trip

Thanet - 2017 Results

Trips by Purpose

		UK		Overseas		Total	
Holiday		167,000	48%	47,000	32%	214,000	44%
Business		48,000	14%	28,000	18%	76,000	15%
Friends & relatives		124,000	36%	26,000	18%	150,000	30%
Other		6,000	2%	4,000	3%	10,000	2%
Study		0	0%	43,000	29%	43,000	9%
Total	**2017**	**345,000**		**148,000**		**493,000**	
Comparison	**2015**	**351,000**		**143,000**		**494,000**	
Difference		**-2%**		**3%**		**0%**	

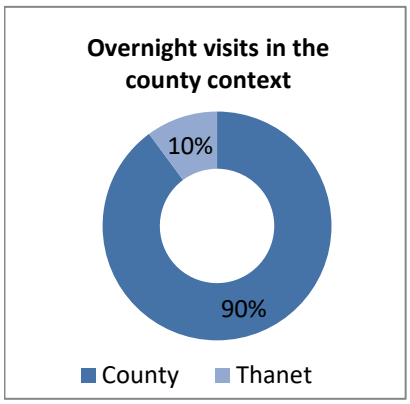
Nights by Purpose

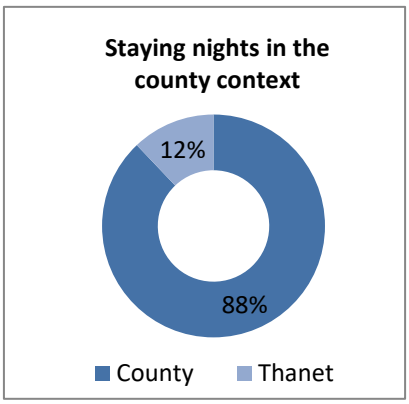
		UK		Overseas		Total	
Holiday		601,000	58%	244,000	22%	845,000	39%
Business		164,000	16%	72,000	6%	236,000	11%
Friends & relatives		258,000	25%	226,000	20%	484,000	23%
Other		17,000	2%	27,000	2%	44,000	2%
Study		0	0%	551,000	49%	551,000	26%
Total	**2017**	**1,040,000**		**1,120,000**		**2,160,000**	
Comparison	**2015**	**993,000**		**1,066,000**		**2,059,000**	
Difference		**5%**		**5%**		**5%**	

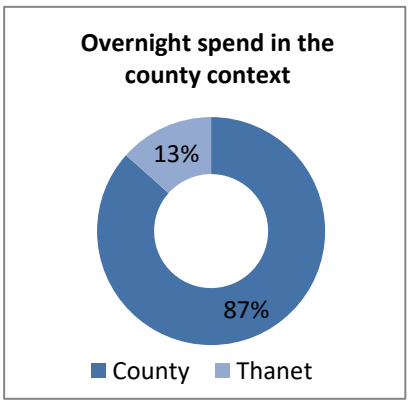
Spend by Purpose

		UK		Overseas		Total	
Holiday		£28,143,000	52%	£17,211,000	25%	£45,354,000	36%
Business		£16,237,000	30%	£5,040,000	7%	£21,277,000	17%
Friends & relatives		£9,201,000	17%	£6,953,000	10%	£16,154,000	13%
Other		£541,000	1%	£2,265,000	3%	£2,806,000	2%
Study		£0	0%	£38,927,000	55%	£38,927,000	31%
Total	**2017**	**£54,122,000**		**£70,396,000**		**£124,518,000**	
Comparison	**2015**	**£54,237,000**		**£67,850,000**		**£122,087,000**	
Difference		**0%**		**4%**		**2%**	

Proportion of staying visits in the county context







Day Visitors

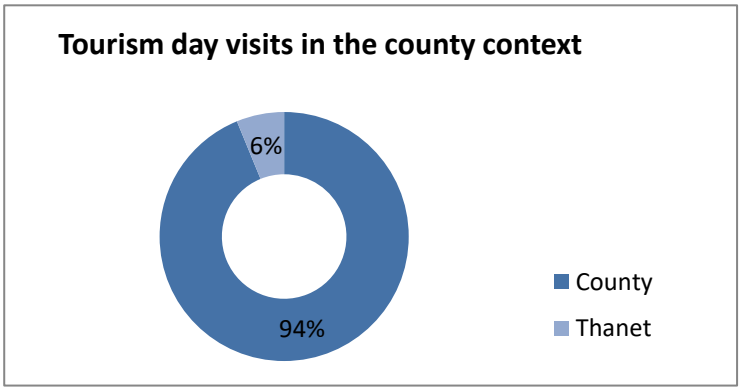
Thanet - 2017 Results

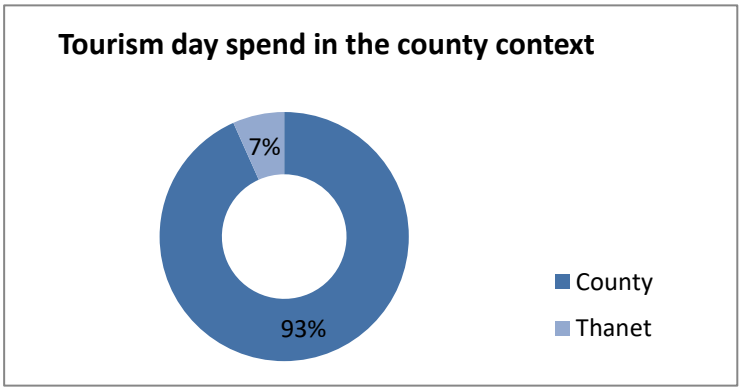
Total Volume and Value of Day Trips

		Trips	Spend
Total	**2017**	**3,723,000**	**£136,304,000**
Comparison	2015	3,386,900	£119,391,494
Difference		10%	14%

Day Visitors in the county context

District	Day Visits (millions)	Day Visit Spend (millions)
Ashford	4.0	£141.4
Canterbury	7.1	£238.1
Dartford	10.6	£404.7
Dover	4.2	£127.0
Gravesham	1.8	£52.6
Maidstone	4.1	£135.7
Medway	4.4	£144.5
Sevenoaks	4.0	£140.4
Folkestone & Hythe	4.3	£127.7
Swale	4.7	£141.4
Thanet	3.7	£136.3
Tonbridge&Malling	2.8	£89.6
Tunbridge Wells	4.3	£157.4
Kent	**60.1**	**£2,036.7**





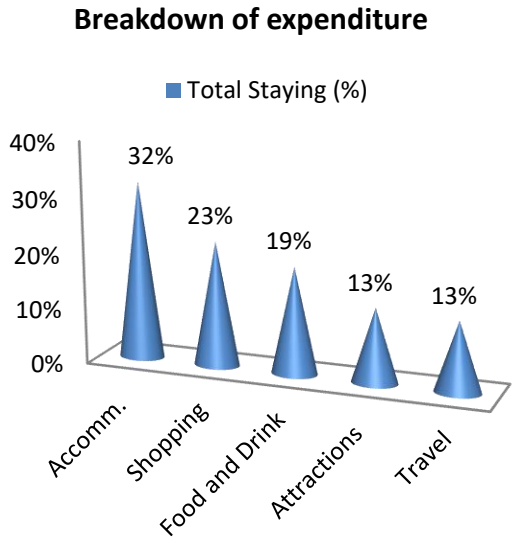
Value of Tourism

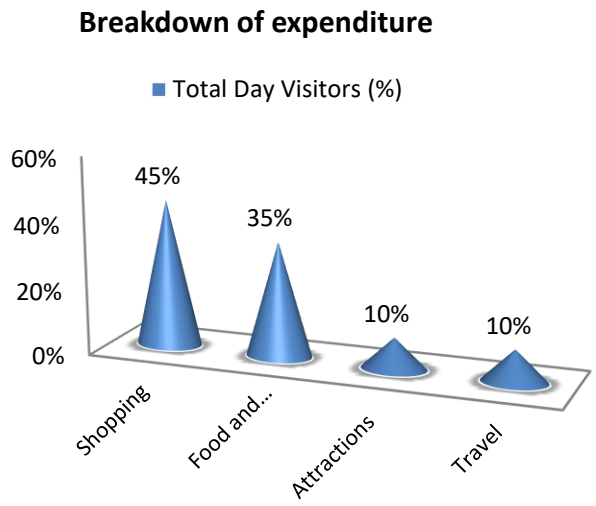
Expenditure Associated with Trips

Thanet - 2017 Results

Direct Expenditure Associated with Trips

		Accomm.	Shopping	Food and Drink	Attractions	Travel	Total
UK Tourists		£19,829,000	£6,641,000	£11,715,000	£5,464,000	£10,473,000	£54,122,000
Overseas tourists		£20,192,000	£21,381,000	£12,294,000	£11,257,000	£5,271,000	£70,396,000
Total Staying		£40,021,000	£28,022,000	£24,009,000	£16,721,000	£15,744,000	£124,518,000
Total Staying (%)		32%	23%	19%	13%	13%	100%
Total Day Visitors		£0	£61,473,000	£47,979,000	£13,221,000	£13,640,000	£136,304,000
Total Day Visitors (%)		0%	45%	35%	10%	10%	100%
Total	**2017**	**£40,021,000**	**£89,495,000**	**£71,988,000**	**£29,942,000**	**£29,384,000**	**£260,831,000**
%		**15%**	**34%**	**28%**	**11%**	**11%**	**100%**
Comparison	**2015**	**£39,622,000**	**£81,071,000**	**£65,272,000**	**£28,160,000**	**£27,353,000**	**£241,478,000**
Difference		**1%**	**10%**	**10%**	**6%**	**7%**	**8%**





Other expenditure associated with tourism activity

Other expenditure associated with tourism activity - Estimated spend				
Second homes	**Boats**	**Static vans**	**Friends & relatives**	**Total**
£912,000	£1,200,000	£210,000	£20,928,000	£23,250,000

Spend on second homes is assumed to be an average of £2,000 on rates, maintenance, and replacement of furniture and fittings. Spend on boats assumed to be an average of £2,000 on berthing charges, servicing and maintenance and upgrading of equipment. Static van spend arises in the case of vans purchased by the owner and used as a second home. Expenditure is incurred in site fees, utility charges and other spending and is estimated at £2,000. Additional spending is incurred by friends and relatives as a result of people coming to stay with them. A cost of £175 per visit has been assumed based on national research for social and personal visits.

Direct Turnover Derived From Trip

Thanet - 2017 Results

Business turnover arises as a result of tourist spending, from the purchase of supplies and services locally by businesses in receipt of visitor spending and as a result of the spending of wages in businesses by employees whose jobs are directly or indirectly supported by tourism spending.

		Staying Visitor	Day Visitors	Total
Accommodation		£40,636,000	£960,000	£41,596,000
Retail		£27,801,000	£60,858,000	£88,659,000
Catering		£23,359,000	£46,540,000	£69,899,000
Attractions		£17,313,000	£14,316,000	£31,629,000
Transport		£9,490,000	£8,178,000	£17,668,000
Non-trip spend		£23,250,000	£0	£23,250,000
Total Direct	**2017**	**£141,849,000**	**£130,852,000**	**£272,701,000**
Comparison	**2015**	**£135,189,000**	**£114,616,000**	**£249,805,400**
Difference		**5%**	**14%**	**9%**

Adjustments have been made to recognise that some spending on retail and food and drink will fall within attractions or accommodation establishments. It is assumed that 40% of travel spend will take place at the origin of the trip rather than at the destination.

Supplier and Income Induced Turnover

		Staying Visitor	Day Visitors	Total
Indirect spend		£8,590,000	£7,102,000	£15,692,000
Non trip spending		£3,488,000	£0	£3,488,000
Income induced		£15,415,000	£12,396,000	£27,811,000
Total	**2017**	**£27,493,000**	**£19,498,000**	**£46,991,000**
Comparison	**2015**	**£25,993,000**	**£17,079,000**	**£43,072,000**
Difference		**6%**	**14%**	**9%**

Income induced spending arises from expenditure by employees whose jobs are supported by tourism spend.

Total Local Business Turnover Supported by Tourism Activity – Value of Tourism

		Staying Visitor	Day Visitors	Total
Direct		£141,849,000	£130,852,000	£272,701,000
Indirect		£27,493,000	£19,498,000	£46,991,000
Total Value	**2017**	**£169,342,000**	**£150,350,000**	**£319,692,000**
Comparison	**2015**	**£161,182,400**	**£131,695,000**	**£292,877,400**
Difference		**5%**	**14%**	**9%**

Employment

Employment

Thanet - 2017 Results

The model generates estimates of full time equivalent jobs based on visitor spending. The total number of 'actual' jobs will be higher when part time and seasonal working is taken into account. Conversion of full time equivalent jobs into actual jobs relies on information from business surveys in the sectors receiving visitor spending. A new Full Time Equivalent tourism job is created with every £54,000 increase in tourism revenue.

Direct employment

Full time equivalent (FTE)						
	Staying Visitor		Day Visitor		Total	
Accommodation	949	36%	22	1%	972	20%
Retailing	367	14%	804	37%	1,171	25%
Catering	517	20%	1,031	48%	1,548	32%
Entertainment	256	10%	212	10%	468	10%
Transport	110	4%	95	4%	205	4%
Non-trip spend	431	16%	0	0%	431	9%
Total FTE 2017	**2,631**		**2,164**		**4,795**	
Comparison 2015	**2,509**		**1,895**		**4,405**	
Difference	**5%**		**14%**		**9%**	

Estimated actual jobs						
	Staying Visitor		Day Visitor		Total	
Accommodation	1,405	37%	33	1%	1,438	21%
Retailing	551	15%	1,206	38%	1,757	25%
Catering	776	21%	1,546	48%	2,322	33%
Entertainment	361	10%	299	9%	660	9%
Transport	155	4%	134	4%	289	4%
Non-trip spend	491	13%	0	0%	491	7%
Total Actual 2017	**3,740**		**3,218**		**6,957**	
Comparison 2015	**3,584**		**2,819**		**6,403**	
Difference	**4%**		**14%**		**9%**	

Indirect & Induced Employment

Full time equivalent (FTE)			
	Staying Visitor	Day Visitors	Total
Indirect jobs	224	132	355
Induced jobs	285	230	515
Total FTE 2017	**509**	**361**	**870**
Comparison 2015	**481**	**316**	**798**
Difference	**6%**	**14%**	**9%**

Estimated actual jobs			
	Staying Visitor	Day Visitors	Total
Indirect jobs	255	150	405
Induced jobs	325	262	587
Total Actual 2017	**580**	**412**	**992**
Comparison 2015	**549**	**361**	**909**
Difference	**6%**	**14%**	**9%**

Total Tourism Jobs

Thanet - 2017 Results

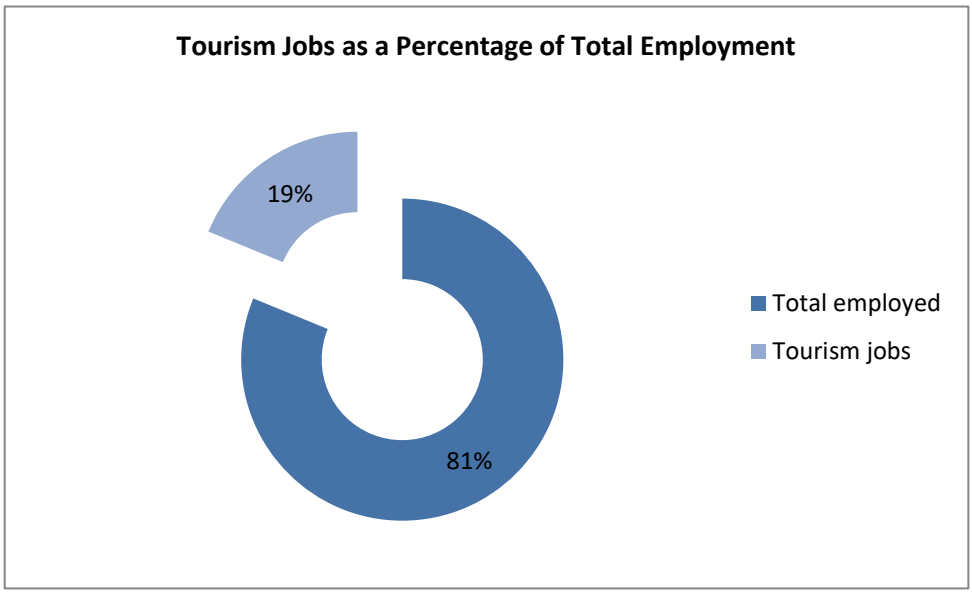
Actual jobs are estimated from surveys of relevant businesses at locations in England and take account of part time and seasonal working.

Full time equivalent (FTE)						
		Staying Visitor		Day Visitor		Total	
Direct		2,631	84%	2,164	86%	4,795	85%
Indirect		224	7%	132	5%	355	6%
Induced		285	9%	230	9%	515	9%
Total FTE	**2017**	**3,140**		**2,525**		**5,665**	
Comparison	**2015**	**2,990**		**2,212**		**5,202**	
Difference		**5%**		**14%**		**9%**	

Estimated actual jobs						
		Staying Visitor		Day Visitor		Total	
Direct		3,740	87%	3,218	89%	6,957	88%
Indirect		255	6%	150	4%	405	5%
Induced		325	7%	262	7%	587	7%
Total Actual	**2017**	**4,320**		**3,630**		**7,950**	
Comparison	**2015**	**4,133**		**3,179**		**7,312**	
Difference		**5%**		**14%**		**9%**	

Tourism Jobs as a Percentage of Total Employment

		Staying Visitor	Day visitors	Total
Total employed		42,300	42,300	42,300
Tourism jobs		4,320	3,630	7,950
Proportion all jobs		**10%**	**9%**	**19%**
Comparison	**2015**	**4,133**	**3,179**	**7,312**
Difference		**5%**	**14%**	**9%**



Economic Impact of Tourism – Headline Figures Thanet - 2017 Results

The key 2017 results of the Economic Impact Assessment are:

4.2 million trips were undertaken in the area
3.7 million day trips
0.5 million overnight visits

2.2 million nights in the area as a result of overnight trips

£273 million spent by tourists during their visit to the area
£23 million spent on average in the local economy each month.

£125 million generated by overnight visits
£136 million generated from day trips.

£320 million spent in the local area as result of tourism, taking into account multiplier effects.

7,950 jobs supported, both for local residents from those living nearby.
6,957 tourism jobs directly supported
992 non-tourism related jobs supported linked to multiplier spend from tourism.

Appendix I - Introduction about Cambridge Model

This report examines the volume and value of tourism and the impact of that expenditure on the local economy. The figures were derived using the Cambridge Economic Impact Model and the research was undertaken by Destination Research.

The model utilises information from national tourism surveys and regionally based data held by Destination Research. It distributes regional activity as measured in those surveys to local areas using 'drivers' such as the accommodation stock and occupancy which influence the distribution of tourism activity at local level.

Limitations of the Model

The methodology and accuracy of the above sources vary. The results of the model should therefore be regarded as estimates which are indicative of the scale and importance of visitor activity in the local area. It is important to note that in the national tourism surveys the sample sizes for each area changes year on year. This is as a result of the random probability nature of the methodology. As such, the results of the Cambridge Model are best viewed as a snapshot in time and we would caution against year-on-year comparisons.

It should be noted that the model cannot take into account any leakage of expenditure from tourists taking day trips out of the area in which they are staying. While it is assumed that these may broadly balance each other in many areas, in locations receiving significant numbers of day visitors from London, there is likely to be an underestimate in relation to the number of overseas day visitors staying in holiday accommodation in London.

Whilst it is important to be aware of these issues, we are confident that the estimates we have produced are as reliable as is practically possible within the constraints of the information available.

Rounding

All figures used in this report have been rounded. Therefore, in some tables there may be a slight discrepancy between totals and sub totals.

Data sources

The main national surveys used as data sources in stage one include:

- Great Britain Tourism Survey (GBTS) - information on tourism activity by GB residents;
- International Passenger Survey (IPS) information on overseas visitors to the United Kingdom;
- Day Visits in the annual Great Britain Day Visitor Survey using information on visits lasting more than 3 hours and taken on an irregular basis

These surveys provide information down to a regional level. In order to disaggregate data to a local level the following information sources are used:

- Records of known local accommodation stock held by Destination Research;
- VisitEngland's surveys of Visits to Attractions, which provide data on the number of visitors to individual tourist attractions ;
- Mid- 2017 estimates of resident population as based on the 2011 Census of Population;
- Selected data from the 2011 Census of Employment;
- Selected data on the countryside and coast including, national designations and length of the coastline.

Staying Visitors
The GBTS provides information on the total number of trips to the region and the relative proportions using different types of accommodation. By matching these figures to the supply of such accommodation, the regional average number of trips per bedspace or unit of accommodation can be derived. The IPS provides information on the total number of trips by overseas visitors to the region. The model uses three year rolling averages to reduce extreme highs and lows which are due to small sample sizes, rather than being a reflection on drastic changes in demand year-on-year.

Day Visitors
Information on day trips at the regional level is available from the Day Visits in Great Britain survey. The survey includes all leisure-related trips from home. It should be noted that a large proportion are local trips made by people resident in the locality. The model uses information from the survey to estimate the number of longer day trips (defined as those lasting at least 3 hours and involving travel of more than 20 miles) and irregular trips lasting more than 3 hours.

Impact of tourism expenditure
This section examines the impact of the tourism expenditure in terms of the direct, indirect and induced expenditure as well as an estimate of the actual jobs (both direct and indirect) supported by tourism expenditure in the district.

The GBTS, IPS and Day Visits to Great Britain survey data on the breakdown of visitor spending. The impact of this initial round of expenditure will be subsequently increased by multiplier effects. These arise from the purchase of supplies and services by the businesses in receipt of visitor expenditure (indirect impacts), and by the income induced-effects arising from the spending of wages by employees in the first round of business and in subsequent expenditure in supplier business (induced impacts).

The New Earnings Survey which provides information on wage levels by industry sector and region; An internal business database which includes data on the structure of business expenditure, local linkages and multiplier ratios drawn from a wide range of business and economic studies carried out by Geoff Broom Associates, PA Cambridge Economic Consultants and others. By applying the breakdown to the estimates of visitor spending, the model generates estimates of total direct spending.

Evidence from national studies suggests that some minor adjustments are required to match visitor spend to business turnover – for example, some expenditure on food and drink actually takes place in inns and hotels that fall in the accommodation sector and within attractions. More significantly, expenditure on travel costs associated with individual trips is equally likely to take place at the origin of the trip as the destination. Therefore the model assumes that only 40% of travel expenditure accrues to the destination area.

Number of full time job equivalents
Having identified the value of turnover generated by visitor spending, it is possible to estimate the employment associated with that spending. Wages for staff and drawings for the proprietors will absorb a proportion of that turnover. By applying these proportions to the overall additional turnover in each sector, the amount of money absorbed by employment costs can be calculated. The New Earnings Survey provides data from which the average costs by business sector, adjusted to take account of regional differences, can be calculated.

After allowing for additional costs such as National Insurance and pension costs, an average employment cost per full time equivalent job can be estimated. The number of such jobs in the local area can then be estimated by dividing the amount of business expenditure on wages and drawings by the average employment cost per job.

Number of Actual Jobs

The model generates estimates of full time equivalent jobs based on visitor spending. However, the total number of actual jobs will be higher when part time and seasonal working is taken into account. The full time equivalent jobs arising directly from visitor spending are converted into actual jobs using information from business surveys in the sectors receiving visitor spending (principally accommodation, food and drink, retail, attractions, transport). In general, the conversion factor between full time equivalent jobs and actual jobs varies around 1.5 in those sectors.

The indirect and induced jobs arise across a much wider range of employment sectors. Therefore, the average 1.16 for all sectors based on Census of Employment data has been used to convert full time equivalent jobs in this sector to actual jobs.

The employment estimates generated by the model include both self-employed and employed people supported by visitor expenditure. The model also includes an estimate of the additional jobs arising in the attractions sector, which are not related to visitor expenditure. However, the numbers do not include other tourism-related employment such as jobs in local authorities arising from their tourism functions, e.g. tourist information staff, additional public health, parks and gardens, public conveniences, maintenance sections and jobs arising from capital investment in tourism facilities.

Local level data for Kent EIA Reports 2017

The Cambridge Model allows for the use of local visitor related data. Local data from visitor survey and other sources is not always sufficiently detailed or available regularly enough to make the results consistent. We rely on partners to collect additional locally source data to feed into the model. We have also used data from Visit Kent's Business Barometer. The following local data has been included in the 2017 Kent results:

Dartford - Bluewater Shopping Centre **-** Bluewater attracted 28 million visitors in 2017. Only about a quarter of these visits is accounted for in the Cambridge Model, equating to about 7.8 million visits.

Dover District - Cruise Passengers data - Port of Dover received about 225,000 cruise passengers in 2017. Official statistics (DfT) suggest that about half of all passengers to Dover would be 'port calls' visits. Furthermore, cruise passengers are included at both departure and arrival if their journey begins and ends at a UK seaport. We made the following assumptions:

A total of 112,000 cruise passengers were classed as 'port call' visits and have been counted as day visitors. For the additional estimated 112,000 that departed or finished their trip in Dover we assume that most would start and finish their trip at Dover. A multiplier factor of 0.6 has been applied to avoid double counting and the additional trips have been added as extra serviced accommodation trips (67,500).

Tonbridge & Malling - Tonbridge Castle visitor numbers have rebounded recently, following a drop in performance between 2014-2016. The latest admission figures have been included in the district results.

Other anecdotal information taken into consideration was the significant growth in high-end independent cafes and restaurants in Tonbridge since 2016, now making it quite a foody destination (includes Tonbridge Old Fire Station, Beyond the Grounds, Basil, Havet, Saltwaters, Verdigris, Fuggles and Paws Cat Café). Outside of Tonbridge, Aylesford Priory attracts hundreds of thousands of visitors each year. The latest admission figures have been included in the district results.

Folkestone & Hythe District Council (previously Shepway District)

The latest admission figures for Romney Marsh Visitor Centre have been included in the district results. Folkestone Triennial 2017 - During September and October 2017 the Triennial attracted record high visitor numbers . The latest admission figures have been included in the district results.

Ashford

Annual footfall figures for the Big Cat Sanctuary in Smarden have been included.
Car park data shows that Ashford carparks saw a 2% drop in users and Tenterden a 1% drop.

Medway

Increase in the number of festivals and events (Sweeps Festival, Dickens Summer Festival, Rochester Castle concerts, Medieval Merriment, Dickensian Christmas Festival, 'The Battle of Medway' (two weeks in June 2017) with additional 200 Dutch yachts and many visitors to the two week series of events. Coach visits (2017) 22,047 coaches and assumed 114,608 visitors (assumes x54 pax per coach).

Swale

We have used selected information from the Destination Intelligence reports submitted as part of their British Destination membership and the data sharing and benchmarking research.

Thanet

Thanet Language Schools – Figures for 2017 compared to 2015 show an 11% increase in volume. Southeastern - Comparison stats for 2015 and 2017 - For travel to Margate, Broadstairs and Ramsgate only, journeys on Off-Peak products increased by 33% from April 2016 to March 2017 compared to the previous year.

Produced by:

Registered in England No. 9096970
VAT Registration No. GB 192 3576 85

45 Colchester Road
Manningtree
CO11 2BA

Sergi Jarques
Director
Tel: 01206 392528
info@destinationresearch.co.uk
www.destinationresearch.co.uk

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION
SUBMISSION TO DEADLINE 11:
Comments on Information requested by the ExA and received from the Applicant to Deadline 10
and
Examples of Section 106 Agreement in DCO

1. We make no comment on the progress and content of the draft Section 106 Agreement save to say that the Applicant's conduct to KCC and TDC continues in the same vein of prior to and throughout the Examination.
2. As the ExA will be aware TDC submitted to the Planning Inspectorate its response to the Adequacy of the Consultation Representation at [**AoC-005**] and **[AoC-006]**).
3. TDC clearly state within its Submission that:
   (a) *"The first statutory consultation is not considered to comply with Section 47(5) of the Planning Act 2008*" (please see para 7, page 3 of **[AoC-005]** and **[AoC-006]**)
   (b) That with regard to the second statutory consultation that "*…It is unclear whether the applicant [Riveroak Strategic Partners] has complied with Section 47(5) of the Planning Act 2008 and whether sufficient regard has been had to the Council's comments*" (please see first paragraph, page 4 **[AoC-005]** and **[AoC-006]**))
   (c) "*…TDC are unable to confirm that the applicant [Riveroak Strategic Partners] has complied with Section 47(7) of the Planning Act 2008 from the evidence before the Council at this time"* (please see second paragraph, page 6 **[AoC-005]** and **[AoC-006]**))

4. Further, a detailed Section 42 Consultation Response from the officers of TDC (Stage 3 response) was not commented upon by the Applicant; it was effectively ignored.
5. This has meant a number of relevant issues raised by TDC relating to local impacts and the need for proper mitigation were not discussed prior to the Examination at pre-application stage.
6. As you will be aware trust is at the heart of community relations and engagement.

7. It is disappointing to see the Applicant treat the officers discharging their duties on the part of the residents, the Council and the Government with such disregard.
8. The conduct of the Applicant to the host district and County is alarming and is not the conduct of an entity that upholds accountability, good governance, engagement.
9. We respectfully submit two examples of DCO's with Section 106 Agreements – Thames Tideway Tunnel and The National Grid (Hinkley Point C Connection Project) from the Planning Inspectorate website.
10. We respectfully submit the Application must be judged on the information submitted prior to and for the Examination to close on 9 July 2019 at 23:59.

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION

SUBMISSION TO DEADLINE 11:

Comments on Information requested by the ExA and received from the Applicant to Deadline 10

Comment on Response to ExA 4th Written Questions

And

Comment on Applicant's Technical Note at EC 4.2

AND

Comment on Natural England's comments on the Report of the Implications for European Sites (DL10)

1. We note that Natural England wrote to the ExA on 1 July 2019 submission at [REP10-XXX][1] titled Natural England's comments on the Report of the Implications for European Sites (REIS).

2. In [REP10-XXX][2] it refers to the Applicant's Appendix Technical Note Ec4.2 [REP9-XXX][3] submitted at Deadline 9.

3. Natural England state at paragraphs 5/6 of [REP10-XXX][4]:
"***Appendix Ec.4.2 demonstrates that the proposed flightpath is similar to that used by the previous Manston Airport,*** *and* ***the noisiest planes that used to fly from Manston would not be allowed at the new airport****. Therefore, although the previous airport caused fewer peak noise events, these would have been louder than would be produced by the proposed operations. As the previous disturbance study did not specifically note disturbance by commercial aircraft, even though the planes would have*

[1] Natural England's comments on the Report of the Implications for European Sites of 1 July 2019 TR020002-004583

[2] Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019

[3] Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019

[4] Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION

SUBMISSION TO DEADLINE 11:

Comments on Information requested by the ExA and received from the Applicant to Deadline 10

COMMENT ON RESPONSES TO EXA 4 WRITTEN QUESTIONS

– NEED-

UNDERSTANDING THE FREIGHT MARKET :

GOVERNMENT OFFICE FOR SCIENCE

1. We respectfully submit the following study by the Government Office of Science titled Understanding the UK Freight Transport System.
2. We respectfully note that at 1.1 the study states that the objective of this study is to provide an **evidence-based** review of the **current 'landscape'** of the freight transport system in the UK it is dated February 2019.
3. The methodology adopted to complete this study has involved:
   a) Desk research to analyse **existing public policy and research**
   b) Data analysis to **develop a statistical 'picture' of the current position based on official data and outputs from the GB Freight Model**, which forms the freight module of the DfT's current National Transport Model and other databases developed by MDS Transmodal
   c) **Providing observations on how the freight transport system might develop up to about 2028**
4. We respectfully attach the Study in full for your consideration and respectfully draw your attention in particular to the following sections:
   a) The Cost of Road Freight Transport at Page 22
   b) Rail Freight: volume and goods transported at Page 23
   c) Port freight: volume and goods transported at Page 27
   d) Air Freight: volume and goods transported at Page 31
   e) Waterborne Freight: volume and goods transported at Page 32
   f) Pipeline: volume and goods transported at Page 33

Government Office for Science

Foresight

Understanding the UK Freight Transport System

Future of Mobility: Evidence Review

Foresight, Government Office for Science

Understanding the UK Freight Transport System

MDS Transmodal

February 2019

This review has been commissioned as part of the UK government's Foresight Future of Mobility project. The views expressed are those of the author and do not represent those of any government or organisation.

This document is not a statement of government policy.

This report has an information cut-off date June 2018.

Table of Contents

GLOSSARY OF TERMS

Bulk freight	Large volumes of homogeneous freight carried in specialised transport equipment between specialised terminals.
Bulk rail freight	Where freight is carried in railway wagons designed specifically for carrying particular types of bulk freight (e.g. coal and chemicals) and requires special facilities to transfer the freight between rail and storage.
Coastal shipping	The domestic movement of freight by sea between two UK ports.
Deep-sea shipping	The international movement of freight by sea between a UK port and a port situated outside Europe and the Mediterranean.
Distribution centre	Industrial buildings where freight is stored; there are essentially two types of distribution centre – national distribution centres and regional distribution centres.
Domestic freight transport	The carriage of goods with a first origin and final destination within Great Britain.
Freight transport	Carriage of goods between an origin and a destination.
Heavy goods vehicle (HGV)	Goods vehicles over 3.5 tonnes gross laden weight (i.e. weight of vehicle plus load).
Intermodal rail freight	Freight carried in units (e.g. a container) on special flat rail wagons for the 'trunk' haul between two intermodal terminals; collection and delivery is by road to provide a door-to-door service.
Intermodal terminal	Facility designed to transfer units between rail and road and consists of sidings to accommodate trains, special cranes for loading and unloading the units and space for storage of units.
International freight transport	The carriage of goods with a first origin or final destination outside the United Kingdom. However, for the purposes of this report it has been defined as including movements between Great Britain and Northern Ireland.
Loading gauge	The cross-section of a railway line through which an intermodal rail freight service – with units transported on intermodal rail wagons – can safely pass. More generous loading gauges can allow more cost-effective combinations of standard intermodal wagons and larger units to be transported.
Load-on/load off (LoLo)	Unitised cargo in containers that is loaded on and off a ship by a crane.
Logistics	Designing and managing 'supply chains' for organisations, including purchasing, manufacturing and storage as well as transport.

Logistics providers	Organisations that undertake the movement and handling of goods on behalf of their customers; there are two main types of logistics providers – road hauliers and 3PLs (third party logistics providers).
National distribution centre (NDC)	Inventory holding points for imported and nationally sourced goods before re-distribution to other stages in the supply chain; serve the whole of the UK from one location.
Network Rail	Organisation responsible for the maintenance and renewal of the GB rail network.
Non-bulk freight	Freight carried in standard 'box' units, mainly road trailers and containers.
Non-bulk rail freight	Freight carried in units (usually a container) on an intermodal rail freight service or in railway 'box cars' or 'vans' between specialist terminal facilities.
Rail-connected distribution park	Large distribution site, with an intermodal terminal serving on-site distribution centres and the wider region; also called a Strategic Rail Freight Interchange.
Regional distribution centre (RDC)	Re-distribution of inward supplies of goods to other stages in the supply chain, normally a retail outlet; they have a regional hinterland and are normally associated with retailers. Their primary role is to consolidate and re-distribute goods in short periods of time rather than to hold goods for long periods.
Road hauliers	Provide road transport services from one location to another at the direction of their customers.
Roll-on/roll-off (RoRo)	Unitised cargo in trailers which is rolled on and off a ship without the use of a crane.
Short-sea shipping	The international movement of freight by sea between a UK port and a port situated in geographical Europe.
Strategic Rail Freight Interchange (Strategic RFI)	Large distribution sites (over 60 hectares), with an intermodal terminal serving on-site distribution centres and the wider region; also called rail-connected distribution parks.
Third party logistics company (3PL)	Companies that sell comprehensive packages of supply chain management services in addition to road transport operations.
Tonne-kilometres (tkm)	Tonnes lifted x length of haul.
Tonnes lifted	Weight of freight
Tonnes moved	The sum of tonnes moved and the distance it is moved; usually expressed in tonne kilometres.

Vehicle-kilometres (vkm)	Tonne-kilometres divided by average load per vehicle.
West Coast Main Line (WCML)	Key route for GB rail freight services; the line links London with the West Midlands, North West England and the Central Belt of Scotland (Glasgow).

1 INTRODUCTION

1.1 Study objectives

The objective of this study is to provide an evidence-based review of the current 'landscape' of the 'freight transport system' in the UK, while also providing some observations on how the future freight transport system might develop over the next 10 years. The Government Office for Science (GO-Science) has also commissioned a number of parallel pieces of work which seek to provide more detailed views on the future of freight transport up to 2040.

The 'freight transport system' in the UK has been defined for the purposes of this study as the network of users of freight transport (principally shippers and receivers of cargo), freight transport and logistics service providers and the infrastructure which these services use.

1.2 Foresight Future of Mobility Project

This research was commissioned by GO-Science, which has the remit of ensuring that government policies and decisions are informed by the best scientific evidence and strategic long-term thinking. This piece of work forms part of the GO-Science Foresight Future of Mobility project, which is considering what benefits and opportunities the transport system of the future could provide and what the implications are for Government and society.

1.3 The political economy of freight transport

Freight transport is needed because goods available at one geographical location are required at another location for processing, sorting or consumption. Freight transport is therefore an example of what economists call a derived demand as the transport is not required in itself, but only as a means to satisfy another demand.

As a derived demand, the demand for freight transport does not come directly from consumer needs or wants but from private sector companies such as retailers, manufacturers and processors. However such organisations are ultimately responding to consumer demand for goods and dealing with return flows such as unwanted or faulty goods and waste materials such as packaging for recycling or disposal; the level of demand for goods will be influenced by various factors, including the performance of the wider economy and changes in tastes and fashions over time. Freight transport and logistics services are delivered almost exclusively by private sector companies which invest heavily in fixed infrastructure, such as port facilities, rail terminals, distribution centres, and mobile equipment such as trucks, vans, forklift trucks, ships and railway locomotives and wagons.

The private sector needs, however, to use publicly owned road and rail infrastructure and is subject to the taxation and regulatory regimes that the public sector puts in place. Changes in taxation and regulation may lead to more efficient outcomes for the wider economy and society as a whole, but will also affect the value of private sector investments that have been predicated on the existing fiscal and regulatory position. It follows that Government needs to understand the current landscape for freight transport as future interventions are likely to require a combination of public investment in road and rail network infrastructure, changes in the regulatory framework and the taxation regime and the application of appropriate planning policies. These changes should be designed, wherever possible, to increase the efficiency of the freight and logistics sector by reducing its costs; this is particularly important as freight

transport should be seen as a cost of production and as having an impact on the productivity of firms and the UK economy as a whole.

Freight transport movements also have impacts on the environment and on the quality of life and health of citizens and so an appropriate balance needs to be found in the future between, on the one hand, economic objectives and, on the other hand, quality of life and environmental objectives.

As the freight transport industry is highly competitive – facilitated by relative ease of entry into the market – any interventions by the public sector will lead to a response from the private sector operators and any resulting changes in costs will be passed on, in the medium to long term, to the industry's customers and, ultimately, to the wider economy.

Technological changes and innovation in freight transport have facilitated the development of mass and then lean production techniques, which have led to transformational changes in the UK economy since the 18th century (CILT, 2015):

- Canals allowed raw materials and manufactured products to be distributed nationwide and to and from ports at a reasonable cost in the 18th and early 19th centuries, while the railways provided high-capacity freight transport with faster transit times from the latter half of the 19th century;

- The development and mass production of vehicles using the internal combustion engine in the early 20th century and the development of the motorway network after the Second World War allowed road freight to increase its market share on longer-distance hauls at the expense of the railways, without radically transforming the structure of the UK economy;

- Containerisation of a wide range of cargoes since the 1960s, allied to the process of globalisation and investment in very large container ships, has made it easier for goods to be manufactured anywhere in the world and then distributed cost-effectively to the UK;

- Greater use of integrated information and communications technology (ICT) in supply chains since the 1980s has allowed companies to reduce their inventory and operate increasingly lean manufacturing processes, which has led to lower production costs and greater productivity for the UK economy.

As the history of transport since the industrial revolution in the 18th century has shown, technological change in the freight transport sector has had a transformational effect on the economy and on society. This is likely to continue up to 2040 as the freight industry adapts to changing consumer demands, stronger environmental regulation and the challenges of an increasingly integrated global economy.

This provides the context for this study, which has an objective of ensuring that Government has a clear view of the freight transport landscape in the UK. This is important because the public sector can have such a significant impact on the sector, which is in turn a key facilitator for the wider economy.

1.4 UK freight transport policy

Government transport policy in relation to freight transport is designed to be relatively light touch and is set out at a UK level in *The Logistics Growth Review* (Department for Transport, 2011 and 2014). The main aim of the original document, which was produced in 2011 in collaboration with the freight and logistics industry, was to identify the barriers to economic growth within the industry and present a series of measures to address the barriers that were identified.

The document outlined five core areas where the Government can assist and facilitate growth and competitiveness in the logistics industry, namely:

- Giving industry greater confidence to invest in the short term by removing planning barriers to sustainable logistics development, with a particular focus on strategic rail freight interchanges (SRFIs[1]) that can facilitate modal shift from road to rail over the longer distances;
- Improving the longer-term capacity, performance and resilience of our congested road and rail networks and improving connectivity to ports;
- Promoting the image of the sector at a local level;
- Reducing unnecessary regulation;
- Attracting and retaining high-calibre recruits.

The 2014 update presented the measures the Government had taken in relation to these five core areas. These included producing a National Networks National Policy Statement to endorse policy on SRFIs, increasing investment to upgrade the strategic road network and providing funding to improve training and skills in the logistics sector.

1.5 Scope and methodology

The scope of this research project is on the UK freight transport system as defined above, but given the open nature of the UK's economy, it also considers transport links to the European continental mainland, Ireland and the rest of the world. It encompasses all modes of freight transport, but focuses on road and rail, shipping, inland waterways and aviation.

As it is only possible to understand the existing landscape through an appreciation of historic trends, we have presented as much data as possible from 2002 to the most recent year for which published data is available. The time horizon for the Foresight Future of Mobility project is 2040, but our observations on future trends are limited to the next ten years.

[1] Strategic Rail Freight Interchanges are large distribution sites (over 60 hectares), with an intermodal terminal serving on-site distribution centres and the wider region; they are also called rail-connected distribution parks.

The methodology adopted to complete this study has involved:

- Desk research to analyse existing public policy and research;
- Data analysis to develop a statistical 'picture' of the current position based on official data and outputs from the GB Freight Model, which forms the freight module of the DfT's current National Transport Model and other databases developed by MDS Transmodal;
- Providing observations on how the freight transport system might develop up to about 2028.

As this report demonstrates, there is a significant amount of data available in the public domain, much of which is collected by the public sector in order to inform the development of policy. Data are collected to fulfil different needs. Hence the datasets report on different aspects of the transport system, using different methods. Consequently there can be differences in the picture shown by the data. For example there is sometimes inconsistency between the HGV distance in the Continuing Survey of Road Goods Traffic and the Road and the National Road Traffic Survey. The reasons for this difference are given on the DfT methodology page (2016). Policy makers and users of this (and any) data need to comprehend any uncertainties in the picture being presented, or there are risks of misunderstanding.

As the freight transport sector is essentially operated by the private sector, this official data is aggregated and anonymised to avoid raising issues of commercial confidentiality and generally seeks to record movements of freight by individual mode. This makes it difficult to follow the movements of different commodities through the transport chain and examine the (often international) supply chains of individual companies or industries from a statistical point of view. Advances in ICT can allow individual consignments to be tracked automatically from production to consumption, improving company's situational awareness. However, whilst government and local authorities could benefit from this information, in terms of planning, it is likely challenging to obtain and use, given its commercial nature.

Where possible the report includes references to data sources and research produced by others; where references are not provided, the views expressed are those of the authors.

1.6 Structure of report

Section 2 Freight transport & stakeholders provides definitions of freight transport and how it is measured. It then considers the key stakeholders in freight transport that have a particular interest in how it develops up to 2040. It then describes the main modes of freight transport and provides a short introduction to freight transport economics.

Section 3 Freight transport demand provides data and analysis of the demand for freight transport by mode of freight transport, with the main focus on road, rail, port-based and air freight.

Section 4 Freight transport services provides information on the service providers that operate in the freight transport industry by mode of transport.

Section 5 The strategic freight transport infrastructure network seeks to describe the infrastructure that the services use – both publicly owned and privately owned infrastructure.

Section 6 The Future of Freight provides some observations on the potential impact of, inter alia, changes in regulation, technology, changing trade relationships, and alternative fuels on the future UK freight system.

2 FREIGHT TRANSPORT & STAKEHOLDERS

2.1 Introduction

This section provides definitions of freight transport and how it is measured, as well as the wider concepts of logistics and supply chains. It then considers the key stakeholders in freight transport that have a particular interest in how it develops in the future. It concludes by describing the main modes of freight transport and provides a short introduction to freight transport economics.

2.2 Definition of freight transport

Freight transport is the carriage of goods between an origin and a destination for commercial reasons because goods available at one geographical location are required at another location for processing, sorting or consumption. This definition excludes the majority of light goods vehicle (or 'white van') traffic, which is for the provision of services or for personal use rather than for the transport of goods (Braithwaite, 2017).

Logistics is a broader concept that involves designing and managing supply chains for individual organisations. It seeks to efficiently manage the purchasing, manufacturing and storage functions and the transport as an integrated system. Minimising stockholding (inventory) and the associated costs is a key principle of logistics. The **supply chain** of an individual organisation is the sequence of processes involved in the production and distribution of a commodity. The freight transport industry is therefore involved in both transport and logistics – particularly as many transport service providers also provide 'added value' services such as packaging, labelling and sorting of goods – and is essential for the distribution of goods within the supply chain of an individual organisation.

This report mainly discusses freight transport rather than logistics, but attention is also paid to distribution centres because of their importance as nodes in the wider freight network, in adding value to the goods stored and in creating employment.

Freight transport can generally be categorised by its:

- Origin or destination, with a particularly important distinction made between domestic transport (i.e. within the UK) and international freight between the UK and other countries, whether within the existing customs union that includes the rest of the European Union or with non-EU countries;
- Mode of appearance (principally bulk or non-bulk for land-based transport);
- Mode of transport (road, rail, air, etc.).

Domestic freight transport is defined as the carriage of goods with both the first origin and final destination within the United Kingdom, while **international freight transport** is the carriage of goods with either an origin or destination outside the United Kingdom. As Great Britain is an island, all international freight has to be handled through a port, airport or

through the Channel Tunnel, while for Northern Ireland international freight transport can also involve movements across the land border with the Republic of Ireland.

Bulk freight transport is where large volumes of a homogeneous cargo are carried in specialised transport equipment between specialised terminals. Examples include the transport of aggregates from a quarry to a rail-served terminal and the transport of petroleum products by sea in oil tankers from an oil refinery based on an estuary to a coastal tank farm.

Non-bulk freight transport is made up of two main categories of cargo:

- Unitload transport: where cargoes are carried in standard 'box' units, mainly road trailers and containers. Examples are where a truck makes a delivery of food and beverages from a distribution centre to a supermarket or where a container containing consumer goods from China is transported on a rail service from a container port to an intermodal rail freight terminal, where it is then loaded onto the back of a truck for delivery to a distribution centre.

- Semi-bulk transport: where high-volume industrial products are 'packaged' to ease handling without being in pure bulk form or being transported in a unit. Examples include steel coils, paper rolls or packaged timber.

2.3 Measuring freight transport

Freight transport is usually measured in terms of **freight tonnes lifted** or **freight tonnes moved**. Freight tonnes moved can be expressed in tonne-kilometres (tkm) or, for road freight, vehicle-kilometres (vkm). Tonne-kilometres is generally regarded as the most relevant measure for defining modal share and a combination of tonne-kilometres and tonnes lifted allows the average length of haul to be derived.

tonne kilometres (tkm) = tonnes lifted x length of haul in kilometres

vehicle kilometres (vkm) = tonne kilometres / average load in tonnes

tonne kilometres / tonnes lifted = average length of haul in kilometres

2.4 Key freight transport stakeholders

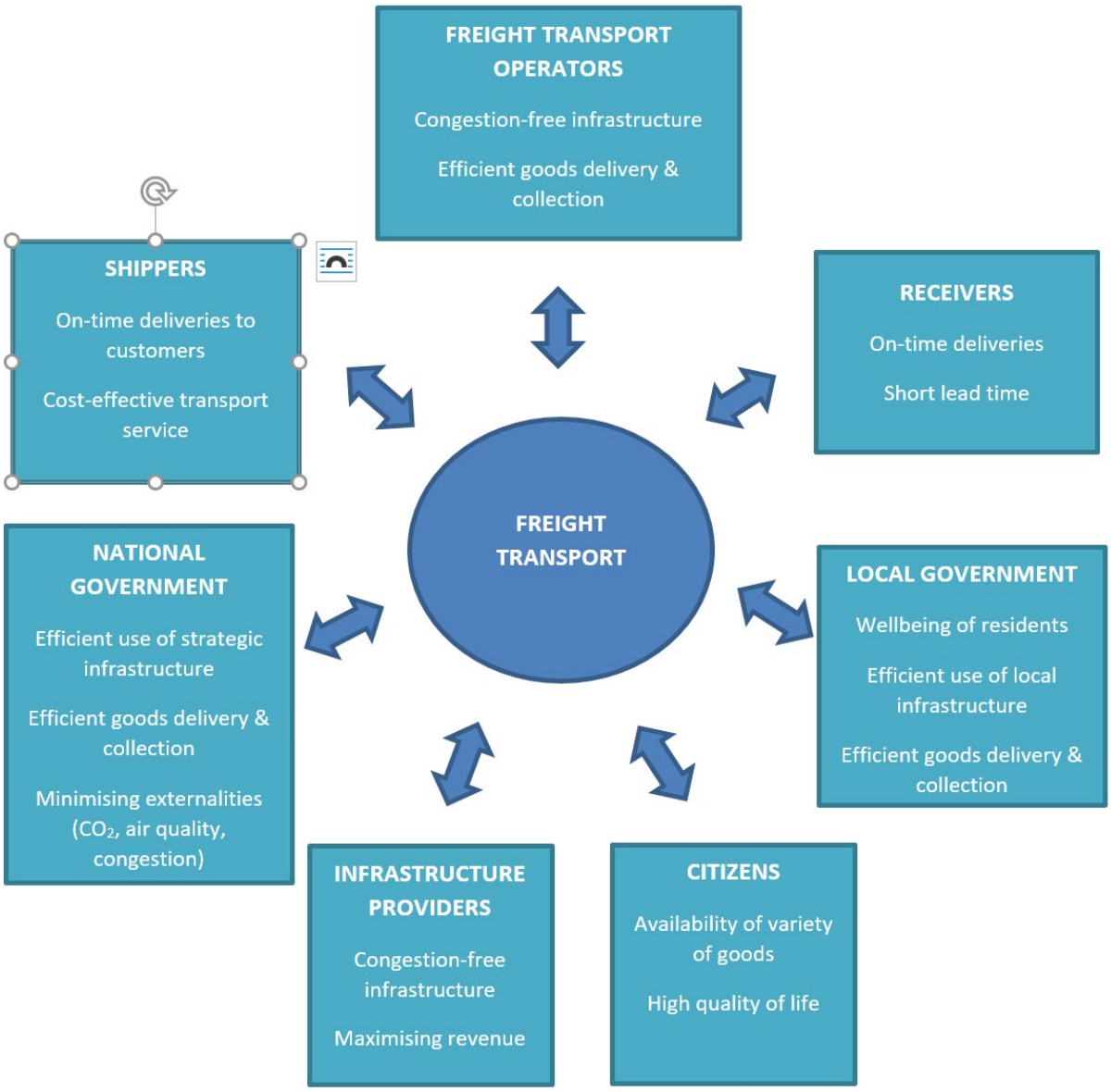
Freight transport movements are a source of environmental emissions, and they contribute to congestion and generate noise. These issues cause concern for a wide range of stakeholders and can justify intervention by the public sector to protect the wider public interest. At the same time the functioning of the UK economy is facilitated by the availability of efficient freight transport services, ensuring the availability of goods, supporting manufacturing activity and supporting employment.

The different expectations of the various stakeholders in relation to freight transport can be described through stakeholder analysis, which categorises the different groups of people and organisations with an interest in the subject and highlights their different expectations.

Figure 1 shows the key stakeholder groups that are affected by freight transport, with their main expectations. In general terms, citizens are seeking a high quality of life, while transport operators and their customers (shippers and receivers of goods) have a strong interest in achieving low-cost on-time delivery and collection of goods to improve their competitiveness.

These different expectations can result in conflicts that need to be resolved through trade-offs between the private needs of the freight industry and its customers and public needs (such as improved air quality, lower levels of congestion, etc.) through intervention in the market by the public sector. In economic terms, where the costs of private activities are not fully reflected in the user costs of the freight industry and their customers, there is market failure; the public sector therefore has a role in seeking to balance the needs of the private operators with the wider needs of society.

Figure 1: Freight transport stakeholders and expectations (source: MDS Transmodal)



2.5 Modes of freight transport & modal economics

Freight transport is often defined in terms of the mode of freight transport because this determines the relative economics of the freight transport movement and its environmental impacts.

Road freight transport is the dominant mode because of a number of factors:

- The mode's inherent flexibility and cost-effectiveness, particularly over shorter distances and for smaller consignments.
- The ease of entry into the road haulage sector due to lower start-up costs and a lower level of institutional and regulatory complexity compared to, for example, the railway industry.
- The extent of the high-capacity strategic highways network that was developed after the Second World War, notwithstanding the current congestion and bottlenecks in some locations, particularly at peak times.
- The fact that most distribution centre sites are no longer directly connected to other modal networks.

The vast majority of road freight lifted and moved is carried in heavy goods vehicles (HGVs), which are defined as vehicles over 3.5 tonnes gross laden weight (i.e. the weight of the vehicle plus its load). The average length of haul for an HGV is about 100km (Department for Transport, 2018c). Although there are a variety of types and sizes of HGV, the main type of HGV used for long-distance road haulage is the combination of a tractor and 13.6-metre trailer unit. There has been an increase in light goods vehicles (LGVs or so-called 'white vans') traffic. The majority of LGV movements on the road network are not associated with e-commerce deliveries (Braithwaite, 2017). They are mainly used for food distribution, construction and business services (such as plumbers, electricians, fitters, etc.). Therefore, while the growth in LGV traffic on the roads is often assumed to be related to the growth in e-commerce, this is a contributory factor, it is also likely related to the growth in service-related activity. However there remains considerable uncertainty in exactly what LGVs are used for.

Rail freight transport can be cost-effective, even over short distances (i.e. less than 100km), for full trainload consignments moving between two rail-connected sites (such as shipments of coal from ports to inland power stations). It can also provide economic and flexible transport chains for higher-value goods when transported in containers within intermodal transport chains. However, rail freight tends to be competitive with road over longer distances and the average length of haul is about 150km (Office of Rail & Road, 2018d). Other benefits of rail freight include:

- The ability to receive large volumes of cargo in 'one move';
- The ability to deliver/receive cargo at specific times and in a timely manner which avoids road congestion; rail operates to working timetables with recent performance for the sector indicating that around 94% of freight trains arrive 'on-time';
- Lower greenhouse gas and other emissions per unit moved so that, where organisations are required to report them, the use of rail can either off-set emissions

elsewhere or contribute to a reduction of overall emissions, as well as help in meeting corporate social responsibility objectives; and

- Greater levels of security – the railway operates in a closed/secured environment so that, for example, spent nuclear fuel is transported by rail freight despite road haulage potentially being able to offer a more cost effective solution.

Maritime freight transport via seaports is essential to trade with the European continental mainland, Ireland and the rest of the world. A wide variety of modes are used to transport goods by sea, from container ships and roll-on/roll-off ferries carrying high-value consumer goods to bulk carriers transporting petroleum products, crude oil, liquid natural gas, grain, biomass, bulk steel and a wide variety of other goods.

Waterborne freight transport includes the transport of domestic freight within the UK on inland waterways, along the coasts and between Great Britain and Northern Ireland and 'one-port traffic' between a single UK port and an offshore installation. While large volumes of bulk goods and some containers are transported coastwise between UK ports and along major inland waterways such as the Manchester Ship Canal, a few other wide inland navigations and on the major river estuaries, there is no cargo transported by barge on narrow-gauge canals.

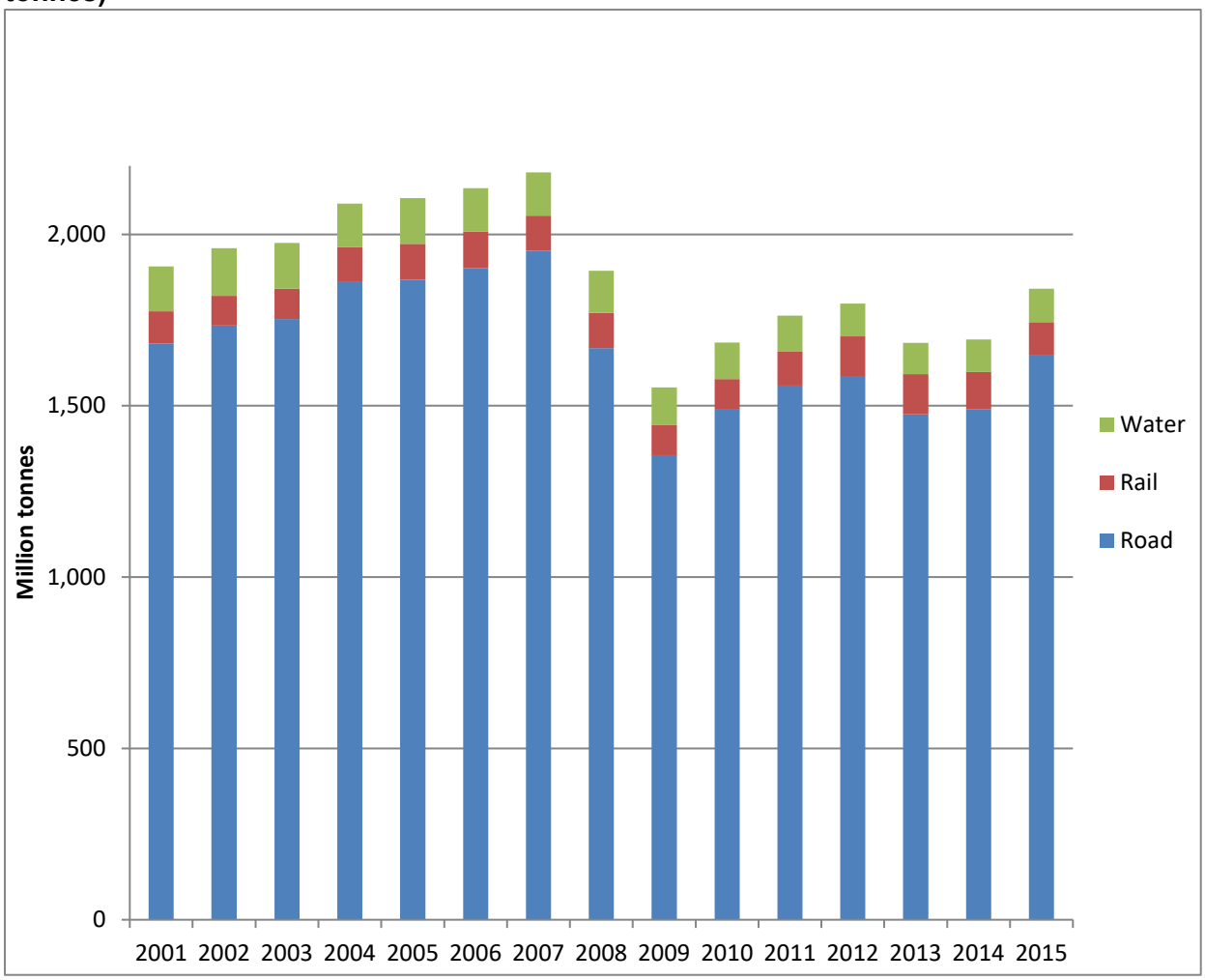
Pipelines provide a specialist mode of transport for the cost-effective transport of large volumes of bulk liquids and gases between ports and manufacturing sites, refineries and power stations.

Air freight is a specialist mode of freight transport, mainly for the inter-continental transport of relatively low volumes of very high-value or urgent goods and documents.

2.6 Overall freight transport volumes

Figure 2 shows how GB domestic freight transport by mode in terms of tonnes of freight lifted has fluctuated during the period 2001–15, with road freight responsible for transporting between 87% and 90% of total freight by volume over the period.

Figure 2: Domestic freight transport lifted by mode in Great Britain 2001–15 (million tonnes)



Source: Department for Transport Statistics Great Britain

In addition, road and rail freight data analysed by the authors suggests that total freight lifted in the UK by road (including overseas hauliers) and rail in 2016 amounted to 2.1 billion tonnes of goods (Table 1). Of the total goods lifted, 83.6% had an origin in England, 2.6% had an origin in Northern Ireland, 4.8% had an origin i77n Wales and 9.0% had an origin in Scotland.

Inland freight moved in the UK by road and rail in 2016 amounted to an estimated 209 billion tonne-kilometres, with each tonne being moved on average 100km (Table 2). The rail modal share in terms of freight moved was an estimated 9% in 2016 (Table 3), with the highest share for rail being 15% in Yorkshire and the Humber where there are significant bulk rail movements to and from the port of Immingham.

Table 1: Total estimated UK freight lifted in tonnes by origin-destination region, 2016 (million tonnes)

	Origin tonnes	Destination tonnes
North East	81	78
North West	220	228
Yorkshire and the Humber	216	205
East Midlands	230	213
West Midlands	188	199
East Of England	252	242
London	132	151
South East	258	270
South West	171	163
Wales	100	94
Scotland	188	191
Northern Ireland	53	54
Total	2,088	2,088

Source: MDS Transmodal analysis of data from DfT's Continuing Survey of Road Goods Transport (GB & Northern Ireland), International Road Haulage Survey & Network Rail data

Table 2: Total estimated UK freight moved in tonne km by origin-destination region, 2016

	ORIGIN		DESTINATION	
	Origin billion tonne-km	Av. distance moved (km)	Destination billion tonne-km	Av. distance moved (km)
North East	7.8	97	7.3	94
North West	23.4	107	24.6	108
Yorkshire and the Humber	24.0	111	21.1	103
East Midlands	24.2	105	21.9	103
West Midlands	18.6	99	20.2	102
East of England	25.6	102	24.5	101
London	7.7	58	10.6	70
South East	27.0	104	29.5	109
South West	17.7	104	16.7	102
Wales	11.1	112	9.8	103
Scotland	18.8	100	19.7	103
Northern Ireland	3.4	63	3.4	63
Total	209.4	100	209.4	100

Source: MDS Transmodal analysis of data from DfT's Continuing Survey of Road Goods Transport (GB & Northern Ireland), International Road Haulage Survey & Network Rail data

Table 3: Total UK freight by road & rail by origin region, 2016 (billion tonne-km)

	Road tonne-km	Road modal split %	Rail tonne-km	Rail modal split %	Total tonne-km
North East	7.0	90%	0.8	10%	7.8
North West	21.6	92%	1.8	8%	23.4
Yorkshire and the Humber	20.5	85%	3.6	15%	24.0
East Midlands	21.5	89%	2.7	11%	24.2
West Midlands	17.8	95%	0.9	5%	18.6
East Of England	23.3	91%	2.4	9%	25.6
London	7.2	94%	0.4	6%	7.7
South East	25.7	95%	1.3	5%	27.0
South West	15.9	90%	1.8	10%	17.7
Wales	9.6	87%	1.5	13%	11.1
Scotland	17.2	91%	1.7	9%	18.8
Northern Ireland	3.4	100%	0.0	0%	3.4
Total	190.6	91%	18.8	9%	209.4

Source: MDS Transmodal analysis of data from DfT's Continuing Survey of Road Goods Transport (GB & Northern Ireland), International Road Haulage Survey & Network Rail data

2.7 Summary

Freight transport is an essentially private sector activity which has wider economic, social and environmental impacts. These wider impacts can justify appropriate intervention by the public sector to address market failure.

The modes of transport have different strengths and weaknesses but for domestic freight road is competing with rail and, to a lesser extent, coastal shipping. For international freight transport, maritime transport has the highest market share in terms of tonnage, but air freight is used for the transport of very urgent and high-value inter-continental cargo and the Channel Tunnel fixed link competes with cross-Channel ferry services for traffic to and from the European continental mainland.

3 FREIGHT TRANSPORT DEMAND

3.1 Introduction

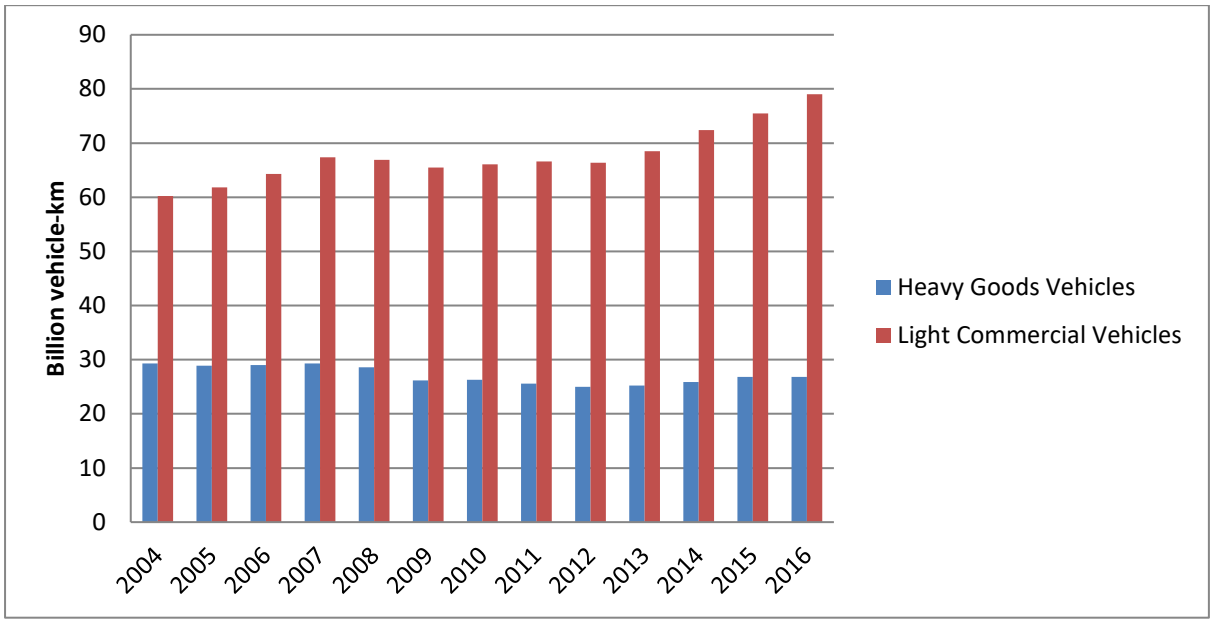
This section provides data and analysis of the demand for freight transport by mode of freight transport, with the main focus on road, rail, ports and air freight. Where a consistent time series is available it sets out the data from 2001 to 2016 (or the 2016–17 financial year) to show historic tends.

3.2 Road freight: traffic volumes & goods transported

Traffic volumes

Total HGV and LGV freight traffic is recorded by the DfT's National Traffic Survey, which is based on continuous traffic counts. This data suggests that HGV traffic has been gradually increasing since 2012 and in 2016 reached 27.1 billion vehicle kilometres. However, it has still not reached its pre-recession peak of 29.3 billion vehicle kilometres achieved in 2007.

Figure 3: Road traffic (billion vehicle-km) by vehicle type, 2004–16



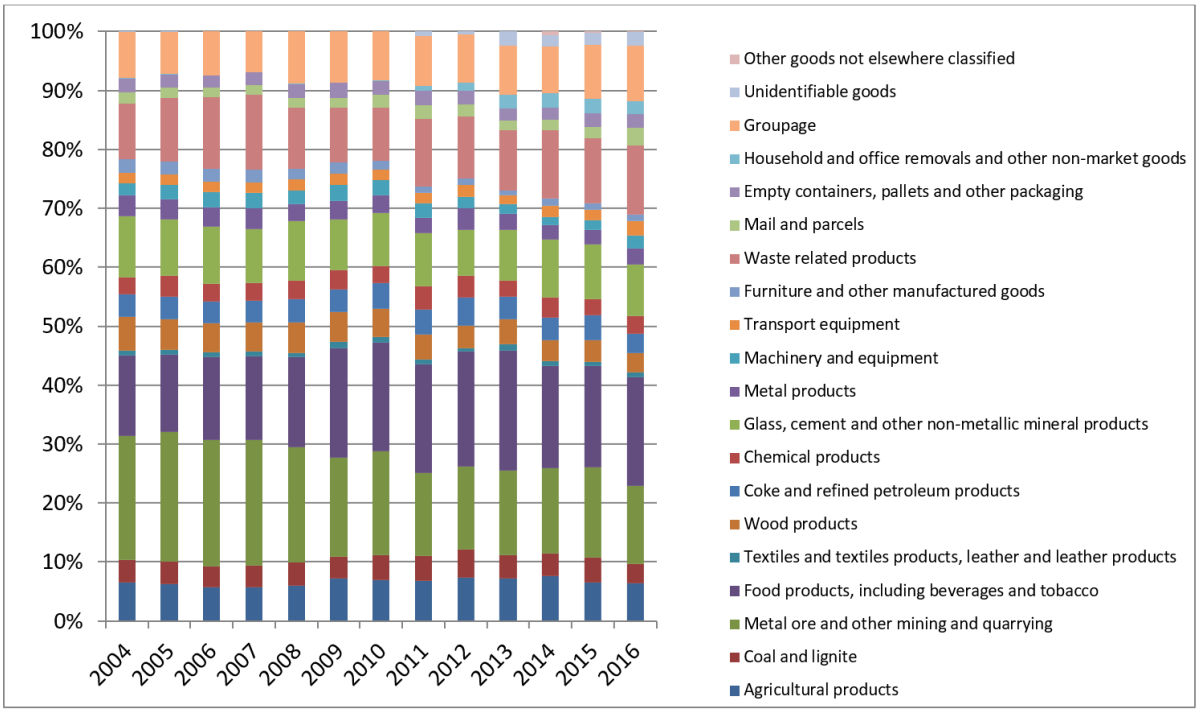
Source: Department for Transport, 2018, TRA0201

By comparison, LGV traffic has increased steadily from 60 billion vehicle-kilometres in 2004 to 79 billion vehicle kilometres in 2016, an increase of 31%. Although less is known about LGV movements, much of this increase is likely to be related to the growth in in the service economy and, probably to a more limited extent, growth in e-commerce (Braithwaite, 2017).

Commodities transported

Figure 4 provides analysis of freight tonnes lifted by broad commodity by UK-registered HGVs over the period 2004–16 and as recorded in the DfT's Continuing Survey of Road Goods Transport (Department for Transport, 2018, RFS0104). While the trends in different broad commodity groups can be difficult to establish from this data source, there appears to be a gradual reduction in the proportion of goods transported that relate to agriculture,

extractive industries, raw materials and intermediate goods for manufacturing, while there has been an increase in the volume of mail and parcels and waste products transported and food and beverages volumes have remained roughly stable. This is likely to reflect an ongoing gradual shift in the structure of the British economy away from manufacturing and towards a service-based economy that imports an increasing proportion of its final consumer goods.



Source: Department for Transport, 2018, RFS0104

Figure 4: Goods lifted by UK-registered HGVs by broad commodity, 2004–16

The cost of road freight transport

The cost of road freight transport is usually relatively low compared to the value of the goods being transported. The one-way cost for a 13.6 metre trailer carrying up to 26 pallets between a distribution centre in the Midlands and the North West might be in the region of £260, which could equate to as little as £0.01 per kilogramme of goods transported.[2] This relatively low cost of transport compared to the value of the goods allows them to be manufactured in one location and consumed in another and often pass through two or three storage facilities between manufacture and final consumption.

[2] MDS Transmodal's estimate is based on its in-house road haulage cost model. This is based on a fixed operating cost per hour of £27, a variable cost per kilometre of £0.38 and includes re-positioning of the vehicle to pick up a backload. The cost per kilogramme of goods is based on a full load of 26 pallets, each pallet transporting a tonne of goods.

Load factors an empty running

Table 4 shows the road haulage sector's performance in terms of empty running and load factors since 2006.

Table 4: Empty running and load factors in the road haulage sector, 2006–16

Year	Empty running	Load factor*
2006	26.8%	0.56
2007	27.4%	0.57
2008	28.9%	0.58
2009	28.3%	0.57
2010	28.7%	0.59
2011	30.2%	0.62
2012	28.5%	0.63
2013	28.6%	0.63
2014	28.8%	0.62
2015	28.6%	0.64
2016	30.2%	0.68

Source: Department for Transport, 2018, RFS0125

*The volume of goods moved as a proportion of the total volume of goods that could have been carried.

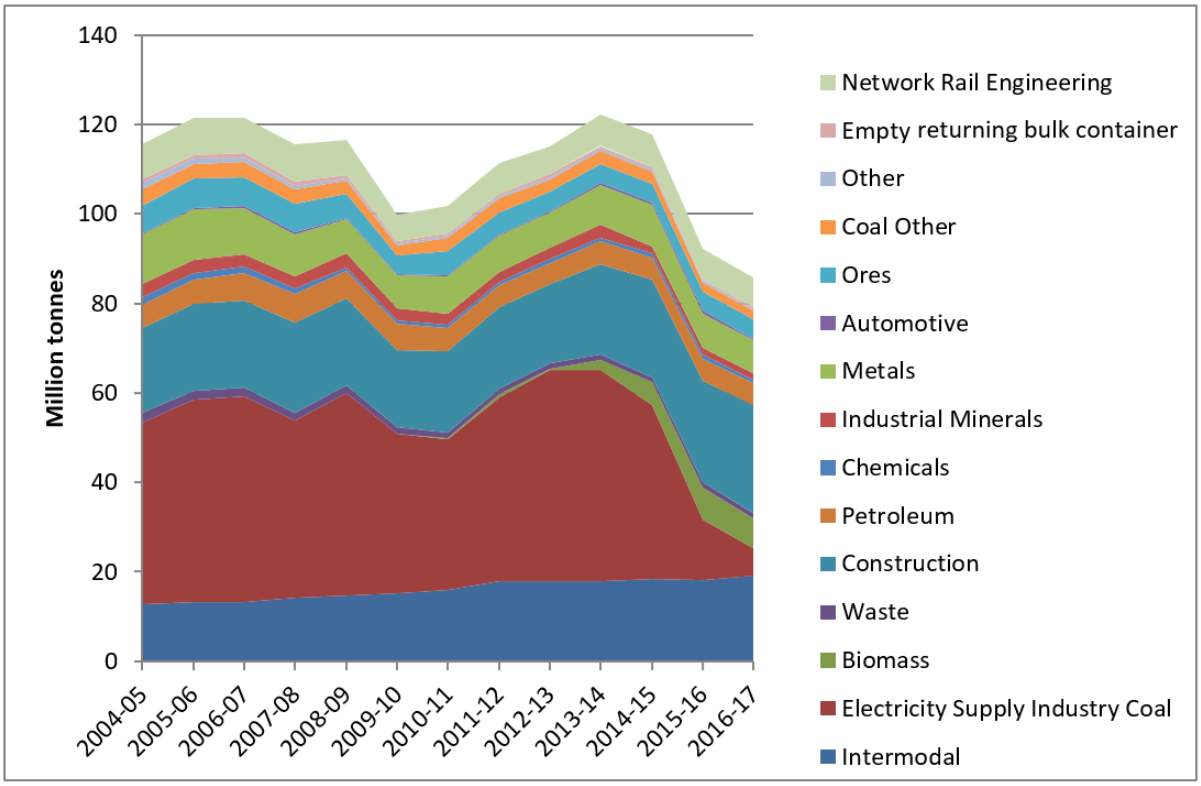
According to DfT statistics, empty running in the road haulage sector has fluctuated around a mean of 28.5% over the past decade (Department for Transport, 2018, RFS0125). The inherent nature of some road haulage operations is that vehicles are unable to collect a backload and have to return empty after making a delivery; examples would include HGVs delivering fuel to a filling station or aggregates to a construction site. Given that empty running has remained fairly stable over the past decade, this suggests that operators are generally able to secure return loads (thereby running loaded in both directions) where this is possible. Based on official DfT statistics there also appears to have been a gradual improvement in load factor over the past decade as road hauliers seek to increase their efficiency and remain competitive (Department for Transport, 2018, RFS0125).

3.3 Rail freight: volume & goods transported

Total freight lifted by rail reached a post-crisis peak of 122 million tonnes in 2013–14, before declining by 30% to 86 million tonnes in 2016–17 (Figure 5). The significant fall in rail freight tonnage since 2013–14 was due to a dramatic reduction in coal volumes, principally coal supplied to the Electricity Supply Industry (ESI), which fell from a high of 47 million tonnes in 2013–14 to 6 million tonnes in 2016–17. This is explained by European emissions legislation and Government policy to phase out electricity generated from coal, which resulted in many coal-fired power stations closing over that period and a consequent reduction in the use of steam coal for electricity generation. While total rail freight volumes in 2016–17 were at their

lowest point in the time series of data, the fall in ESI coal volumes essentially masks growth in other sectors, particularly domestic intermodal and construction materials.

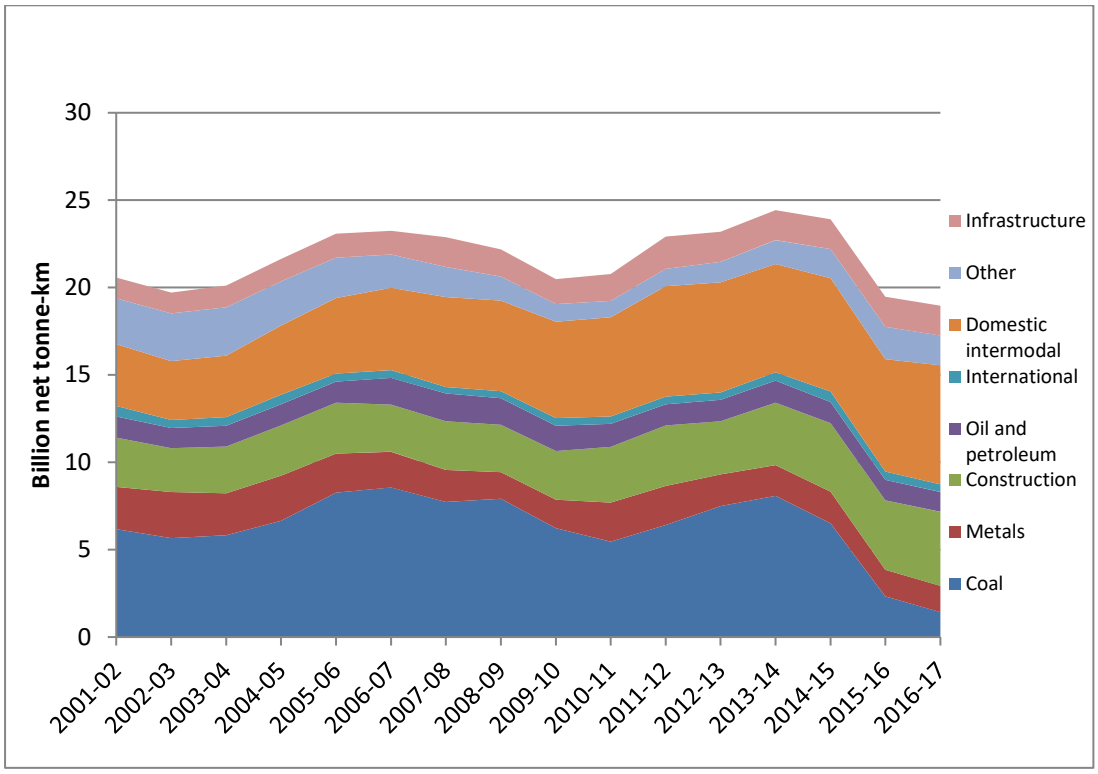
Figure 5: Rail freight lifted by broad commodity by financial year, 2004–17 (million tonnes)



Source: MDS Transmodal based on Network Rail, 2013

Total freight moved by rail (Figure 6) reached a peak of 24 billion tkm in before declining to 19 billion tkm in 2016-17 due to the decline in the volumes of ESI coal being transported by rail (Office of Rail & Road, 2017) . The average length of haul has increased, reflecting a change in the mix of traffic away from relatively short distance movements of ESI coal between import ports and inland power stations to longer distance movements of higher value cargo in containers between deep sea container ports and regional intermodal rail terminal terminals or Strategic Rail Freight Interchanges.

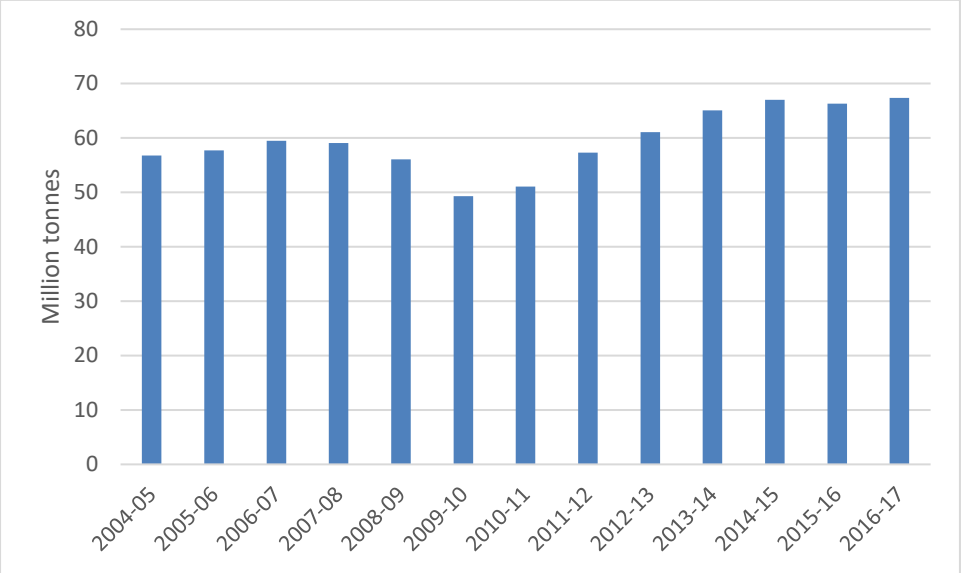
Figure 6: Rail freight moved by broad commodity, 2001–17 by financial year (billion net tonne-km)



Source: Office of Rail & Road, 2018c

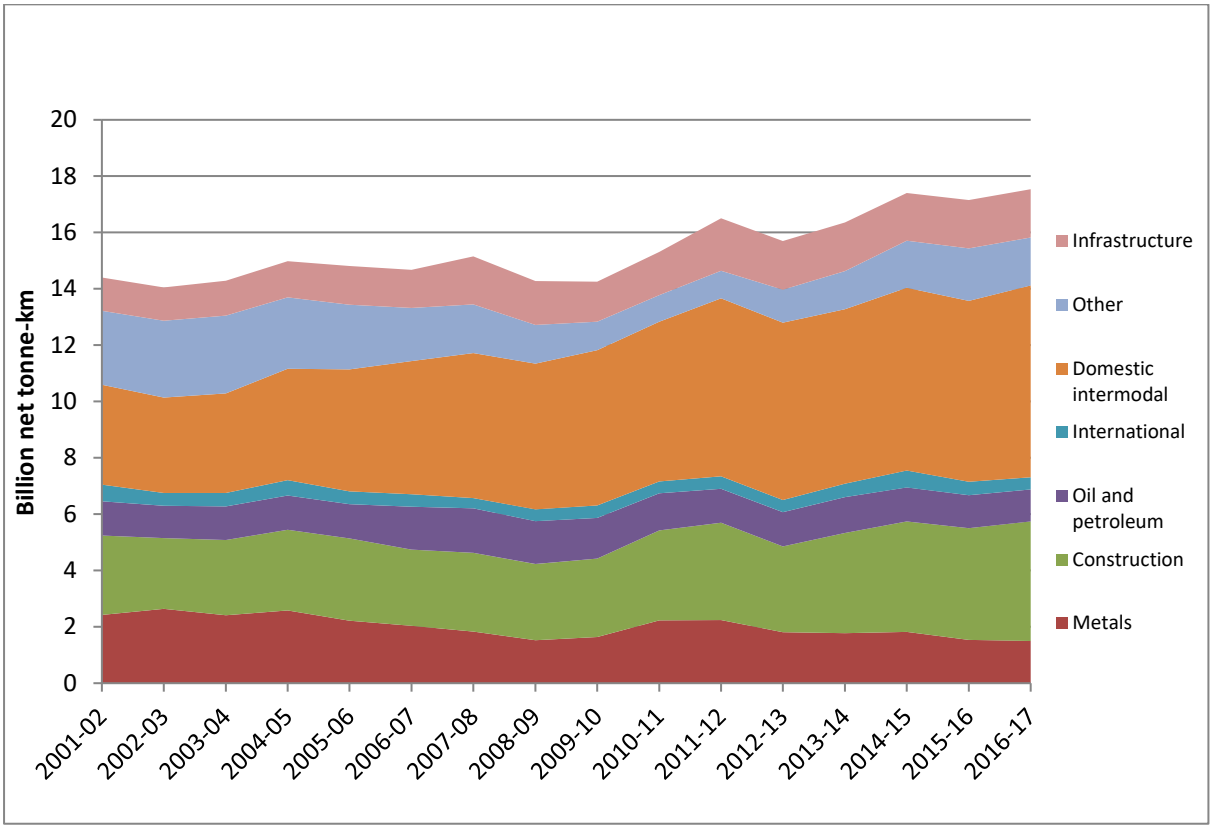
By excluding coal from the data (Figures 7 and 8) the underlying trends within the rail freight sector become more apparent. Since the end of the financial recession in 2009, the fall in coal volumes has masked overall growth in the sector, principally driven by increasing volumes of domestic intermodal and construction materials.

Figure 7: Total rail freight lifted 2004–5 to 2016–17 excluding coal (million tonnes)



Source: Department for Transport, 2018, RAI0402

Figure 8: Rail freight moved by broad commodity (excluding coal) 2001–17 by financial year (billion net tonne-km)

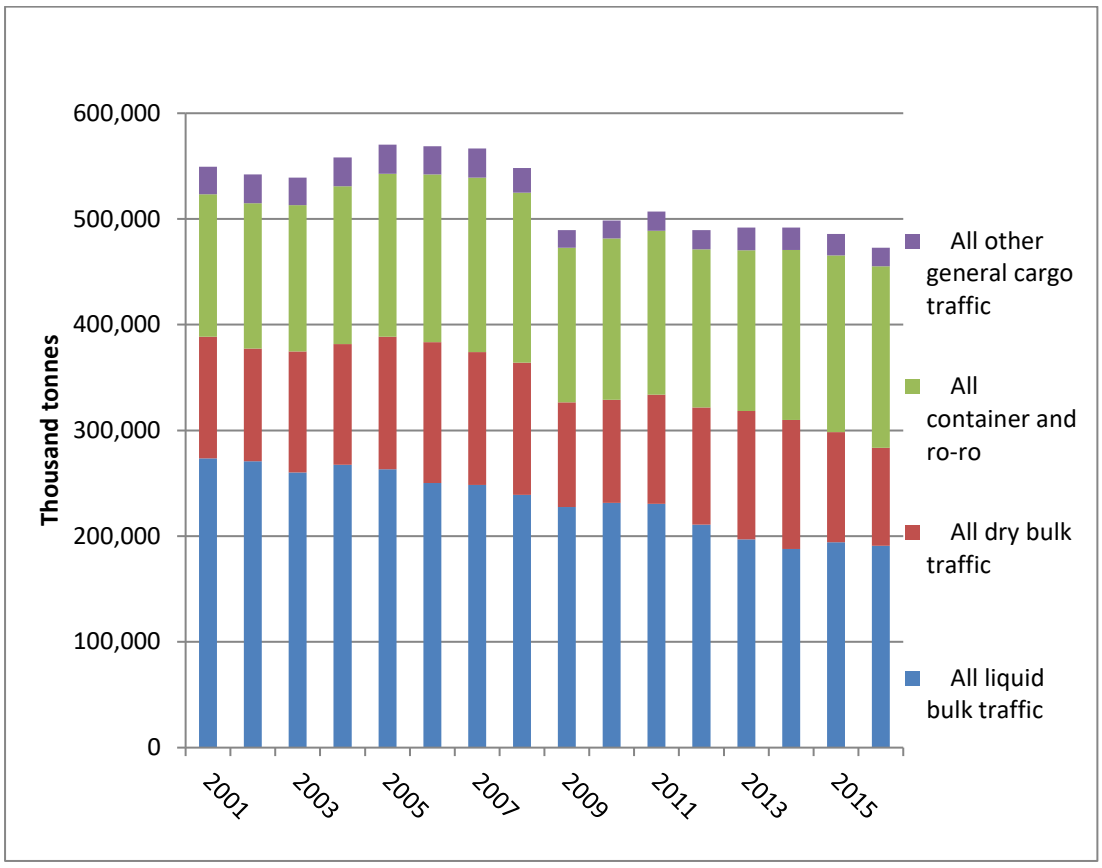


Source: Department for Transport, 2018, RAI0401

3.4 Port freight: volume & goods transported

Total freight handled at ports (Figure 9) has gradually declined from a peak of 570 million tonnes in 2005 to 473 million in 2016 (Department for Transport, 2017a), a decline of 17% over 11 years. This decline is related essentially to the reduction in the volumes of crude oil and gas from the North Sea fields that is then exported either as crude or as refined petroleum products and the reduction in imports of steam coal as feedstock for inland power stations; between 2001 and 2016 total bulk traffic volumes have declined by 27% from 389 million tonnes to 284 million tonnes. Steam coal is being replaced as a feedstock for electricity generation to some extent by increased imports of liquefied natural gas (LNG) via Milford Haven in West Wales and a terminal on the Isle of Grain in the Thames Estuary and by biomass imported via ports such as Liverpool and Immingham, but also by a switch to renewables such as wind power that generate little tonnage through ports.

Figure 9: UK major port traffic by commodity group 2001–16 (thousand tonnes)



Source: Department for Transport, 2018, PORT0201

Other non-unitised traffics, such as forest products and steel, have generally fluctuated in line with the relative health of the construction industry. Most non-unitised traffic, with the exception of steam coal, forest products and steel, has little impact on strategic inland networks because it is either transported inland by pipeline or is only transported relatively short distances by either road or rail.

Table 5 shows the liquid bulk, dry bulk and general cargo commodity groupings divided into their individual commodities for the period 2006–16 (Department for Transport, 2017a). This shows that crude oil traffic declined by 39% over the period 2006–16, while liquefied gas traffic increased by 41% over the same period. Coal volumes handled by ports declined by 79% over the 10-year period.

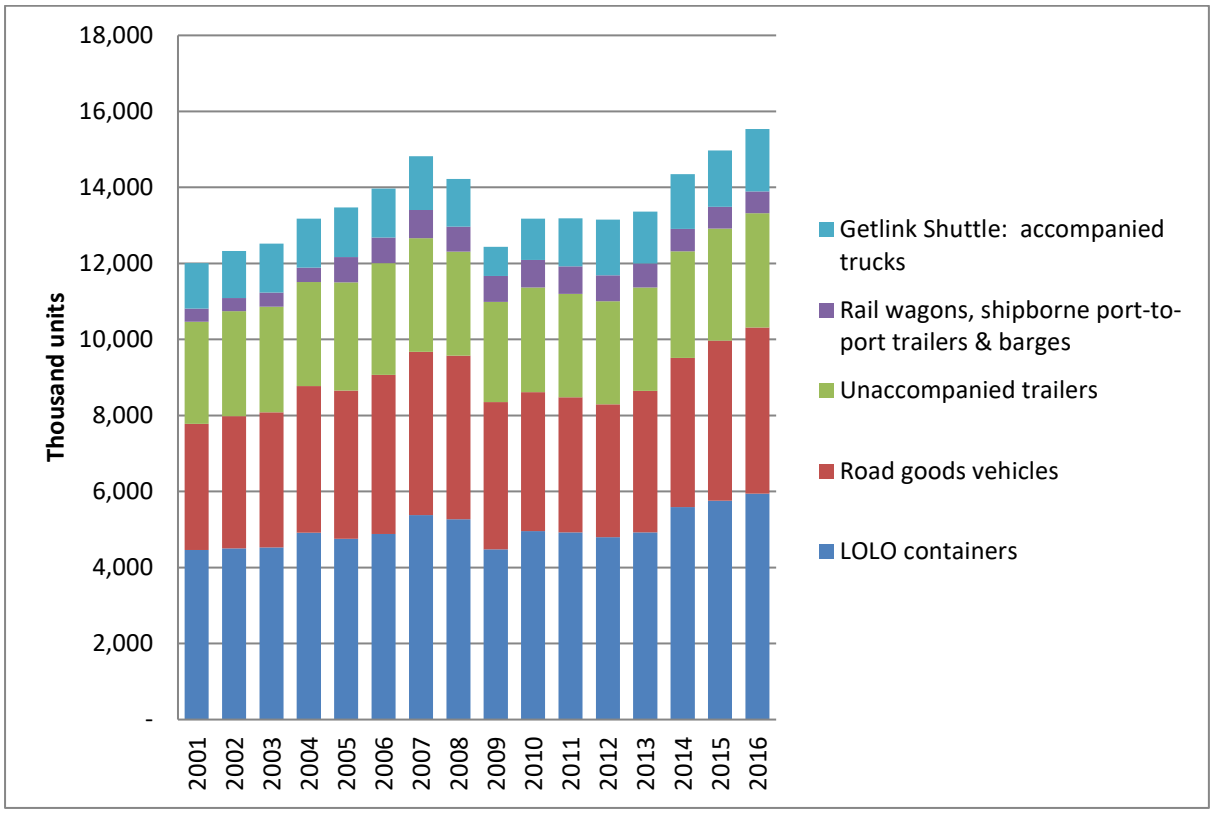
Table 5: UK major port liquid bulk, dry bulk and general cargo traffic, in thousand tonnes, 2006–16 (source DfT Port Freight Statistics, 2017)

Liquid bulk	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Liquefied gas	9,471	7,902	7,444	13,051	21,240	24,088	15,869	12,437	12,795	15,218	13,401
Crude oil	142,200	140,132	132,146	122,924	118,189	113,045	105,028	93,042	89,461	90,718	87,090
Oil products	85,120	85,960	86,814	79,094	79,415	81,414	78,794	81,868	74,455	77,953	78,450
Other liquid bulk	13,598	14,599	12,770	12,475	12,765	12,011	11,167	9,633	11,086	10,461	12,053
sub-total	*250,388*	*248,592*	*239,174*	*227,544*	*231,609*	*230,558*	*210,858*	*196,980*	*187,797*	*194,351*	*190,994*
Dry bulk											
Ores	18,301	19,144	18,091	14,822	18,235	16,702	16,320	20,754	20,783	17,720	15,714
Coal	57,282	47,427	50,515	39,612	29,852	36,910	47,040	52,186	44,658	25,342	12,011
Agricultural products	13,095	12,746	13,978	13,966	15,024	13,448	13,540	13,099	14,127	13,242	14,007
Other dry bulk	44,403	46,067	42,272	30,643	34,296	36,349	33,981	35,378	42,417	47,761	50,885
sub-total	*133,080*	*125,383*	*124,856*	*99,045*	*97,407*	*103,408*	*110,881*	*121,417*	*121,985*	*104,064*	*92,617*
General Cargo											
Forestry products	8,894	8,987	6,525	5,243	5,588	5,713	4,679	7,022	5,704	5,861	5,310
Iron and steel products	10,637	12,236	10,317	6,182	6,128	6,936	7,789	8,991	9,975	8,848	6,965
Other General cargo	7,141	6,215	6,243	5,451	5,068	5,368	5,846	5,387	5,526	5,615	5,112
sub-total	*26,672*	*27,438*	*23,085*	*16,876*	*16,784*	*18,017*	*18,313*	*21,400*	*21,204*	*20,325*	*17,387*

The main growth sectors for international freight have related to unitised traffic, both short-sea traffic between Great Britain and the Continental mainland and Ireland and deep-sea container traffic between the UK and non-European locations, as shown in Figure 10 (Department for Transport, 2017a; Getlink, 2018). Unitised traffic overall grew from 12.0 million units in 2001 to 14.8 million units in 2007 before falling back to 12.4 million units in 2009 and then reached a new record high of 15.5 million units in 2016. A 'unit' in this context is, in general terms, the equivalent of a 13.6 metre-long semi-trailer which is transported by sea as either:

- an accompanied truck, which is transported on a ferry or on the Getlink Shuttle as an HGV accompanied by a driver;
- an unaccompanied trailer, which is transported on a ferry without a tractor unit and driver; or
- a container that is transported on a container ship or on a ferry.

Figure 10: UK ports unitised freight traffic by type of unit in both directions, 2001–16 (thousand units)



Source: DfT Port Freight Statistics and Getlink

Freight growth is due to a complex set of factors such as trade relations, international supply chains, UK's propensity to import, liberalisation and population growth. This growth has had the following impacts on freight transport:

- The development of new deep-sea container port capacity at Felixstowe, London Gateway, Liverpool and Southampton over the last decade;

- Overall growth in intermodal rail freight services to link deep-sea container ports such as Felixstowe and Southampton to inland terminals in the Midlands, the North of England, Scotland and Wales (AECOM, 2016);

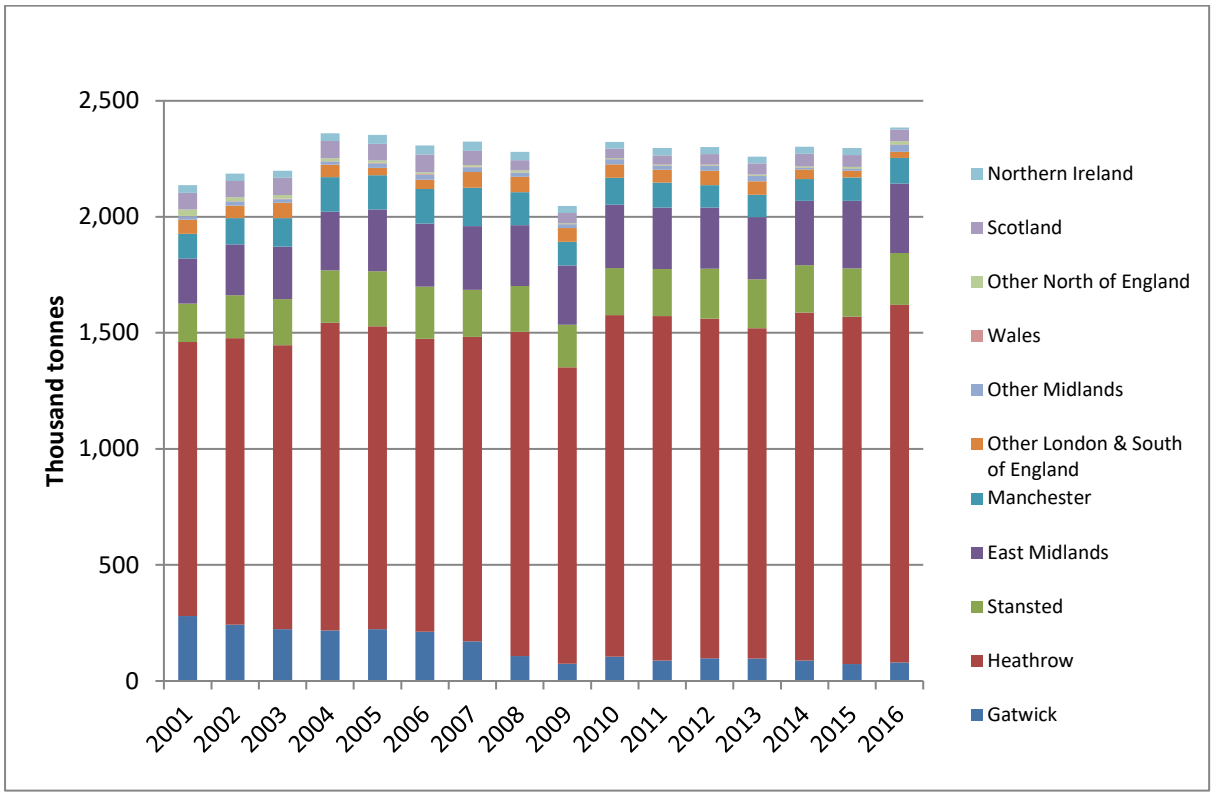
- Growth in traffic through Dover and on the Getlink freight shuttle services (Freightlink, 2016).

3.5 Air freight: volume & goods transported

Air freight is a highly specialised sector of the freight industry, which handles relatively low volumes of high value freight; in 2016 total air freight volume passing through UK airports was less than 2.4 million tonnes as shown in Figure 11 (Civil Aviation Authority Airport Statistics, 2017), while the total volumes of traffic handled through UK seaports was 473 million tonnes in the same year (Figure 11).

Figure 11 shows how the air freight sector was affected by the economic downturn, with a significant decline in traffic in 2008–9 and then a gradual increase up to 2016 to exceed the pre-crisis peak level. Most air freight handled at UK airports is carried in specialised containers in the belly holds of international passenger jets, principally wide-bodied aircraft operating on inter-continental routes. For this reason, Heathrow is by far the most important UK airport for freight in terms of tonnage handled, with a market share that has increased from 55% in 2001 to 64% in 2016. East Midlands and Stansted have specialised in handling dedicated air freighters operated by the main international express couriers (e.g. TNT, UPS), transporting less than container-load consignments on 24–48 hour lead times, generally feeding European hubs (such as Brussels and Leipzig) for services to the Far East. While air freight forms a very small percentage of the overall freight market when measured as tonnes-lifted, it forms a much larger proportion when measured by the value of the cargo lifted.

Figure 11: Air freight by airport group, 2001–16 (thousand tonnes)



Source: Civil Aviation Authority Airport Statistics, 2017

Operations at airports that handle large volumes of freight, such as Heathrow, require support from specialised distribution facilities located close to the airports where air freight logistics operators receive and despatch air freight and provide storage. As the volumes of freight are quite low, only road freight transport is used for collection and delivery.

3.6 Waterborne freight: volume & goods transported

Freight moved by waterborne freight consists of:

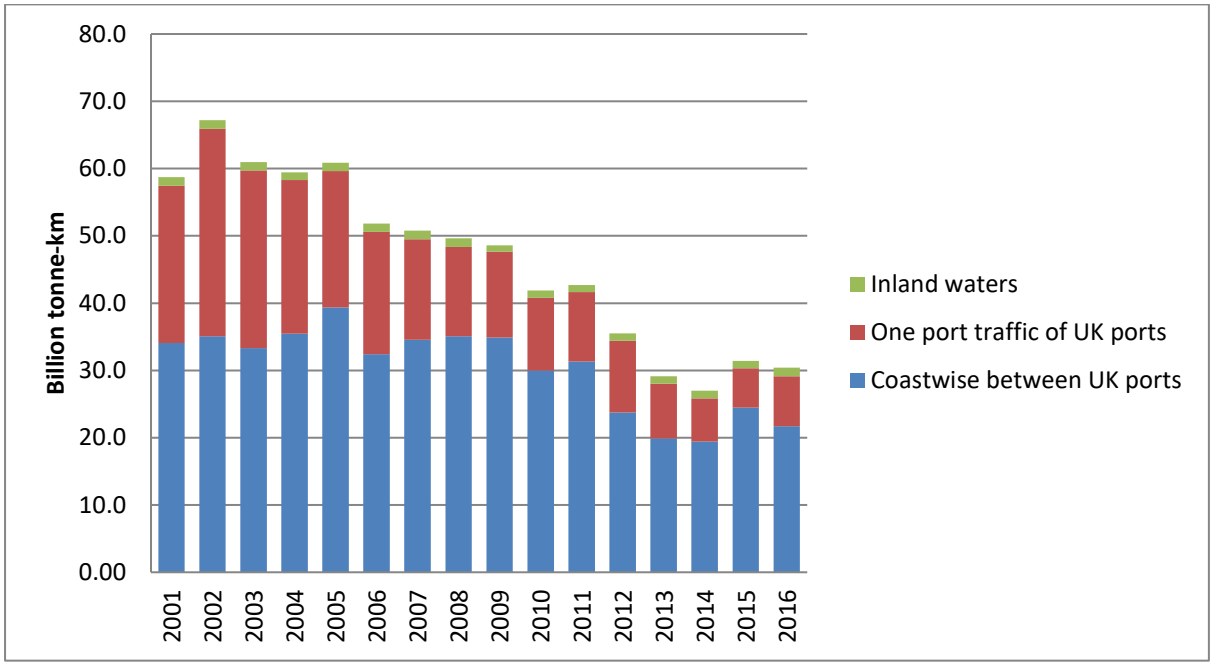
- Coastwise traffic: freight moved around the coast of the UK;
- One-port traffic: freight moved between a UK port and offshore installations, such as offshore wind farms and oil and gas installations;
- Inland waters traffic: freight traffic carried by both barges and seagoing vessels along inland waters, both non-seagoing traffic and seagoing traffic which crosses into inland waters from the sea (Department for Transport, 2017b).

96% of waterborne freight relates to movements by seagoing ships, either coastwise or one-port movements or to and from inland waters by seagoing vessels. The only movements on inland waterways are on the main river estuaries such as the Thames, Humber and Forth and on the Manchester Ship Canal, while the use of broad-gauge canals and other rivers for freight is limited due to the lack of economies of scale that are available and the limited

connectivity provided by the network. There are no freight movements on narrow-gauge canals (Department for Transport, 2017c).

Total freight moved by waterborne freight has roughly halved since 2005 (Figure 12), particularly due to a fall in one-port traffic between UK ports and offshore oil and gas installations as activity in the North Sea has declined.

Figure 12: Waterborne freight moved by type 2001–16 (billion tonne-km)



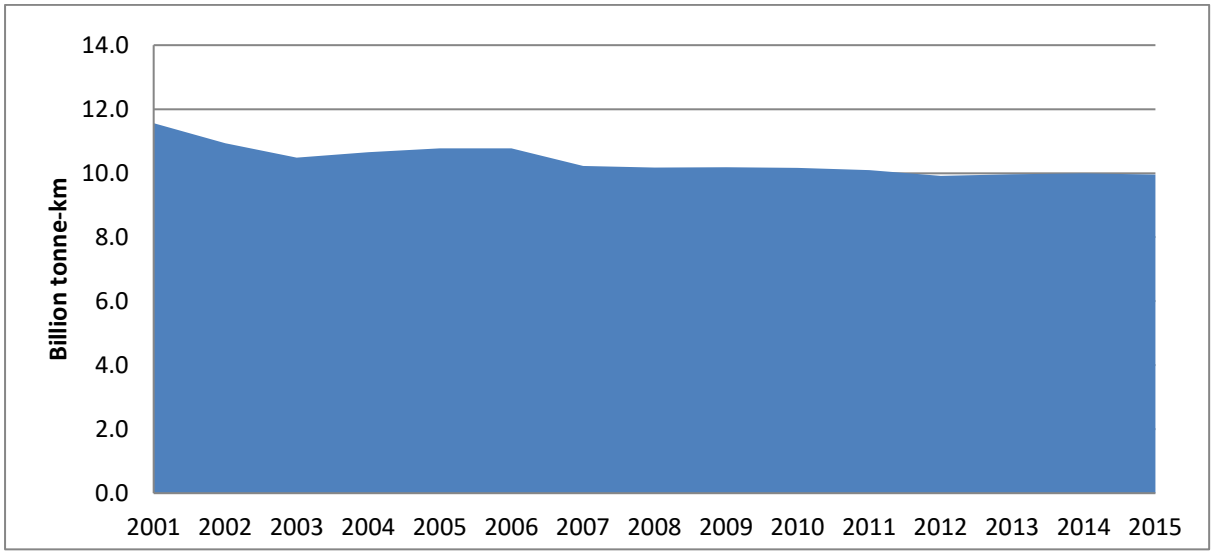
Source: DfT Domestic Waterborne Freight Statistics

Seventy-six percent of goods transported on inland waters are bulk commodities such as aggregates and petroleum products, but there are unitload services that operate on sections of rivers that are classified as inland waters and there is also a container service that operates to a facility on the Manchester Ship Canal.

3.7 Pipeline: volume & goods transported

Pipelines provide a specialist mode of transport for the cost-effective transport of large volumes of bulk liquids and gases between ports and manufacturing sites, refineries and power stations. They have very high initial investment costs and so are only developed between locations where there are expected to be very high levels of demand over a long period; however, the operating costs are low.

Figure 13: Freight moved by pipeline in the UK 2001–15



Source: European Commission, 2017

Note: data for 2013–15 is estimated using European Commission data

Figure 13 shows the trend for freight moved by pipeline during the period 2001–15, including freight transported from the North Sea oil and gas fields. There has been a general downward trend due to the reduction in the output of oil and gas from the North Sea.

3.8 Active modes in freight: cycling & walking

There are no official statistics available on trends in the use of the active modes of transport, for freight namely cycling and walking. There has been longstanding use of these modes of transport by Royal Mail for the delivery of letters and packets in towns and cities. Looking forward it is likely that courier companies will make increasing use of cycling and walking to make final deliveries and collections of parcels in urban areas due to increasing road congestion and the need to operate within pedestrianised zones.

Deliveries of parcels by bicycle are therefore already possible in a number of urban areas for the delivery of lightweight and smaller parcels, particularly as separate infrastructure is developed for cyclists. With the increased importance of e-commerce, which involves the delivery of smaller parcels rather than larger consignments to retail outlets, the international parcels delivery companies that work for e-commerce retailers are more prepared to hand over parcels for ‘last mile’ deliveries to local courier companies for deliveries into the centre of urban areas. Bicycles can be used for a wide variety of deliveries and collections, with Hereford Pedicabs & Cargo delivering parcels and also collecting retail waste material (Hereford Pedicabs, 2016); while Zedify has tricycles that can transport up to 250kg (Zedify, 2018).

As urban centres have become pedestrianised with time windows that only allow road freight vehicles access at the beginning and the end of the day, final deliveries and collections are also carried out on foot by delivery staff.

4 FREIGHT TRANSPORT SERVICES

4.1 Introduction

This section sets out the service providers that operate in the freight transport industry by mode of transport. While road and rail freight and bulk freight services can only be described in generic terms, data on unitload shipping services has been provided based on proprietary databases.

4.2 Road haulage services and 3PLs

Types of road freight enterprise

There were about 51,000 road freight enterprises, employing 284,000 people, operating in the UK in 2016. These road haulage enterprises operated a total of 499,400 HGVs (Department for Transport, 2018c).

Some 45% of road freight lifted is transported by vehicles operated by the owners of the goods. Operator licence restrictions prevent these 'own account' operators from conveying goods for other organisations, thereby limiting opportunities for backloads. 55% of freight lifted is contracted out to specialist road hauliers and third party logistics operators (public or third party haulage) on a 'hire and reward' basis. Reasons for shippers adopting an outsourcing strategy for their road haulage requirements include:

- Economies of scale: Larger third party operators can operate more efficiently due to, among other factors, managing large distribution centres shared between multiple shippers, more efficient HGV deployment (including greater opportunities to obtain return loads, to operate trucks full in both directions), shared back office costs and the use of sophisticated IT inventory systems;

- Quality: they are perceived as offering a higher quality of service than in-house transport operations as a result of competition to win and retain business;

- Innovation: they can introduce new ideas and working practices, overcoming in-house management inertia, and remove restrictive working practices.

While many smaller operators may struggle to generate the economies of scale enjoyed by the larger players, they can focus on offering services in specialist sectors such as bulk chemicals and temperature-controlled foods, and they can potentially develop closer relationships with customers and offer higher quality and more flexible services. The degree and level of outsourcing to logistics companies can vary, but typically it involves outsourcing day-to-day operations (distribution centres, inventory management and transport operations), while shippers maintain overall control of the supply chain (the structure of the supply chain, the number and location of distribution centres and modal choice), controlling inventory levels and purchasing policies.

Third party providers of road freight transport services can also be divided into two main types of organisation: road hauliers and third party logistics operators (3PLs).

Road hauliers generally provide road transport services from one location to another at the direction of their customers. They are normally small to medium-sized concerns operating up to 1,000 vehicles and drivers, and range from publicly quoted companies through to family-owned businesses and owner drivers. Their key commercial operating strategy is to secure long-term contracted work directly from shippers and receivers, along with sub-contracted work for larger logistics providers and spot hire loads (occasional loads for shippers with irregular shipments), thereby ensuring that HGVs are nearly always 'busy'. This can include offering 'groupage' services, where part vehicle loads from a number of shippers are combined to form a full vehicle load. Many hauliers provide some multi-user warehousing. Secure long-term revenue flows can then be used to invest in new HGV equipment.

More recently, many road hauliers have combined some of their operations to establish pallet load networks such as Palletline and Pallex to target shippers seeking to move less than full-load consignments on a next day basis. This is where hauliers belonging to the network will transport full loads from each of their home areas (comprising pallets from multiple customers) into a central hub which is normally located in the Midlands. The pallets are then cross-docked onto other vehicles for onward delivery (usually by another haulier in the network from the destination region). For example, pallets from Cardiff to Newcastle will initially move to the Midlands hub on an HGV from South Wales, before being re-loaded onto an HGV originating from (and returning to) the North East. By sharing loads in this manner, operators are able to fill vehicles in both directions, and can offer low-cost express 'next day' deliveries on a nationwide basis.

Third party logistics providers (3PLs) have usually grown out of road haulage businesses and are large publicly quoted companies that sell major shippers and receivers comprehensive packages of supply chain management services integrated with road transport operations. These services include non-transport activities (called 'added value' activities) including the provision and operation of distribution centres together with other services such as packaging, labelling and bar-coding and there is a strong focus on the application of ICT to the management of the supply chains and the transport movements within them. Their key commercial strategy is to secure long-term contracts with customers; again this allows investments in new HGVs and other equipment, secured against a long-term revenue flow.

More recently, so called **4PLs (or Lead Logistics Provider)** have emerged. This is where the one company, contracted to the shipper, is then tasked with managing, coordinating and integrating the services of multiple 3PLs and road hauliers in order to deliver total supply chain benefit to the client.

Table 6 shows the top 20 British road hauliers/3PLs as defined by turnover in 2016–17.

Table 6: Top 20 British road hauliers and 3PLs by turnover

Rank	Company	Financial Year Ending	Turnover (£)	Pre-Tax Profit (£)	Return on Turnover
1	Royal Mail	26/03/2017	7,658,000	411,000	5.4%
2	DHL	31/12/2016	4,035,769	116,559	2.9%
3	XPO Logistics	31/12/2016	1,257,210	34,903	2.8%
4	Wincanton	31/03/2016	1,118,100	45,000	4.0%
5	DPD Group UK	03/01/2017	1,089,382	169,860	15.6%
6	UPS	31/12/2016	944,927	62,321	6.6%
7	Kuehne + Nagel	31/12/2016	809,640	31,386	3.9%
8	TNT UK	31/12/2015	717,699	-22,104	-3.1%
9	Eddie Stobart Logistics	30/11/2016	570,200	48,200	8.5%
10	Whistl UK	31/12/2016	528,449	8,391	1.6%
11	Hermes Parcelnet	29/02/2016	510,369	33,727	6.6%
12	Yodel Distribution	30/06/2016	505,713	-58,249	-11.5%
13	Culina Group	31/12/2016	420,700	19,500	4.6%
14	Gist	31/12/2016	416,678	17,707	4.2%
15	Ceva Logistics	31/12/2016	394,484	16,147	4.1%
16	UK Mail Group	31/12/2016	366,087	7,605	2.1%
17	Clipper Logistics Group	30/04/2017	340,100	16,100	4.7%
18	Turners (Soham)	31/12/2016	313,608	27,346	8.7%
19	DX Group	30/06/2017	291,900	-82,300	-28.2%
20	FedEx UK	31/05/2016	253,035	32,939	13.0%

Source: Motor Transport Top 100, 2017

Market structure

The road freight transport market provides an example of near-perfect competition as there are a large number of buyers and sellers operating in the market, road haulage costs are well understood and there are few barriers to entry, particularly in terms of capital investment and regulation. The average fleet is relatively small, with an average of 5 vehicles in 2017 (Department for Transport, 2018c).

In this environment, road haulage operators have to be highly efficient and cost-effective in order to remain profitable. Analysis of the Top 100 UK hauliers by the publication *Motor Transport* suggests the average return on sales in 2016–2017 was just under 3%, down from 4% the previous year; turnover increased by 1% over the same time period (Motor Transport Top 100, 2017).

Types of heavy goods vehicle

The vast majority of road freight lifted and moved is carried in heavy goods vehicles (HGVs), which are defined by the Department of Transport as vehicles over 3.5 tonnes gross laden weight (i.e. weight of vehicle plus its load).

Table 7 shows the numbers of HGVs by taxation group and axle configuration operating in Great Britain in 2016.

Table 7: Number of registered HGVs in Great Britain by type and axle configuration, 2016 (thousand vehicles)

Year	HGV	Trailer HGV	Total
Rigid Vehicles			
2 Axle	191.9	3.0	195.1
3 Axle	42.7	6.4	49.2
4 Axle	34.3	1.4	35.8
All Rigid	268.8	10.8	280.1
Articulated Vehicles			
2 Axle Tractor & 2 axle trailer	7.1	0.0	7.1
2 Axle Tractor & 3 axle trailer	11.4	0.0	11.4
2 Axle Tractor & 4 or more axle trailer	2.8	0.0	2.8
All 2 Axle Tractor	21.4	0.0	21.4
3 Axle Tractor & 2 axle trailer	0.7	0.0	0.7
3 Axle Tractor & 3 axle trailer	101.3	0.0	101.3
3 Axle Tractor & 4 or more axle trailer	1.3	0.0	1.4
All 3 Axle Tractor	103.3	0.0	103.4
All Articulated Vehicles	124.6	0.0	124.7
All Goods Vehicles	393.5	10.8	404.8

Source: DfT Vehicle Licensing Statistics

The main type of HGV used for long-distance road haulage is the combination of a tractor and 13.6-metre trailer unit. However, smaller rigid HGVs represent 69% of the national fleet and are generally used for more local deliveries and collections.

'Light goods vehicles' or 'LGVs' (defined as a commercial vehicle with a maximum gross laden weight of 3.5 tonnes or less) are also an integral part of many logistics supply chains. This is particularly the case in the e-commerce and urban delivery markets, where LGVs are the obvious vehicle of choice given physical access limitations. They can also be driven using a standard 'car' driving licence, meaning a wider labour pool is available when compared with HGV-qualified drivers. The latest vehicle registration statistics from the DfT

indicate that there are currently 3.8 million LGVs licensed in Great Britain compared with just under 0.5 million HGVs (DfT, 2018a).

There has been significant growth in the numbers of LGVs operating on British roads. The DfT's figures indicate that LGVs are the fastest-growing segment of the road user market, with 70% growth over the past 20 years when measured in distance moved compared with 12% growth for cars and 5.5% growth for HGVs. This suggests that LGV traffic is growing, but not necessarily at the expense of HGV traffic. This LGV growth appears to have more or less mirrored recent trends in the retail sector, whereby e-commerce has shown significant growth rates and gained market share from traditional 'bricks and mortar' retailing. This appears to suggest the two trends are directly linked, given that online deliveries to homes or places of employment are predominantly undertaken by LGVs.

However, research by Professor Alan Braithwaite for the RAC Foundation (2017) suggests that the use of LGVs is diverse and extends beyond what is typically regarded as freight transport (i.e. the carriage of goods from one location to another). His research concluded that:

- The national LGV fleet is growing at around 5% annually; however, this is not at the expense of smaller HGVs, which also continue to grow, albeit at slower rates;

- E-commerce continues to grow between 10 and 12% each year, while e-commerce parcel volumes are growing at around 9% annually (the difference is accounted for by so called 'click and collect' orders);

- LGVs in use by parcel and grocery e-commerce operators comprise around 4% of the national LGV fleet and around 10% of LGV traffic, i.e. only one in 10 LGVs on the road is associated with e-commerce deliveries; and

- The implication to be drawn from this analysis is that, while LGVs are an important part of many supply chains, the majority of LGV movements on the road network are associated with economic activities other than, in particular, e-commerce. These include food distribution, construction and business services (such as plumbers, electricians, fitters, etc.).

Further research undertaken by Professor Braithwaite in the London Borough of Barking and Dagenham found that 37% of LGVs were unmarked, meaning it was difficult to determine their use based on the business type. Around 32% of LGVs were identified as undertaking 'servicing' activities rather than carrying freight, while it was also recognised that LGVs in this sector will convey parts and materials associated with that service. Likewise, LGV movements associated with food service (2%) and construction (8%) are also likely to be conveying materials. The research also suggested that 3% of vans in the Borough were being used directly for freight and another 3–4% were conveying parcels (though this share would rise if unmarked vans were to be correctly attributed).

Therefore, while the growth in LGV traffic on the roads is often assumed to be related to the growth in e-commerce, it is also likely to be related to the growth in service-related activity. However, both pieces of research also conclude that the use of LGVs in general, and in the freight/logistics sectors specifically, is poorly understood and that further work is required.

4.3 Rail freight services

Market structure

The rail freight sector in Great Britain is effectively the only fully privatised part of the railway industry[3], in that private sector freight operating companies (FOCs) compete for business in an open competitive market and, essentially, at their own commercial risk. Rail freight services are therefore a response to demand, rather than operating regardless of the number of passengers carried. Intermodal rail freight services, particularly those serving the deep-sea container ports, tend to operate as daily scheduled trains in much the same manner as passenger trains (services will always operate in their timetabled paths regardless of loadings). Likewise, conventional (bulk) rail freight trains have reserved paths in the working timetable, even if services may only actually operate when there is sufficient customer demand. For example, a bulk aggregates train may have a timetabled path on Mondays, Wednesdays and Fridays each week, but the train may only operate on Monday and Friday when demand is low.

There are currently five competing FOCs, namely:

- DB Cargo – a subsidiary of Deutsche Bahn (German railways);
- Freightliner – a subsidiary of Genesee and Wyoming (a US railroad holding company that has interests in rail freight operators in North America, Europe and Australia);
- GB Rail Freight – owned by Swedish private equity group EQT Partners;
- Direct Rail Services (DRS) – owned by the Nuclear Decommissioning Authority; while the 'shareholder' is a public sector body, the company is registered as a 'Private Limited Company'. Aside from its in-house spent nuclear fuel operations, it operates in the same manner as the other privately owned FOCs by competing for traffics on commercial terms; and
- Colas Rail – a subsidiary of French industrial conglomerate Bouygues.

In simple terms, the five FOCs compete for traffic with each other, as well as with road haulage and coastal shipping in some market sectors. The rail infrastructure providers (principally Network Rail – see following section) supply freight paths to the FOCs on non-discriminatory terms but on the basis of the operators having 'grandfather rights', in return for payment of track access charges. The Office of Rail and Road, the independent regulator, provides impartial oversight in terms of charges and network access, thereby ensuring open competition.

Types of rail freight service

Rail freight services can be categorised by mode of appearance – which refers to the way cargoes are presented for handling at rail terminals – into bulk and non-bulk rail freight.

Bulk rail freight is where a large volume of a relatively low value, heavy or voluminous and homogeneous commodity such as coal, aggregates or biomass is transported in specialist

[3] Although, note the caveat around Direct Rail Services

railway wagons, normally between privately owned railway sidings (e.g. between a quarry and aggregates terminal located near a major urban area or between a port-located biomass terminal and a power station). Commercially and contractually, many bulk rail movements are undertaken on what is known as a 'hook and haul' basis. This is where the shipper will own/lease the actual wagons, with a contracted FOC (generally following a tender) hauling them between cargo origins and destinations at the direction of the shipper. Contracts between FOCs and shippers can be 3–5 years in length. Bulk rail freight therefore relies on significant long-term investments from the private sector in the loading/discharge equipment at private sidings, traction and specialist wagons. These wagons are often leased on long-term deals from specialist leasing companies. The inherent nature of bulk rail freight is that wagons have to be re-positioned empty back to the cargo origin once delivery has been undertaken and this means that the shipper has to pay for a round trip.

In many bulk markets, rail effectively has a monopoly, particularly where planning conditions have been placed on some facilities (such as some quarries) requiring the operators to use rail rather than road for freight movements. More generally, road haulage may not be able to provide a cost-effective solution for the movement of bulk products because of the volume of product that needs to be transported, and the shipper/receiver will have invested in private rail sidings with the loading/discharge equipment at both cargo origin and destination.

The bulk rail freight market is relatively mature, with existing rail freight operators seeking to secure contracts from each other rather than developing major new markets. The principle exception to this is biomass for electricity generation, a relatively new commodity which the rail freight sector has used its inherent advantages to exploit. However, since 2013 there has been a dramatic decline in the volume of coal transport which has led to over-capacity in the market.

Many large-scale infrastructure construction projects are supported by bulk rail freight services. Heathrow T5 and the Olympic Park, for example, both relied heavily on rail freight for the import of aggregates, steel and other materials. Hinckley C power station, currently under construction, is receiving materials in bulk by rail. Large-scale projects such as the Heathrow third runway and HS2 projects would provide new opportunities for rail in the bulk market.

Non-bulk rail freight is where freight is mainly carried in some form of unit load. It includes intermodal rail freight, where cargo in some type of container unit is conveyed on flat-deck platform wagons between specialist intermodal terminals. It is termed 'intermodal' in that the container unit is designed to be moved by rail and other modes of transport, such as HGVs, ships or barges as well as by road, with transfer between modes taking place at an intermodal terminal. More unusually in Great Britain, non-bulk rail freight also includes palletised cargo conveyed in railway 'box wagons' or 'vans' between directly rail-linked warehousing so that the goods can be discharged directly from the box wagons into storage.

Intermodal rail freight services

Commercially, there are two types of intermodal rail freight service, namely:

- **Liner or scheduled services:** This is where a FOC will operate a regular scheduled service (normally Monday to Friday) between two terminals, with shippers subsequently purchasing slots (capacity) on the train service. The train will operate to a fixed timetable regardless of whether it attracts any traffic. The commercial risk therefore rests with the FOC or in some cases with a shipping line, port or road haulier, who will require a minimum load factor in order to cover costs and render the service profitable; hence the

commercial strategy of the risk-taker is to sell capacity for the highest value possible, taking into account competing services and modes. Liner services are therefore attractive to shippers moving less than trainload quantities on a daily basis as a trainload is constructed from multiple shippers.

- **Contract (dedicated) trains:** This is similar to 'hook and haul' bulk trains in that one train will be dedicated to a particular shipper or other commercial risk-taker such as a road haulier between two terminals, generally on a daily basis. A contracted FOC will haul intermodal wagons between cargo origins and destinations at the direction of the shipper. The commercial risk therefore lies with the shipper, in that the FOC will charge a fixed rate per trip regardless of how much traffic is conveyed. Contract trains are therefore only attractive to those shippers able to convey trainload volumes between terminals on a daily basis.

Intermodal rail freight services are usually carrying higher-value consumer (palletised) cargo and more lightweight general freight, rather than large volumes of a single commodity, and are more likely to be competing with long-distance road. The market for the inland distribution of deep-sea containers from ports such as Felixstowe and Southampton is well established and has been expanding. Most intermodal services are operated as liner/scheduled services, while a number of the largest deep-sea container lines have sufficient volumes moving on a daily basis to justify contracting dedicated trains.

Rail has a presence in only a few sectors of the domestic general freight market, principally between major national distribution centres in the Midlands and Scotland. Most of these are operated on a contract basis, either directly by large supermarket chains or by a handful of Scottish logistics operators with sufficient Anglo-Scottish traffic to fill a daily train. The domestic intermodal rail freight sector is generally therefore under-developed and there is substantial scope for growth in services at the expense of road haulage for domestic movements of high-value commodities on trunk routes where there are large volumes of regular flows.

Shippers or their logistics providers may decide to use rail where the freight flow is large enough to justify a regular trainload and where the mode can meet the required service levels (e.g. transit time, frequency). If the freight flow is suitable for rail freight and an adequate level of service can be provided by rail, then the key decision-making factor is then cost. Rail is likely to have to be cheaper than road where the shipper is accepting service levels that are lower than could be provided by road.

CASE STUDY: FREIGHTLINER

Freightliner is the leading intermodal rail freight service provider in Great Britain, focusing on the transport of deep-sea containers between three deep-sea container ports (Felixstowe, Southampton and London Gateway) and 12 terminals in all the major British conurbations. It markets itself as providing 100 services each day and handles about 770,000 containers per annum.

The company's operations started in the 1960s as part of British Rail but became a private company in 1995 just after privatisation of the rail freight industry in 1993–94. As a result of the privatisation process Freightliner inherited a network of intermodal terminals and it now serves its own terminals in Liverpool, Manchester, Leeds, Doncaster, Coatbridge, Birmingham, Bristol and Cardiff, as well as a number of third party terminals, including rail-connected distribution parks such as DIRFT at Daventry in the Midlands and 3MG at Ditton near Liverpool.

Freightliner has its own fleet of 250 trucks so it can offer a quay-to-door service for its customers, i.e. from the quay at the port to the regional intermodal by rail and then final delivery by truck to a distribution centre or manufacturing facility in the relevant region.

In 1999 the company established its Heavy Haul division and started to secure bulk rail freight contracts in competition with the incumbent bulk operator (English Welsh and Scottish Railway, now acquired by Deutsche Bahn) and has secured contracts in the bulk rail freight market. It has subsequently established rail freight operating subsidiaries in Poland and Australia. In 2013 the company purchased European Rail Shuttle (from global shipping line Maersk) which mainly operates rail freight services to and from the Port of Rotterdam.

Freightliner is owned by Gennesee and Wyoming, which is a US railroad holding company. The holding company has also purchased Pentalver, one of the largest container road hauliers in the UK.

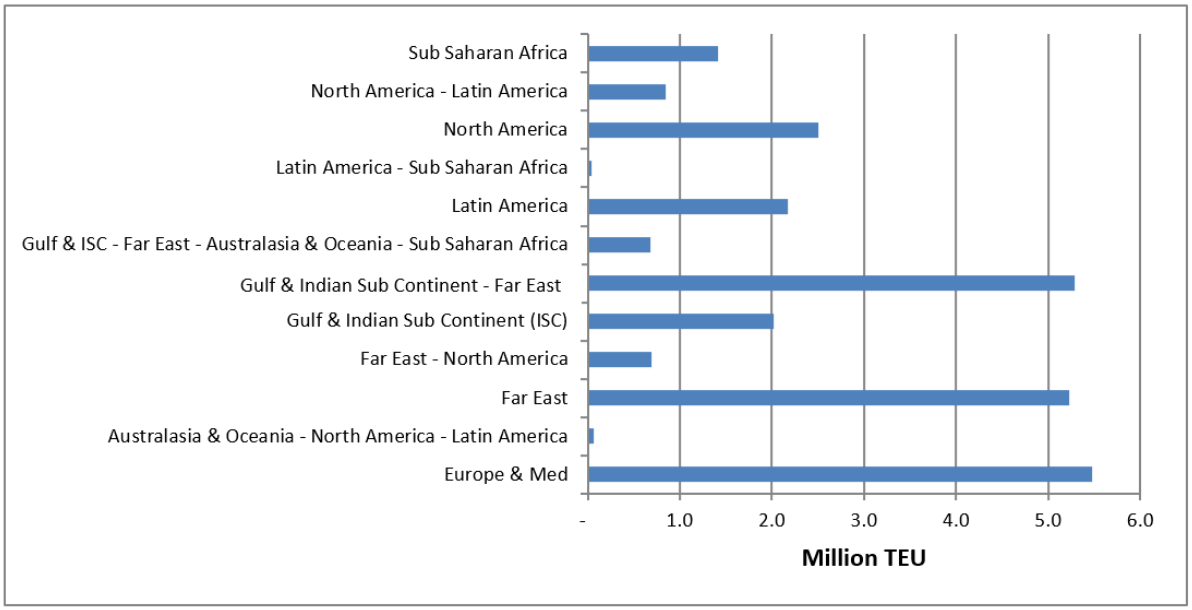
4.4 Container shipping services

Container shipping services provide cost-effective transport between the UK and the rest of the world and can be categorised as follows:

- Coastal services between two or more UK ports;
- Short-sea services between the UK and the rest of North West Europe, Ireland, Scandinavia, the Baltic, the Atlantic coast of Europe and the Mediterranean basin; and
- Deep-sea services between the UK and the rest of the world.

At the end of 2017 there were a total of 131 short-sea and deep-sea services linking UK ports with the rest of the world, provided by a total of 572 different vessels making calls at UK ports (MDS Transmodal, 2017). Figure 14 shows how the total annual capacity deployed by the shipping lines of 26.4 million TEU (20-foot equivalent units) is divided between the different routes by world region; the main routes are short-sea services, linking the UK to the rest of Europe (5.5 MTEU) and deep-sea services through the Suez Canal to the Gulf, Indian Subcontinent and the Far East (a total of 12.5 MTEU) and transatlantic to North America (3.3 MTEU).

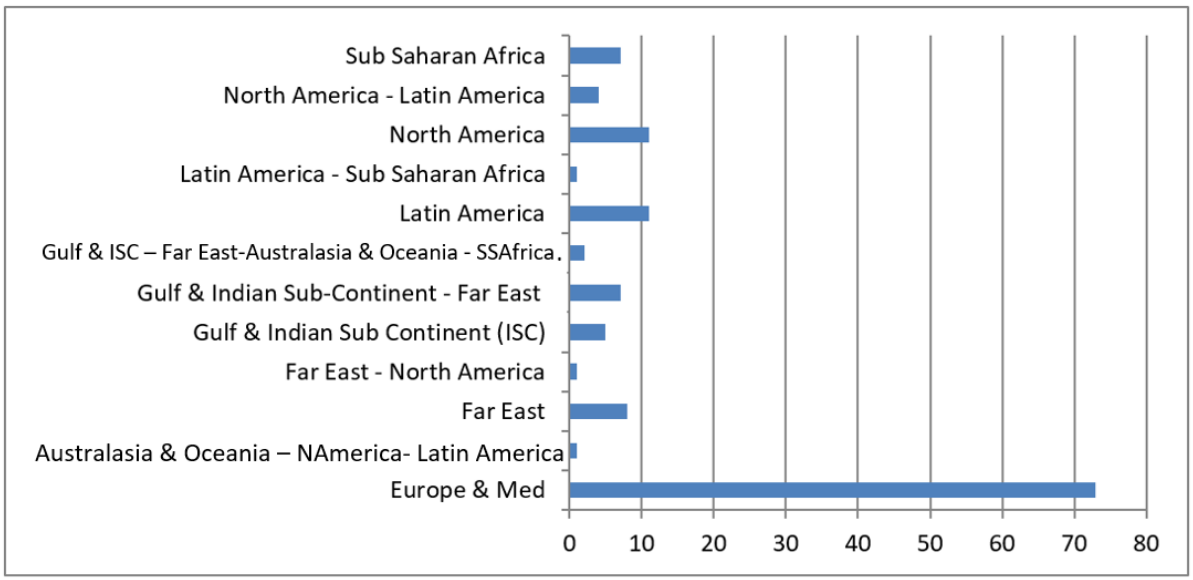
Figure 14: Annual deployed short-sea and deep-sea container service capacity calling at UK ports by world region, 2017(million TEU)



Source: MDS Transmodal Container ship Databank

The vast majority of the individual services are short-sea, providing links between the UK and European markets and between North West European deep-sea container port hubs such as Rotterdam and Antwerp and UK regional ports. As shown in Figure 15, some 56% of the services that call at UK ports are short-sea rather than deep-sea services. The average size of the ships deployed on short-sea routes is 1,400 TEU, while the average size of ships on services to and from the Gulf and the Far East is 14,500 TEU.

Figure 15: Number of short-sea and deep-sea container services calling at UK ports by world region, 2017



Source: MDS Transmodal Container ship Databank

On the deep-sea routes there are two key trends that are having a significant impact on the global container shipping market following the 2008–9 global economic crisis and as a result of the end of shipping line cartels in 2008:

- Ship sizes have increased as the major shipping lines have sought to secure economies of scale and reduce unit costs per container transported once their privilege to operate cartels was ended by the EU;

- Shipping lines have sought to consolidate both through mergers and acquisitions and also by forming three global alliances – called the 2M Alliance, THE Alliance and the Ocean Alliance – in order to have greater control over capacity on the major trade lanes such as between Europe and the Far East.

This has an impact on UK container ports in that they are faced with fewer customers and also have to cater for larger ships, which leads to a need to invest in enhanced facilities such as deeper dredged channels and quays; the larger ships also lead to a greater number of containers being loaded and unloaded at any one time, which places greater pressure on cranes, storage yards and on inland logistics.

There are almost no ‘pure’ coastal container services that only transport containers between two UK ports, but there are some 17 services that provide direct links between two UK ports while also serving ports in NW Europe or the Republic of Ireland. These services are included within the short-sea Europe and Mediterranean services in the analysis in Figures 14 and 15 above.

4.5 RoRo shipping services

RoRo services, which are unitised cargo in trailers that are rolled on and off a ship without the use of a crane, provide frequent maritime transport links between Great Britain and the European continental mainland and Ireland. The overall market is usually split between:

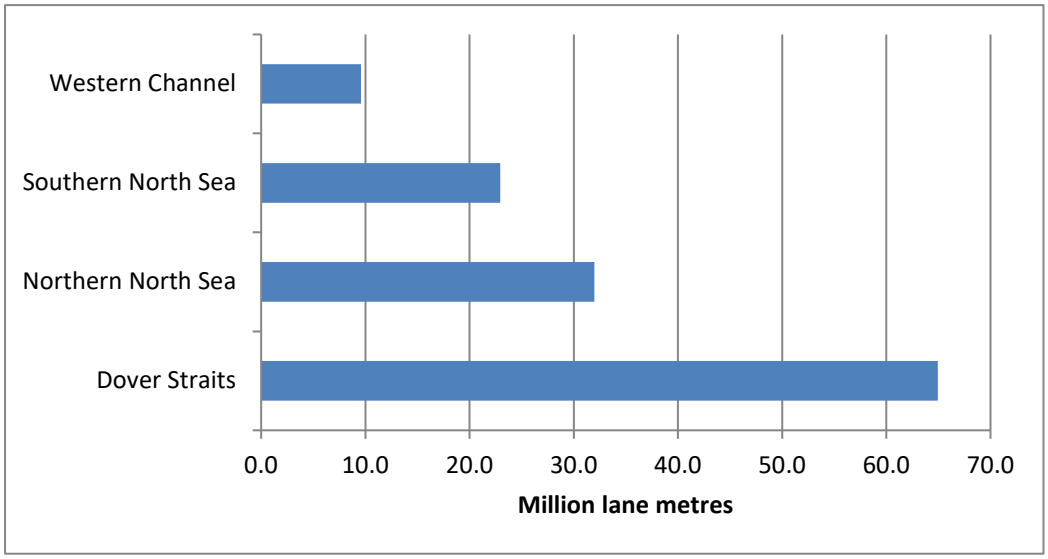
- The GB–Continent market, which is then split further into the Dover Straits (between Dover and the Region Hauts-de-France[4]), the North Sea corridor (between GB ports in the Thames to Forth range to the Near Continent, Scandinavia and the Baltic) and the Western Channel (between GB ports in the Newhaven to Plymouth range to France and Spain).

- The GB–Ireland market, which is then split further between the Northern Corridor (GB ports to Northern Ireland), the Central Corridor (Lancashire and North Wales ports to Dublin) and the Southern Corridor (South West Wales ports to southern Ireland).

At the end of 2017 there were a total of 56 RoRo services carrying freight at GB ports, provided by a total of 112 different vessels (MDS Transmodal, 2017).

Figure 16 shows how the total capacity deployed by the ferry operators in the GB–Continent market in late 2017 of 130 million lane metres is divided between the different corridors; the dominant corridor is the Dover Straits with 65 million lane metres of capacity provided by the high-frequency 'turn-up and go' ferry services that operate on this corridor for driver accompanied trucks. However, for slower-moving unitload traffic, the North Sea corridor both on the southern North Sea (to and from the Thames and Harwich Haven) and the Northern North Sea (to and from the Humber, Tees, Tyne and Forth) provide a combined deployed capacity of 55 million lane metres.

Figure 16: Annual deployed capacity in the GB–Continent market in million lane metres, 2017

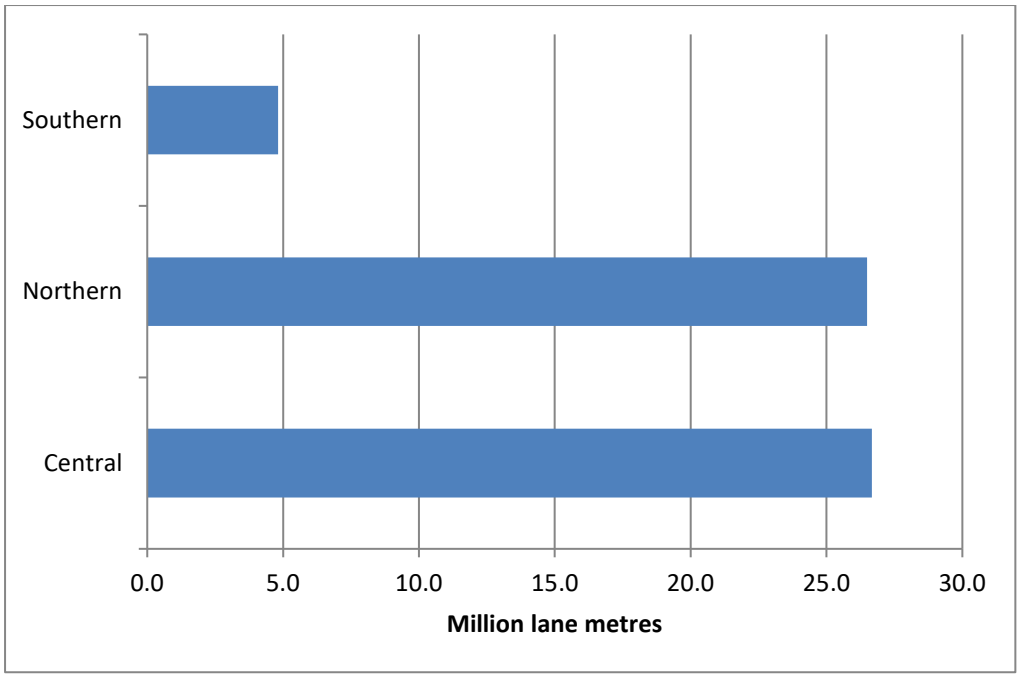


Source: MDS Transmodal Ferry Databank

[4] Formed from a merger of the former regions of Nord Pas de Calais and Picardie, with the new region coming into existence on 1 January 2016.

Figure 17 shows how the total capacity deployed by the ferry operators in the GB–Ireland market of 58 million lane metres is divided between the different corridors; the two most important corridors are the Northern and Central Corridors which link Great Britain with the major Irish population centres of Belfast and Dublin respectively.

Figure 17: Annual deployed capacity in the GB–Ireland market in million lane metres, 2016



Source: MDS Transmodal Ferry Databank

Commercially, most RoRo services on GB–Continent and GB–Ireland routes are operated on a scheduled/liner basis. Services therefore operate to scheduled timetables, with the shipping lines selling capacity (deck space) to road hauliers and logistics operators in an open competitive market. Road hauliers therefore have a choice of routes and shipping lines and the commercial risk rests with the shipping line, with sales revenue needing to cover operating costs in order to generate a financial return. The key players in the RoRo market are:

- Dover Straits – P&O Ferries, DFDS and Eurotunnel;
- Western Channel – Brittany Ferries and LD Transmanche;
- North Sea – Stena Line, P&O Ferries, Cobelfret and DFDS; and
- Irish Sea – Stena Line, Irish Ferries, Sea Truck and P&O Ferries.

In most cases, space is sold to hauliers and logistics operators on a third party basis, so that the shipping line has no financial interest in the hauliers. However, Cobelfret, P&O and DFDS also own subsidiaries that are pan-European logistics companies.

Small island communities located off the mainland of Great Britain rely on lifeline services to receive supplies and to facilitate trade with the mainland and the rest of the world. The relevant island groups are:

- The Western Isles of Scotland, served by services operated by Caledonian Macbrayne that operate between the mainland and 23 island communities, as well as providing some inter-island services;
- The Northern Isles of Scotland (Shetland and Orkney), served by Northlink Ferries which provides links to and from the mainland (both Aberdeen and Scrabster) and between the two island groups;
- The Channel Islands, which has freight services to and from Portsmouth operated by Condor Ferries;
- The Isle of Man, which has a freight service mainly to and from Heysham operated by the isle of Man Steam Packet Company;
- The Isle of Wight, which has freight services provided by Red Funnel (to and from Southampton) and Wightlink (to and from Portsmouth and Lymington).

4.6 Bulk shipping

Bulk shipping provides port-to-port shipping services transporting unpackaged dry bulk cargoes (such as coal, iron, ore, cement and grains) and liquid bulk cargo (such as crude oil, chemicals, liquid natural gas and refined petroleum products). The ships are usually specialised and so transport large volumes of a homogeneous cargo between specialised port handling and storage facilities.

In 2016 some 47,000 ship arrivals at UK ports were either by liquid bulk tankers or dry cargo vessels out of a total of 138,000 arrivals, so that bulk shipping accounted for about one third of all ship calls (Department for Transport, 2017a).

Typical flows in the UK might be the transport of refined petroleum products by a petroleum products tanker from a coastal oil refinery to a coastal tank farm (a storage facility for bulk liquid products) or the shipping of cement in a bulk carrier from a port close to a cement production facility to a port for storage and then use in development projects in the surrounding region.

These bulk shipping services are usually provided by the shipping company to a shipper on a single contract (or voyage charter) rather than on a regular scheduled basis, with the contract stipulating the movement of the cargo between two ports for a given contract value.

5 THE STRATEGIC FREIGHT INFRASTRUCTURE NETWORK

5.1 Introduction

This section describes the infrastructure that freight transport services use, whether it is publicly or privately owned.

The road and rail networks are predominantly publicly owned and managed and freight transport operators generally share use of the infrastructure with passengers. The most important types of privately owned infrastructure in relation to freight transport are distribution centres, ports and airports. Distribution centres are commercial developments and, although some smaller ports are owned by local authorities and there are a number of 'trust ports' such as Dover, Port of Tyne and Milford Haven (which are required to re-invest any financial surpluses), the major UK ports are privately owned following a programme of privatisation in the 1980s and 1990s.

5.2 The strategic road network

The highway network in Great Britain is mainly owned and operated by an arm of the state, with Highways England, Transport Scotland and the Welsh Government owning and operating the strategic highway network in each country and local authorities owning and operating other roads.

The highways network is principally funded from general taxation rather than from vehicle excise duty or fuel excise duty. The exceptions to this are the direct charges levied to use a number of major estuary crossings such as the Dartford Crossings and the M6 Toll and which are funded either by borrowing or a PFI scheme. There are some private highways in and around ports, airports and logistics parks; these were originally funded and are maintained by the facilities owner, even if the general public can in some circumstances drive on them. Highways England, as a DfT-owned company, is subject to economic monitoring by the Office of Rail and Road (ORR).

The Strategic Road Network in England (defined as that owned and managed by Highways England) consists of about 3,000 km of motorways and 4,100 km of trunk A roads. While it represents only 2% of the total road network, it accommodates 66% of HGV tonne-km (Department for Transport, 2015) because a high proportion of freight traffic is strategic in nature and is moving over long distances.

Figure 18 shows the estimated flows of HGVs on the GB road network (MDS Transmodal, 2017), highlighting how the major flows are concentrated on the motorway and trunk road network.

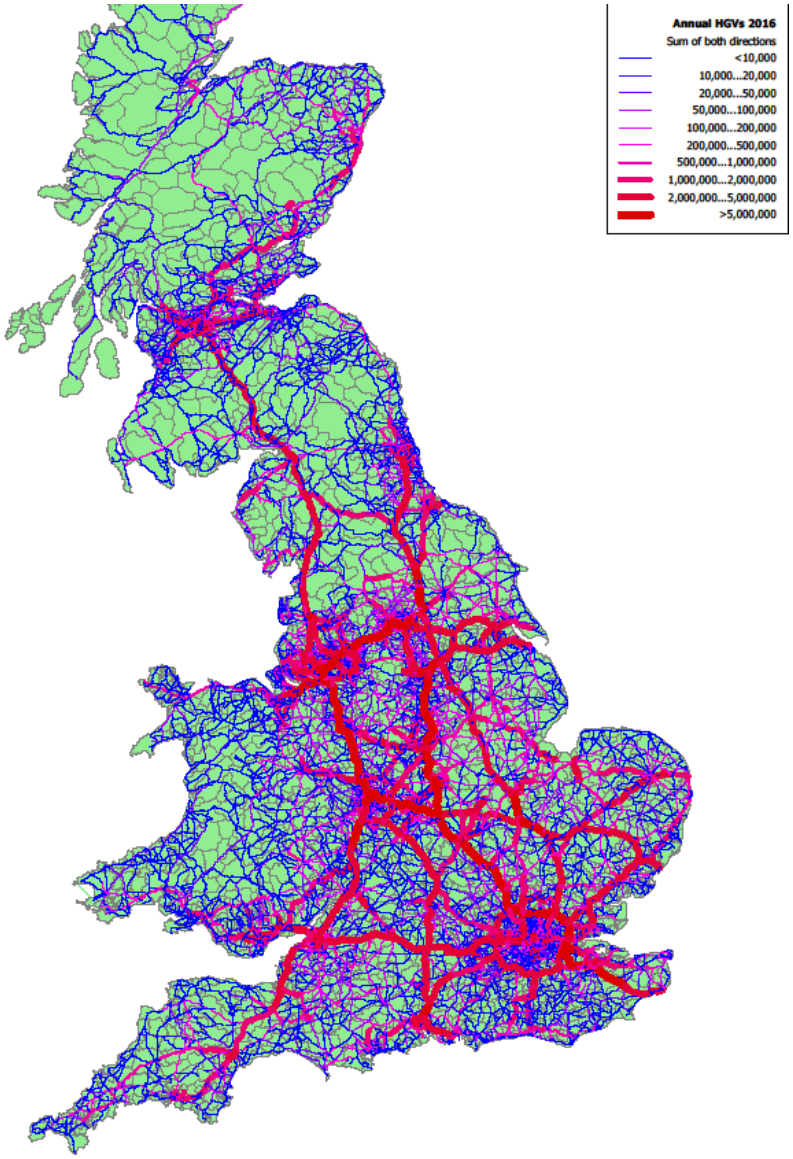


Figure 18: Annual HGV flows on the GB road network, 2016

Source: MDS Transmodal GB Freight Model

5.3 Distribution centres & other storage

Within the general cargo and consumer goods sectors, the 'hub' of most logistics operations is the distribution centre and these have tended to be located on greenfield sites close to, or with easy access to, the strategic road network to increase the efficiency of road-based distribution operations and avoid conflicts with local residents. There are basically two types of distribution centre (DC):

- **National distribution centres (NDCs):** these act as inventory holding points for imported and nationally sourced goods, before re-distribution to subsequent stages in the supply chain. Average dwell time varies considerably but may average 4–6 weeks. They are termed 'national' because they serve the whole of Great Britain (and often Ireland) from the one site and are normally associated with manufacturers, with suppliers

to retailers such as importers of electrical goods, beers/wines/spirits or clothing and major retailers. NDCs have traditionally been located in the Midlands, as they are centrally located to serve domestic suppliers, ports and regional distribution centres, thereby minimising overall road transport costs. Outbound flows were typically to regional distribution centres or retail outlets, although direct deliveries to homes are becoming increasingly important due to the increasing levels of e-commerce.

- **Regional distribution centres (RDCs):** these receive goods from NDCs or direct from suppliers, before re-distributing the goods to retail outlets and, increasingly, direct to homes. They have a regional hinterland and are normally associated with retailers which receive inbound goods from suppliers and their own NDCs before consolidation into loads for individual retail outlets throughout the region. Dwell times are much shorter; perishable and time-sensitive goods will be redistributed within 24 hours without passing through pallet racking systems and with a simple transfer between vehicles (a process called ‘cross docking’).

Goods with short lead times and time-sensitive cargoes would generally pass direct to an RDC from a domestic supplier or port. Some DCs act as both national and regional distribution centres, depending on the precise distribution requirements of the business.

Distribution centres for the large retailers therefore form part of complex international supply chains and a typical distribution centre can be expected to receive goods from domestic, EU and deep-sea sources. Goods with short lead times (essentially domestic and EU sourced goods) and those which are time-sensitive usually pass through distribution centres fairly quickly. Cargo with a longer lead time, principally that from deep-sea sources, tends to be stored for longer periods ahead of demand.

In addition to the traditional storage and re-distribution functions at pallet level quantities, distribution centres are increasingly the location of other ‘added value’ operations. With respect to e-commerce, they are often the location of product ‘fulfilment’; this is where an individual order will be received, ‘picked’ from storage, prepared and appropriately packed and then dispatched to the customer’s delivery address. Associated returns processing and other back office functions may also be co-located at the same distribution centre.

UK distribution centres are still fairly labour intensive, despite some automation driven by e-commerce and fulfilment. Employment densities are in the range 70–95 square metres per FTE (full-time equivalent), with NDCs generally recording higher levels of employment per square metre (Homes and Communities Agency, 2015).

Figure 20 shows the location of ‘large’ distribution centres in England, defined as more than 8,000 square metres of storage space. The map shows that there is a concentration of distribution centres (mainly NDCs) in the so-called logistics ‘Golden Triangle’ (bounded by the M42, M1 and M6), but there are also significant concentrations located within or close to the major British conurbations.

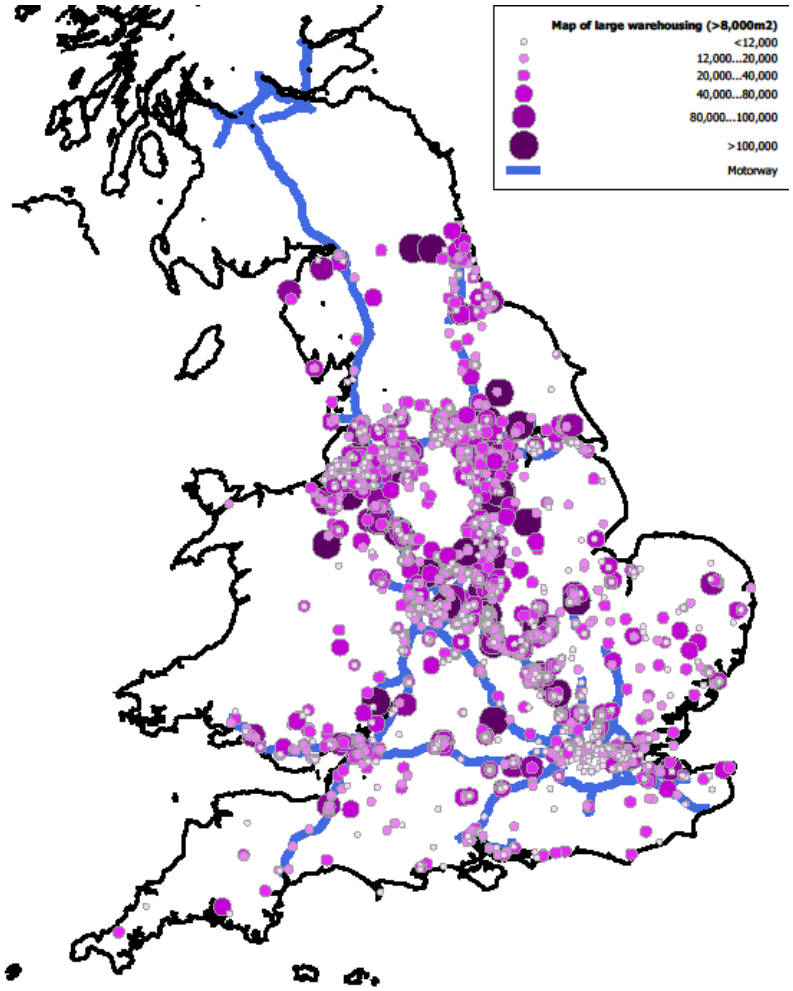


Figure 20: The location of distribution space over 8,000 square metres in England and Wales in 2017

Source: MDS Transmodal, based on Valuation Office Agency data

The concentrations of distribution centres in different regions reflects their competitiveness in terms of total transport costs for inbound and outbound cargo, land values and the cost of labour. The Midlands and parts of the North of England tend to be the most favoured areas for NDCs because these areas minimise the overall costs when goods have to be received from both overseas and around Britain and then distributed to all other British regions. This is shown in Table 8, which compares the proportion of distribution centre space (medium and large-scale distribution centres over 5,000m^2) in England and Wales by region compared to the proportion of the population (MDS Transmodal, 2017). Whereas London – with 15% of the total population of England and Wales and only 6% of the warehousing space – is relatively under-represented, the East Midlands – with only 8% of the population but 17% of the warehousing space – has a relative specialisation in providing distribution space.

Table 8: Comparison of warehousing space with population for English regions & Wales in 2016–17

Region	Proportion of warehousing space (more than 5,000m^2) in 2017	Proportion of population in mid-2016
East of England	10%	11%
East Midlands	17%	8%
London	6%	15%
North East	3%	5%
North West	15%	12%
South East	10%	15%
South West	6%	9%
Wales	3%	5%
West Midlands	16%	10%
Yorkshire and the Humber	12%	9%
Total	63.8 million m^2	58.4 million

Source: MDS Transmodal Distribution Centre Database & Office for National Statistics

The provision of warehousing is a purely commercial function undertaken by commercial property developers, often in association with pension/investment funds, although some commercial property developers such as Goodman and Pro Logis are also investment funds in their own right. Developers identify and acquire sites, design and build the distribution centre units, which are then let to long-term occupiers. The consequent annual rental payments represent the developer's investment return, or alternatively the completed and occupied unit may then be sold to a pension/investment fund (sale proceeds minus development costs representing the developer's return). Warehousing is therefore the key fixed infrastructure required by (and used by) the general cargo/consumer freight sector, even if it is delivered and funded by long-term private sector investment. The warehouses are therefore commercial investments intended to make a financial return for the investor. As with all commercial investments, the decision on whether to proceed will take into account the capital costs alongside future revenue streams, the likely payback time and overall financial return.

However, delivery of distribution space is ultimately reliant on the planning system; land needs to be allocated through local plans and consents granted at commercially attractive locations. These are generally close to strategic transport routes, to the markets to be served and to a labour supply. Conflicts often emerge, with many sites that could be competitive geographically being located in the greenbelt or in competition with proposed residential developments.

The key to achieving sustainable distribution for medium- to long-distance flows is the development of Strategic Rail Freight Interchanges (SRFIs) and port-centric distribution. SRFIs are large developments of modern large-scale distribution centres co-located on the

same site as an intermodal terminal. This renders rail freight services to and from the SRFIs more cost-effective because the origin and/or destination of the door-to-door freight transport movement (a distribution centre) is next to the rail terminal so that no road delivery or collection is required between the rail freight terminal and the distribution centre. This is considered further in section 5.4.

Port-centric distribution provides similar advantages to SRFIs, but the distribution centres are located in or close to a port estate or a wharf on a major inland waterway such as the Manchester Ship Canal. This renders maritime or waterborne freight services to and from the port or wharf more cost-effective because the port or wharf is the origin and/or destination of the door-to-door freight transport movement with no need for an inland movement by road.

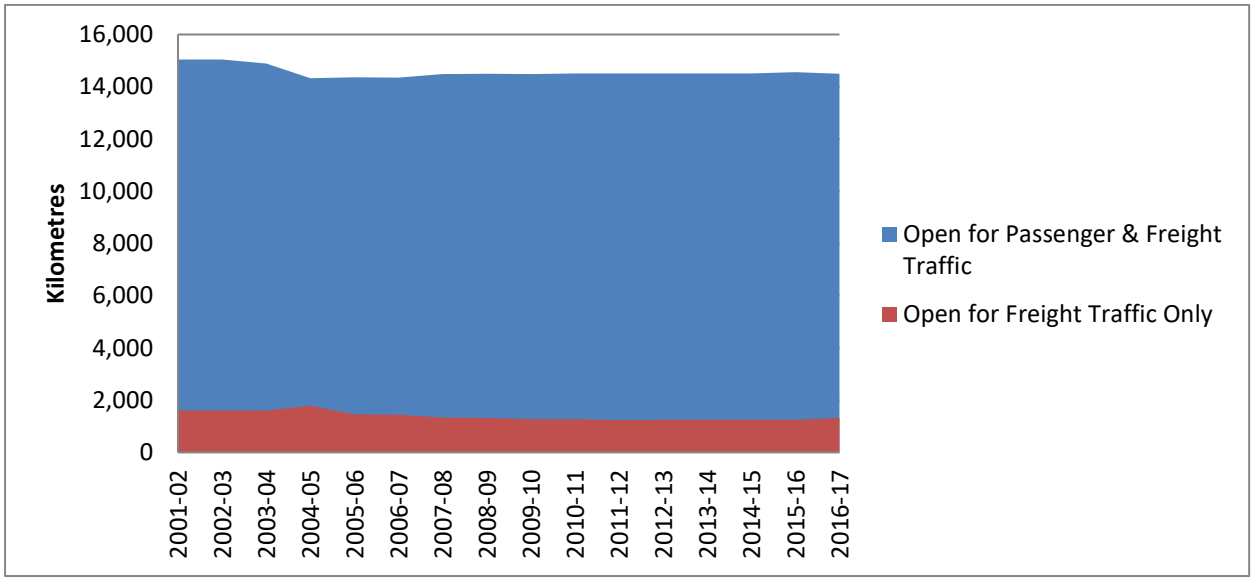
5.4 Rail freight network

The GB rail network

The vast majority of Britain's rail network is owned and operated by Network Rail. Network Rail is an arm's length public sector body of the Department for Transport. However, it is subject to independent economic and safety regulation by the Office of Rail and Road (ORR). Its revenue comes from three main sources, namely track access charges paid by the passenger and freight operators for using the network, a direct grant from the DfT and property/rental income. Section 5.6 describes how it is funded with respect to day-day operations and investments in enhancements. The two principal track networks not owned by Network Rail are HS1 and the Channel Tunnel, which are both operated under private sector concessions.

Data on the length of the rail network in Great Britain in 2016–17 shows that the total network available for freight movements is some 15,800 km, of which 1,300km is only available for freight (Office of Rail & Road, 2018a). Since 2004–5 the total length of the network has remained essentially stable (Figure 21).

Figure 21: Rail infrastructure length 2001–2 to 2016–17



Source: Office of Rail and Road, 2018

Some 92% of the network is shared by freight and passenger trains and where there is congestion on the network this can lead to a lack of capacity for new rail freight services; FOCs are unable to acquire new paths (over and above existing utilised paths) as the network is effectively 'full'. As rail freight services are provided in response to demand, rather than being timetabled in advance of demand, the timetabling of additional passenger services could therefore lead to a lack of capacity for additional freight services on the network. Proposals for additional train services should consider both existing passenger and freight services, and their growth potential. For many routes, or times, there may not be additional spare capacity, so decisionmakers will have to balance competing priorities.

Just over 10 years ago, the Government and Network Rail announced their intention to develop a Strategic Freight Network (SFN) on the railways (Department for Transport, 2007). The SFN was intended to be a core network of trunk freight routes capable of accommodating more and longer freight trains, and being able to handle wagons with a greater loading gauge, integrated with and complementing the existing mixed traffic network. The Government recognised that investment will be required to deliver the SFN, and subsequent funding settlements for Network Rail have included targeted investment in this network.

Figure 22 shows the estimated flows of rail freight services on the GB rail network in terms of average weekday trains in 2016–17, highlighting how the major flows are concentrated on the major north–south link of the West Coast Main Line, between the two major deep-sea container ports of Felixstowe and Southampton and to/from the port of Immingham.

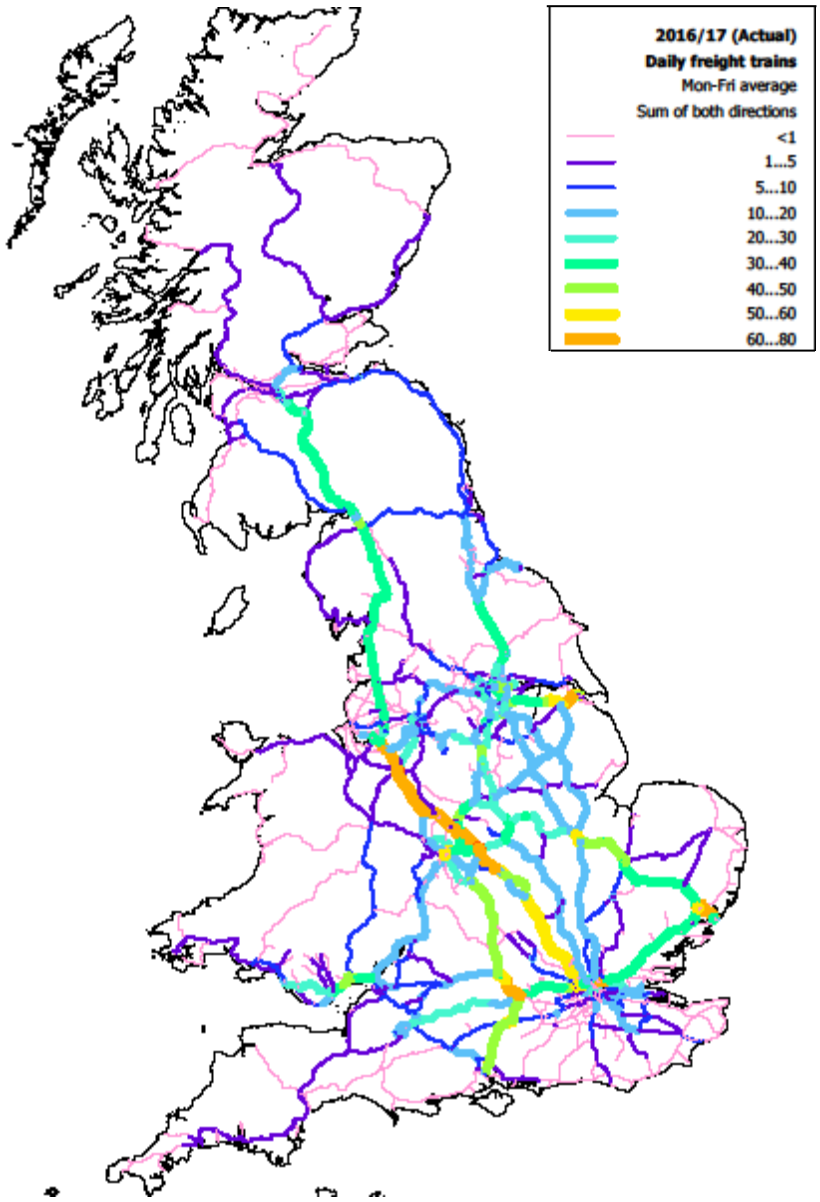


Figure 22: Average daily freight trains on the GB rail network 2016–17

Source: MDS Transmodal GB Freight Model

Rail freight terminals

Rail freight terminals are needed to allow the transfer of cargo between rail and, in particular, road transport. As for rail freight services there are two types of rail freight terminal, namely:

- bulk terminals; and
- intermodal rail freight terminals and SRFIs.

Bulk rail terminals are normally located on private sidings that are either owned or leased on a long-term basis, by the shippers and receivers of the cargo. The terminals are needed for the transfer of bulk commodities to and from rail where rail is most likely to be the most cost-effective mode of transport for long-distance transport (e.g. for the transport of stone

between quarries and major cities for construction projects or for the transport of iron ore from a port to a steelworks). The loading and discharge equipment will have been funded by the cargo shipper and/or receiver. Such facilities therefore rely on significant long-term investments from the private sector in the loading/discharge equipment at the private sidings.

Intermodal rail freight terminals are designed to transfer units between rail and road, and they generally consist of sidings to accommodate trains, special cranes for loading and unloading the units and space for storage. There are existing terminals at the main deep sea container ports as well as some short-sea container ports (principally investments by the ports themselves) and in the British regions with major population centres (i.e. Greater Manchester, West Yorkshire, Liverpool, the West Midlands, Bristol, London, South Yorkshire and the Central Belt of Scotland). Most of these terminals, which were originally developed by British Rail in the 1960s and 1970s, have no distribution centres located on the same site.

Rail freight can offer very competitive transport solutions, when compared with road transport, even over short distances of 100km or less. However, two conditions are required to render such flows competitive:

- The ability to move the product directly between two rail-served facilities i.e. without the requirement to use road transport for part of the end-end journey; and

- The ability to move large quantities in one move on a frequent and regular basis to provide the sufficient volume of traffic to fill a full-length train and provide efficient use of assets.

This explains why for bulk products, shippers and receivers have invested in bulk rail terminals at both cargo origin and destination. Examples include the former merry-go-round coal trains which operated over short distances between collieries (and latterly ports) and coal-fired power stations, and aggregates trains moving product from rail-served quarries to rail-served urban distribution depots; these flows can provide sufficient volumes of traffic for economic trains to operate on a frequent and regular basis.

Where one end of the supply chain is not rail-served, there is a consequent need to use road transport to complete the trip (i.e. to move the cargo from shipper to a rail-head or from a rail terminal to the final customer) and this introduces additional costs compared with one where both ends are rail-served (handling costs and road haulage). Under this operating scenario, the break-even distance (with road transport) increases to around 250km. Where neither end of the transport chain is rail-served and road transport is required at both ends, this distance rises to around 400km. This explains why intermodal container trains from Southampton or Felixstowe will serve destinations from the Midlands northwards (final trip to the end-user generally being by road), with inland destinations in the South East being served by road transport.

In the intermodal sector, therefore, the key factor in attracting traffic away from road transport, particularly over distances less than 250km, is the development of large scale distribution centre capacity at sites with intermodal rail terminals. This is necessary as intermodal services higher value cargo that passes through large scale distribution centres. In planning terms, these are called Strategic Rail Freight Interchanges (SRFIs). When large distribution centres are located on rail-served sites, rail is able to offer significant cost advantages over road transport and the concentration of large scale distribution centres on a single site also generates the requisite volumes of cargo to fill a full-length train.

SRFIs are large developments (over 60 hectares) of modern large-scale distribution centres co-located on the same site as an intermodal terminal, serving the on-site distribution centres and the wider region. They need to be located on main lines with a loading gauge that can accommodate cost-effective intermodal trains and located close to the strategic highway network and close to major urban conurbations; the latter provides both consumers for the cargo passing through them and a local source of labour. Suitable sites for SRFIs are very limited and are often located in the greenbelt. Their development also relies on train paths being available on the network and terminals being available at SRFIs; however, freight services struggle to secure capacity on the network in some locations in competition with passenger services and the planning system has also found it difficult to provide SRFI capacity in key locations such as the South East. Given the above, the Government has attempted to promote their development by classifying them as Nationally Significant Infrastructure Projects (NSIP) and including them in the National Planning Statement for National Networks policy statement.

Figure 23 shows the location of existing Strategic Rail Freight Interchanges (SRFIs) in Great Britain. Note that 'Future SRFIs' are those which have been granted consent and are currently under development. Consent for SRFIs at Radlett (Hertfordshire) and Howbury Park (Dartford) have previously been granted, albeit work has yet to commence on construction; in the case of Howbury Park, the consent time limit has passed and a fresh application is being progressed (Greater London Authority, 2016).

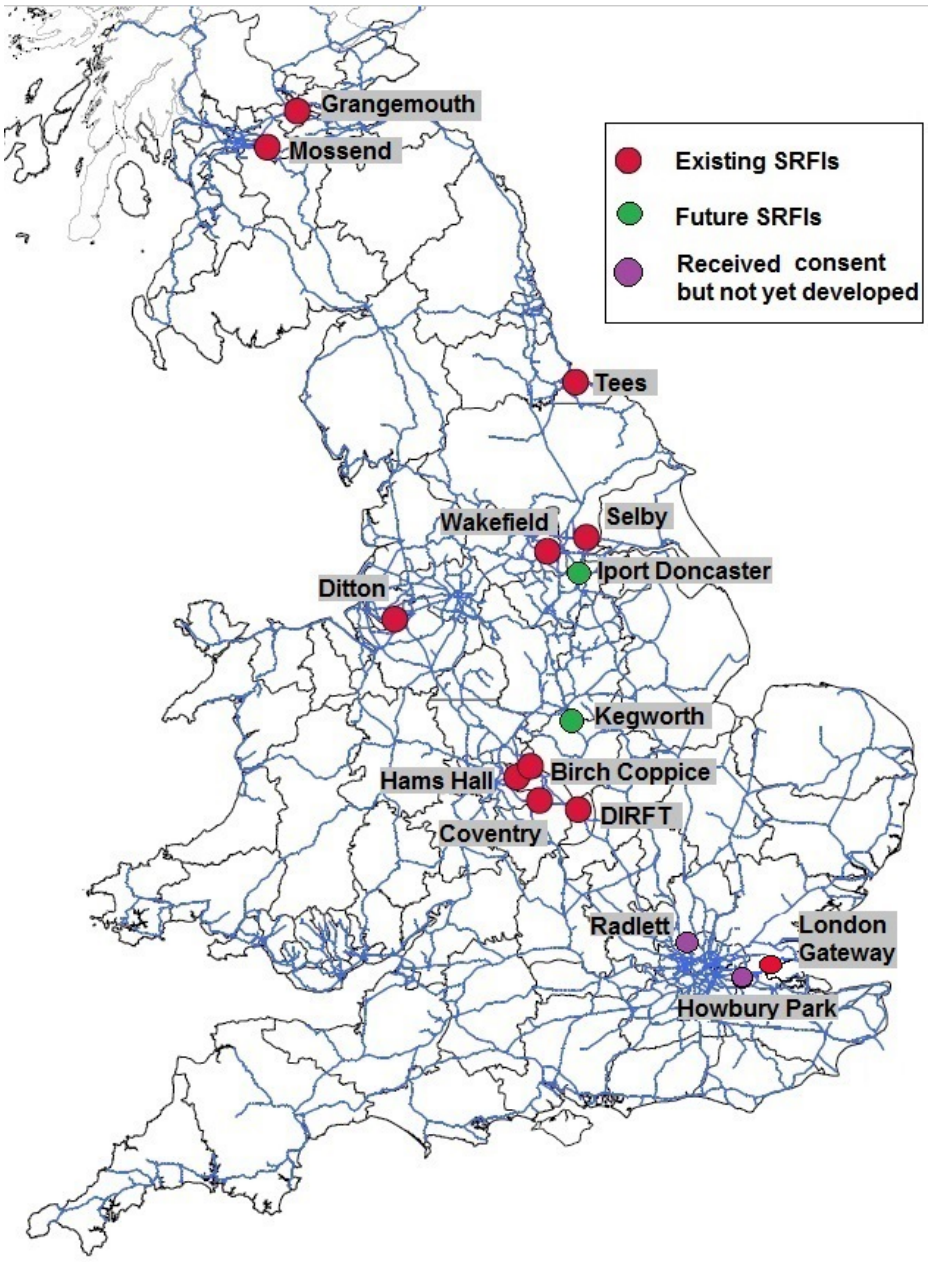


Figure 23: Location of Strategic Rail Freight Interchanges in GB

Source: MDS Transmodal

As for stand-alone distribution centres, SRFIs are funded by commercial property developers on a commercial basis and are essential to securing a shift of traffic from road to rail over medium- to long-distances. The relatively large distribution sites required by SRFIs generate a critical mass of rail freight traffic for the economic operation of rail freight services and also reduce operational costs for the operators of distribution centres. They are therefore key fixed infrastructure assets that are delivered and funded) by long-term private sector investment that is intended to provide a financial return for the investor.

However, delivery is ultimately reliant on the planning system; land needs to be allocated through local plans and consents need to be granted at the commercially attractive locations. These are generally close to strategic transport routes, markets to be served and a labour supply. Conflicts therefore often emerge, with many geographically competitive sites being

located in the greenbelt or competing with proposed residential developments. It is noteworthy that proposed SRFIs in London and the South East have experienced protracted consideration by the planning system. Both Radlett and Howbury Park were examined at public inquiries before consent was granted (twice in the case of Radlett, along with a judicial review), while a further scheme near Slough was twice rejected following a planning inquiry. Despite the Government's attempt to promote such schemes, the fact that the most optimal sites are located in the greenbelt or on similarly designated land means they are often open to challenge (particularly by local authorities) and detailed examination through the planning system. Schemes in the Midlands and North of England have generally experienced a smoother passage through the planning system.

5.5 Port infrastructure network

Ports in the UK fall into one of three categories, namely:

- Privately owned ports – usually by large publicly quoted companies, investment funds or multi-national port owning organisations;
- Trust ports – owned by an independent statutory body; and
- Municipal ports – owned by a local authority.

Most of the largest ports (in terms of traffic handled) are privately owned by Associated British Ports, Forth Ports, Peel Ports, PD Ports, Hutchison and DP World, while smaller ports tend to be Trust or Municipal. The notable exceptions are the larger ports of Dover, the Port of Tyne, London and Milford Haven (all trust ports) and Portsmouth (a municipally owned port).

Table 9 shows the traffic volumes for the top 10 UK ports in 2016. Many of these ports are multi-purpose ports handling a broad range of both unitised and bulk cargoes, such as Grimsby and Immingham, London, Southampton, Liverpool, Forth, Tees and Hartlepool and Belfast, but a few are focused principally on unitised cargoes (Felixstowe and Dover).

Table 9: Top 10 UK ports by traffic volume, 2016

Rank	Port name	Traffic volume in tonnes (million)
1	Grimsby & Immingham	54.4
2	London	50.4
3	Southampton	36.0
4	Milford Haven	34.8
5	Liverpool	31.9
6	Felixstowe	28.2
7	Forth	27.4
8	Dover	27.3
9	Tees & Hartlepool	26.9
10	Belfast	17.6

Source: DfT Port Freight Statistics

Irrespective of ownership, ports generally have two key functions, namely:

- Commercial – generating revenue from berthing vessels, handling cargo and renting land/facilities; and
- Conservancy – the safe movement of shipping within their respective ports.

There are a number of examples, however, where the (trust) port authority only has a conservancy role, with the cargo-handling facilities contained within them being owned by private companies. These ports, all of which have trust port status, include Harwich Haven Port Authority (providing conservancy for the estuary upon which the ports of Felixstowe, Harwich and Ipswich are located) and the Port of London. All ports, regardless of ownership, are operated on purely commercial terms without any Government or state support. Revenue must cover costs and investment in infrastructure (see below) has to be funded on commercial terms. In that respect, ports operate in an open market, competing with each other for traffics, and are able to charge whatever the market will bear.

There are broadly three types of port infrastructure, namely:

- Liquid or dry bulk – jetties or quays and associated discharge/loading equipment, often associated with a nearby production facility such as an oil refinery or steelworks.
- Unit load/unitised traffic – roll-on/roll-off (RoRo) ferry berths and lift-on/lift-off (LoLo) quays plus associated craneage; and
- Semi-bulk /general cargo quays plus associated loading/discharge equipment e.g. for the specialised handling of steel and forest products

Table 10 provides analysis of the GB port infrastructure network in terms of some of the key parameters that determine capacity and capability (MDS Transmodal, 2017). In total there are an estimated 16 km of container terminal quay for the handling of container ships and some 209 km of quay for handling bulk and general cargo traffic. At the same time there are an estimated 730 hectares of space at ports for the handling and storage of RoRo/ferry traffic and 470 hectares of land for the handling and storage of trade vehicles. As well as the three main types of port infrastructure shown above, specialist facilities for trade vehicles are also shown as they require large amounts of land for vehicle storage.

Table 10: GB port infrastructure by type and region in 2015

Region	LoLo facilities		RoRo/ferry facilities		Trade vehicle facilities		Bulk/general cargo facilities	
	No. of facilities	Total quay length (km)	No. of facilities	Terminal space (hectares)	No. of facilities	Terminal space (hectares)	No. of facilities	Total quay length (km)
East Midlands	1	0.2	-	-	-	-	3	1.2
East of England	7	4.0	4	59.9	2	139.2	24	10.6
London	9	1.5	4	75.0	1	150.0	87	18.9
North East	4	1.5	3	40.6	2	48.9	27	13.8
North West	2	1.1	9	49.3	2	7.7	44	30.6
Scotland	6	1.8	17	54.9	1	0.2	70	40.4
South East	2	1.9	12	107.6	2	83.0	60	20.3
South West	1	0.9	1	27.5	2	146.7	21	16.2
Wales	4	1.0	9	42.0	1	0.3	37	29.0
Yorks & Humber	4	1.9	6	123.1	3	43.9	36	27.6
Grand Total	40	15.8	67	579.9	16	473	619.9	208.5

Source: MDS Transmodal GB Port Infrastructure Database

In some cases, the port's commercial role might only extend to being effectively 'landlords'; land is leased to third party private operators on commercial terms, who subsequently invest in berthing, loading/discharge and other handling infrastructure such as rail terminals or distribution centres. In other cases, the ports will invest in, own and physically operate the infrastructure, charging shipping lines fees to generate revenues and a financial return. In addition to the actual berths and direct loading/discharge equipment, ports also invest in other 'added value' infrastructure. This can include landside storage and handling infrastructure such as warehousing, silos and rail freight terminals. As an example, the rail terminals at the Port of Felixstowe were provided by the port, and London Gateway has an associated distribution centre development within the port estate.

Overall, and on a similar basis to distribution centres and SRFIs, ports are key fixed infrastructure assets that are delivered through long-term private sector investment. As with all commercial investments, the decision on whether to proceed will take into account the capital costs alongside future revenue streams, the likely payback time and overall financial return. Securing traffic on long-term contracts is therefore important as they will effectively

help to secure funding for investment. With the exception of Peel Ports and Forth Ports, the other large private port groups are ultimately owned by overseas interests. However, given the longstanding Government policy of encouraging inward investment from overseas, overall this should not affect (and indeed could benefit) future investment in UK port infrastructure. Again, delivery is ultimately reliant on the planning system; land needs to be allocated through local plans and consents need to be granted.

5.6 Airports

As explained in section 3.5, UK airports handled some 2.4 million tonnes of high-value freight in 2016 and the market is dominated by London Heathrow with some 64% market share (Civil Aviation Authority Airport Statistics, 2017). The most important airports for handling freight – London Heathrow, East Midlands, London Stansted, London Gatwick and Manchester – are either privately owned or operated on a commercial basis.

Unlike ports, much of the infrastructure at airports is designed to meet passenger demand; however, specialist air cargo distribution centres are required by air freight forwarders for the sorting and consolidation of air freight into air container loads and these may be located in the vicinity of the airports rather than actually within the airport itself. Otherwise, airport infrastructure is developed on a commercial basis, with delivery reliant on the planning system when additional land is required.

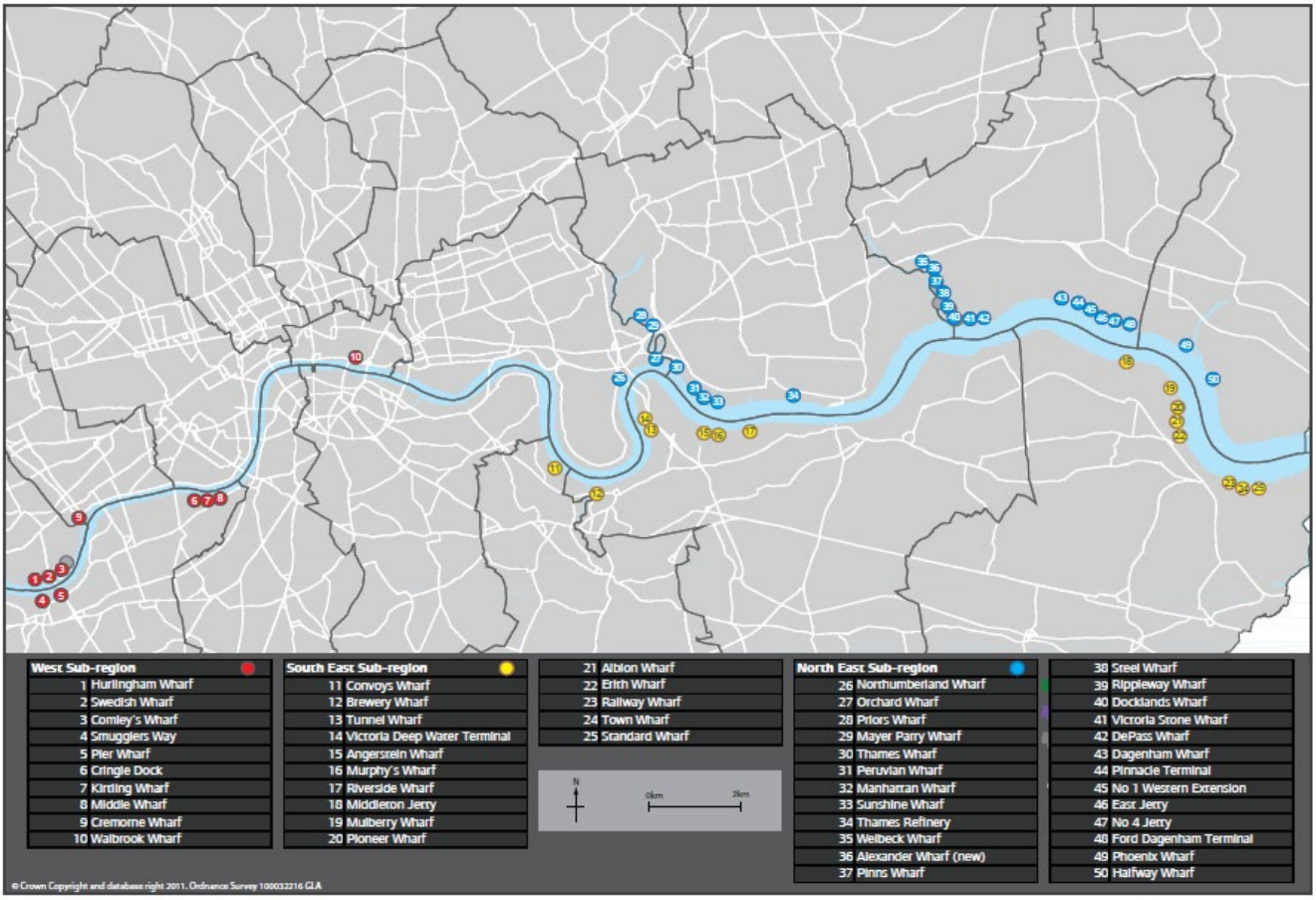
5.7 Waterborne freight network

The UK has an indented coastline, with deep-water access to its major estuarial ports and wharves on the Forth, Tees, Tyne, Humber, Harwich Haven and Thames on the east coast, the Solent on the south coast and on the Severn estuary, Milford Haven, Mersey and Clyde on the west coast. Many of these seaports are privately owned since a round of privatisations in the 1980s and 1990s.

Short-sea and coastal shipping movements along these major estuaries are recorded as inland waterway movements for statistical purposes and there are also numerous (mainly privately owned) wharves on major rivers, such as the rivers Humber, Hull and Trent. Significant movements of freight on man-made canals are limited to traffic to and from wharves on the Manchester Ship Canal.

There are a large number of wharves on the Thames which need to be safeguarded through the planning system against, in particular, residential development so they are available in the future for the loading and unloading of cargo. The number of safeguarded wharves is shown in Figure 24.

Figure 24: Safeguarded wharves on the River Thames (source: Port of London Authority)



The Canal and River Trust has been responsible for the development of freight activity on most rivers and canals in England and Wales since 2012, while the British Waterways Board (operating as Scottish Canals) continues as a public body with the role of supporting the development of freight on canals and rivers in Scotland.

5.8 Pipeline network

The overall length of the pipeline network has remained largely unchanged since 2007 at about 4,400km, reflecting the relatively mature nature of this mode of transport.

5.9 Planned investment in freight transport infrastructure

Highways network

The first Road Investment Strategy (RIS1) provided a long-term programme of investment for the SRN in England, with a plan between 2015 and 2020. The headline figure for investment was £15.2 billion for over 100 projects during a six year period. While there has been investment in constructing some new roads, the main focus has been on upgrading the existing network. This includes the developing network of 'smart motorways', which secures more capacity at peak times by allowing use of the hard shoulder and variable speed limits to improve traffic flow.

The Government is now working with Highways England and other stakeholders to develop RIS2, with research being carried out on six strategic studies and updating route strategies for the whole network. The six strategic studies address the following sections of the SRN:

- Northern Trans-Pennine: the A66 and A69 corridors
- Trans-Pennine tunnel: the potential enhanced link between Manchester and Sheffield
- Manchester north-west quadrant: the M60 from junctions 8 to 18
- A1 in the east of England from the M25 to Peterborough
- The Oxford to Cambridge expressway
- M25 south-west quadrant

In 2015 the Government announced that tax receipts from vehicle excise duty will be hypothecated for investment in the highways network from 2020–21 rather than being available for other uses. As the highway network is funded from taxation, investment in highway infrastructure is decided on the costs of the scheme measured against the wider economic and societal benefits that will be generated by that scheme – unlike investments in port, distribution centre and SRFI infrastructure, which are based on commercial decisions. The DfT's WebTAG (Transport Appraisal Guidance) provides a structured appraisal system that allows the benefits to cost ratio (BCR) of publicly funded schemes to be estimated. A positive BCR is normally required for a scheme to proceed, and where multiple schemes are 'competing' for limited funding, the schemes with the higher BCRs normally secure the funding. The appraisal of such schemes in relation to freight transport should take account of

both changes in user costs (i.e. the change in operating costs, including the cost of time, for the freight transport industry) and non-user costs (such as changes in levels of congestion, the level of environmental emissions and the cost of accidents) and should be carried out in a consistent way across all relevant modes of transport.

Rail network

As a monopoly infrastructure provider, Network Rail is subject to economic regulation by the Office of Rail and Road (ORR). The ORR determines what Network Rail is permitted to spend on day-to-day operations, asset maintenance/renewals and enhancements, and operational performance indicators are also defined. The ORR's process of determining Network Rail's spending, funding and performance is known as a Periodic Review. The subsequent settlement lasts for five years and is known as a Control Period. The current Control Period, CP5, runs from April 2014 to March 2019.

To inform each Periodic Review, the Government is required by legislation to publish a High Level Output Specification (HLOS). This sets out at a strategic level what the Government wants the railway to achieve and deliver during the following Control Period. Alongside the HLOS, the Secretary of State is also required to publish a Statement of Funds Available (SoFA), which sets out the amount of direct funding Network Rail can expect to receive from Government.

The HLOS and SoFA which informed the CP5 Periodic Review were both published in July 2012; they set out a series of capacity and capability enhancements which were expected to cost around £13 billion, out of a total Network Rail spend for CP5 of £38 billion (the balance covering asset maintenance/renewals, day-to-day operations, overheads and interest charges). Enhancements commenced in CP5 included some electrification schemes, such as in the North West, on the Great Western Main Line (GWML) from West London to South Wales, and on the Midland Main Line (MML).

While these are essentially passenger schemes, freight benefits were also expected to be generated in the form of loading gauge enhancement and greater opportunities for using electric traction.

The HLOS and SoFA also made available a 'ring fenced allocation' of £253 million over CP5 to fund investments in the SFN identified by the rail freight industry (a stakeholder panel including Network Rail and the freight operators). These funds have predominantly been spent on a series of loading gauge enhancements between the main deep-sea container ports located in the South of England and the Midlands and North of England and some capacity enhancements specifically for freight. These include:

- East Coast Main Line gauge clearance – from London to Scotland;
- Doncaster to Water Orton (Birmingham) gauge clearance;
- Southampton – diversionary route gauge clearance;
- Ipswich Yard train lengthening; and
- Peak Forest to London train lengthening.

Due to a variety of factors, the final capital costs for some upgrade schemes went significantly beyond that estimated when CP5 was determined by the ORR.

A review was carried out of Network Rail's enhancements programme (and the costs) in 2015 (the Hendy Review). With respect to freight, the review noted that the loading gauge enhancement schemes to Felixstowe (via Ely, Peterborough and Leicester to Nuneaton), the south coast (Southampton) and the North of England/Scotland have been completed. However, the report also stated that while a number of important capacity upgrades planned for the network are still planned to go ahead, their funding and completion dates are pushed back into the following CP6 (2019–2024). This includes the capacity upgrades on the Felixstowe to Nuneaton route and on the Midland Main Line (MML). However, it does note that extra capacity on the Felixstowe branch line should be delivered by 2019, along with loading gauge enhancements on the GWML, to the Yorkshire intermodal terminals and Immingham port.

The HLOS which is informing the CP6 (April 2019 to March 2024) Periodic Review was published in July 2017 and the SoFA informing the CP6 Periodic Review was subsequently published in October 2017. Unlike the 2012 HLOS, the current document is only concerned with operations, maintenance and renewals on the existing railway for CP6, in the context of rising passenger demand and the need to deliver greater levels of performance. It does not commit to enhancements, noting that these are expected to be dealt with separately. The SoFA subsequently confirmed this position in October 2017, stating that the level of expenditure is focused on and provides for the operations, maintenance and renewal of the existing railway over CP6. A maximum direct grant of just under £35 billion to Network Rail over CP6 is stated. This includes 'some provision for the funding of enhancements', assumed to be in part those aforementioned schemes which have been pushed back into CP6. However, the 'Secretary of State expects decisions regarding specific enhancements to be dealt with separately'.

It is therefore likely that some SFN funding will be available for freight enhancements in CP6. However, as yet the value of this funding is not known and the ORR's final determination is scheduled for October 2018. Exactly which options will be chosen is an open question.

In addition to installing grade separation at key flat junctions, the gradual introduction of the European Rail Train Management System (ERTMS) could help to generate additional capacity for the long term. ERTMS is a set of common standards and operating practices that is due to be adopted by modern signalling systems across the EU. This could allow trains to run closer together, when compared with existing fixed-block lineside signals, thereby increasing capacity, and could also help to reduce average end-to-end journey times.

6 THE FUTURE OF FREIGHT

6.1 Introduction

As explained in section 1 of this report, the main focus of this study is to review the current 'landscape' of the freight transport system in the UK rather than to provide detailed observations on the future of freight. GO-Science has commissioned a number of additional pieces of work which seek to provide more detailed insights into the future of freight transport up to 2040.

Having said that, the review of the existing landscape in sections 1–5 highlights some of the key challenges for the UK freight transport system in the future:

- How can the freight transport system become even more cost-effective and help to increase the productivity and competitiveness of the UK economy?
- How can the freight transport system reduce its negative externalities, particularly in terms of its impact on local air quality and on greenhouse emissions?
- How can the use of network infrastructure by freight be made more efficient given the levels of congestion on road and rail networks and on links to and from ports?
- How will the freight transport system need to adapt to the changing trading relationship with the EU?
- How can the land use planning system cater for the future needs of the freight transport system, allowing the development of infrastructure that supports the economic needs of the UK while also reducing negative externalities?
- How can the freight transport system best adapt to rapid changes in consumer demand, in digital and manufacturing practices and transport technology, while providing a reasonably stable investment environment for the private sector?

This section includes some observations on how some of these challenges could be met over the next 10 years (i.e. up to about 2028), with a focus on:

- The impact of regulation, particularly in relation to environmental emissions;
- The impact of alternative fuel technologies;
- The impact of e-commerce;
- The impact of local manufacturing;
- The impact of autonomy and automation;
- The impact of the sharing economy;
- The impact infrastructure pricing and land use planning.

While a number of other issues could have been considered in this section, we believe the points listed above are some of the key areas that will have a particular impact on the UK freight transport system over the next 10 years.

6.2 The impact of regulation

The major focus of regulation is on reducing the emissions of environmental pollutants from HGVs at a local level, and this has been driven by EU emissions standards legislation. The HGV fleet is gradually becoming cleaner as road hauliers increasingly purchase new HGVs which have to conform to Euro 6 standards since the standard was introduced in January 2015. These vehicles meet stricter emissions standards under both laboratory and real-world conditions and remove almost all emissions of particulate matter and reduce nitrogen oxide emissions from HGVs by up to 95%.

However, with the increasing political attention being paid to the impact that poor air quality has on human health at a local level, there is likely to be a much greater focus on regulating access to urban areas by the most polluting freight vehicles. This is likely to be through the introduction of Clean Air Zones in a number of urban areas and will have the effect, at least in the next few years, of encouraging the development of RDCs and depots on the edge of major conurbations so they are within the range of electric vehicles using the existing battery technology.

Greater use of ultra-low emission vehicles for freight movements will also have the advantage of helping to reduce greenhouse gas emissions from road freight transport and therefore contribute to reducing the risks from global warming. This will only be the case, however, if the electricity that the UK generates is from low carbon sources. The trends in electricity generation are positive with generation from renewables reaching a new quarter 3 record high of 30.0% in 2017, while low carbon sources (i.e. renewables plus nuclear) reached a new record of 54.4% during the same period (Office of National Statistics, 2018).

Greater regulation of freight vehicles to improve air quality in local areas will be most likely to have an impact on urban logistics – for the so-called ‘last mile’ delivery of goods into urban areas, as well as the reverse logistics involved in removing waste material such as packaging. This is because most of the Clean Air Zones (CAZs) that will be designated by local authorities will be located in urban areas where there are concentrations of economic activity and traffic. The precise measures that will be introduced for CAZs will vary between urban areas, but they may include high access charges for – or even bans on the use of – more polluting HGVs and LGVs. This would incentivise the introduction of a range of other means to make collections and deliveries in urban areas more sustainable, such as:

- Use of electric vehicles (EVs) for deliveries and collections from urban distribution centres (UDCs), which are large-scale consolidation centres that receive goods and then consolidate them into full loads for last-mile deliveries by EVs. These UDCs would be located on the edge of large conurbations and should, ideally, be located on rail- or water-connected distribution parks so that inbound flows over medium to long distances can be achieved using more sustainable modes of transport;

- Development of smaller-scale road-only consolidation centres on the edge of smaller urban areas to allow the transfer of goods from larger freight vehicles into smaller electric vehicles for final delivery within CAZs.

- Increased use of cycle logistics and walking for last-mile logistics of goods such as parcels in city centres that are also CAZs.

Given that rail freight services are mainly provided by diesel-powered locomotives, looking forward the industry faces the issue of how to decrease emissions cost effectively. Current DfT ambition is to phase out diesel only traction by 2040 (DfT, 2018b). There are various possible routes for the railway industry to achieve this ranging from electric locomotives and extensive network electrification, and/or battery power for 'last mile' operations on non-electrified lines and terminals, to alternative fuels such as hydrogen.

Greater attention will also be paid to emissions from shipping. While the Sulphur Emissions Control Area (SECA), implemented by the International Maritime Organisation and the EU since 2015, has restricted the use of heavy fuel oil as a bunker fuel in much of North West Europe, ships are still permitted to use diesel to provide electricity while in port. It is likely that major ports, with concentrations of ships sitting alongside berths for lengthy periods, will be under increasing pressure to provide shore-based electrical power supplies for shipping over the next 10 years.

6.3 The impact of alternative fuel technologies

Given the ambition to limit the sale of new diesel and petrol cars and LGVs from 2040, it seems increasingly likely that there will gradually be a greater take-up of electric LGVs at a national level for relatively short-distance flows, but unless there is a step-change in battery technology, or advances in other alternative fuel solutions such as hydrogen fuel-cells, this is most likely to be for deliveries from distribution centres located close to the major conurbations rather than to towns and cities in more peripheral locations. This potentially also implies a greater demand for distribution buildings on the edge of major conurbations (particularly London), from where electric vehicles can then undertake deliveries to homes, offices and retail outlets. This has implications for planning policy, given the additional pressures this places on land located in the metropolitan greenbelt.

Existing battery technology tends to encourage the use of electric 'white vans', which lack the economies of scale provided by an HGV; however, manufacturers are focused on developing the battery technology and there is already, for example, a Mercedes electric HGV on the market (Electrek, 2018) and Tesla has launched its Semi HGV (Tesla, 2017), which is being marketed as having a range of 500 km.

Furthermore, existing battery technology is significantly heavier when compared with a tank of diesel fuel. This eats into the gross laden weight, thereby reducing a vehicle's payload capacity. In order to encourage greater use of electric HGVs, the gross weight regulations may need to be amended to allow for heavier electric HGVs that are able to carry the same payload capacity when compared with a diesel vehicle. For longer-distance flows between urban areas, other technological solutions may be required to allow the greater electrification of road haulage. These could include the development of trolley-bus infrastructure for freight, and Siemens has carried out a trial of this technology in Germany along a short section of the highways network (Siemens, 2015). Another potential solution is the 'electric road' concept where electric vehicles receive electric current from the highway using wireless induction charging technology (Autocar, 2017).

6.4 The impact of e-commerce

One of the key trends affecting the freight and logistics market is the increase in e-commerce sales at the expense of 'bricks and mortar' retail activity and the desire for next-day or even same-day delivery. This trend is set to continue over the next 10 years and is likely to have three broad impacts:

- The substitution of journeys in cars or by public transport to and from retail outlets with 'white vans' carrying out deliveries where people live or work;
- Changes in distribution activity and distribution patterns as the unit of freight becomes a parcel rather than (say) a pallet. The parcels operators have their final sorting offices/depots located close to individual major population centres and this implies greater use of double-deck HGVs (providing greater volumetric capacity) for trunking from NDCs located in the Midlands;
- Distribution centres increasingly become 'fulfilment' centres, re-distributing goods at the individual consignment level. As many older distribution centre buildings are unable to accommodate the automated picking/packaging equipment associated with this process, this implies a continuing need to build large modern distribution centre units, designed around automated handling and at commercially attractive locations, which in many cases will replace the older life-expired capacity. If these are on rail- and/or water-connected distribution parks, then there is an opportunity to increase the use of more sustainable modes for medium to long-distance distances.

Information and communications technology (ICT) is already used extensively by the logistics industry to manage bookings and reservations of capacity, to manage operations (including managing fleets), for tracking and tracing of consignments, for financial management and for cost-effective routing. The further development of the use of 'big data', the digitisation of transport and trade documentation and data sharing between collaborators in supply chains is likely to help reduce costs and increase efficiency over the next 10 years.

6.5 The impact of local manufacturing

The combination of reducing trade barriers due to the process of globalisation and the availability of relatively cheap inter-continental freight transport by container ship allowed multinational companies to manufacture in relatively low cost locations such as China and Vietnam and then distribute the goods to consumer markets such as the UK. However, in a practice called 'onshoring' or 'reshoring', some businesses have started to transfer business operations that were moved overseas back to the country from which it was originally relocated. There is some evidence for this practice in the UK as manufacturing costs start to increase in China (Financial Times, 2013), but it is often anecdotal and may not have been sustained, particularly as container shipping is highly cost-effective for inter-continental transport. If it was to become a significant trend in the UK, perhaps incentivised by any increase in protectionism around the world, it could lead to shortening of supply chains and more focus on the import of raw materials rather than final products via ports and the co-location of final assembly of products at NDCs.

3D printing is now readily available for the manufacture of a variety of goods, such as parts for manufacturing processes, at a local level and therefore allows the co-location of manufacturing and consumption. It seems unlikely, however, that 3D printing will replace factories to any great extent over the next 10 years due to the lack of manufacturing economies of scale and the fact that the existing 3D printers are designed to work with only a single raw material (e.g. plastic) rather than a combination (e.g. plastic and metal).

6.6 The impact of autonomy and automation

The main technological change in the road haulage industry up to 2030 at a national level may be the introduction of 'platoons' of HGVs that travel together on the strategic highways network and provide fuel efficiencies to road hauliers due to the reduction of drag. These would not be genuinely autonomous vehicles because they would still require a driver to be located in each cab for the departure and the final approach to the destination. Without significant technological improvements it seems likely that these platoons would be restricted to use on motorways and dual carriageways so that there are opportunities for overtaking and to ensure safety.

Many distribution centre functions have been automated over the past 15–20 years, a trend that is likely to continue; in part this is linked to the growth of e-commerce as automation is ideally suited to picking and packaging goods at the individual consignment level rather than full pallet loads. Further automation of warehousing is likely to have a significant impact on the levels of employment that will be available in DCs and sorting centres over the next 10 years. This will be driven by further e-commerce growth and, as technology develops, will enable distribution centre operators to reduce their operating costs. However, many older distribution centre buildings are unable to accommodate the automated picking/packaging equipment associated with fulfilment, implying a continuing need to build large modern distribution centre units (designed around automated handling) at commercially attractive locations.

6.7 The impact of the sharing economy

Sharing of capacity is already commonplace in freight transport and logistics as freight transport providers are constantly seeking to secure economies of scale and minimise their costs in a highly competitive market. For example, road haulage companies collaborate to provide pallet load networks (where they transport individual pallets for individual customers and then combine them with those of other customers to fill their vehicles) or shared warehousing facilities for their customers. Container shipping, ferry and intermodal rail freight services all need to secure a critical mass of cargo from different customers in order to be competitive.

There may, however, be some scope for 'disruptive' technology which will facilitate the sharing of the capacity provided by freight transport operators – which would therefore facilitate collaboration between shippers/receivers and freight transport providers. However, collaboration is often difficult to achieve in practice because the cost of road haulage is so much lower than the value of the goods being transported; this means that the priorities for shippers and receivers are related to receiving the goods quickly and on time rather than seeking to reduce costs by sharing capacity. However, ICT could help to automate the process of negotiating the balance of costs and benefits from collaboration which can be a major barrier to the take-up of this practice.

6.8 The impact of infrastructure pricing

Capacity on the road network, particularly during the peak periods, is a scarce resource and, at the same time, road freight may not be paying for the full costs it imposes on society which include not only the impact on congestion but also the cost of environmental emissions and accidents.

The Chartered Institute of Logistics and Transport (CILT, 2015) and other organisations including the European Commission have advocated the introduction of a system of infrastructure charging for both freight and passengers. This could involve re-distributing the existing taxation levied on the different modes of transport and applying additional charges where these can be justified on the basis of net externalities – using a distance-based system which could take account of the time of day, the specific section of the network and the type of vehicle as well as the distance travelled. In the road sector, this would be facilitated by the use of fairly mature technology such as GPS and on-board units in the cabs of HGVs and LGVs.

This approach, which should be adopted on a consistent basis across all modes that use publicly owned infrastructure, would have the effect of ensuring that economic resources are allocated efficiently across the different modes while also taking into account the externalities that are generated by all modes of freight transport. It would also have the effect of providing revenue streams for Government that can be applied to the maintenance and enhancement of infrastructure for freight transport.

Such an approach to infrastructure charging would help to ensure that the private sector invests in key freight infrastructure, such as distribution parks and Strategic Rail Freight Interchanges, in competitive locations. However, this will only be possible if the land use planning system is able to bring forward large sites in competitive locations, and this may require a more strategic approach to the selection and promotion of nationally significant sites by Government.

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Government Office for Science
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caused greater peak noise events, this provides evidence for the *Applicant's assertions regarding the absence of impacts. Therefore, Natural England is* ***satisfied that Appendix Ec.4.2 provides sufficient evidence*** *to* ***resolve our uncertainty*** *over noise disturbance impacts on turnstones in Pegwell Bay. We accept that, for the reasons set out in* ***section 3 (Assessment) of the Appendix, an adverse effect on integrity can be ruled out***" (bold added for emphasis).

Appendix Ec.4.2 [REP9-XXX][5]

4. We note that at Line 1, Paragraph 2 of Page 3 of Ec.4.2 [REP9-XXX][6] the Applicant states:

"*The risk of the noisiest aircraft being operated in future is minimized by the* ***Quota Count approach detailed in the Noise Mitigation Plan [REP8-004]***"

a) We respectfully remind the Examining Authority that **Natural England's comments on the Report of the Implications for European Sites** [REP10-XXX] [7] are based on the **evidence provided** by the Applicant in **Appendix Ec.4.2** [REP9-XXX][8] (ie [REP8-004].

b) At Deadline 9 the Applicant submitted a revised Noise Mitigation Plan [REP9X-XXX][9] which **superseded** [REP8-004].

c) The Quota Count approach was changed in [REP9X-XXX][10]

d) The change to the Quota Count approach is a material change between [REP9X-XXX][11] and [REP8-004].

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[5]Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019

[6] Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019

[7] Natural England's comments on the Report of the Implications for European Sites of 1 July 2019 TR020002-004583

[8]Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019

[9] Revised 2.4 Noise Mitigation Plan TR020002/D9/2.4 Examination Document 28 June 2019

[10] Revised 2.4 Noise Mitigation Plan TR020002/D9/2.4 Examination Document 28 June 2019

[11] Revised 2.4 Noise Mitigation Plan TR020002/D9/2.4 Examination Document 28 June 2019

e) **As such, we respectfully submit the Applicant and the Examining Authority and the Secretary of State cannot rely on the 1 July 2019 submission at [REP10-XXX][12] titled Natural England's comments on the Report of the Implications for European Sites (REIS).**

f) **As such, we respectfully submit the Applicant and the Examining Authority and the Secretary of State cannot rely on Natural England's Answers to the Examining Authority's Fourth Written Questions at EC.4.2 in relation to the Turnstone Mitigation[13] [REP9-XXX].**

Appendix Ec.4.2 [REP9-XXX][14]

5. We, also, note that at Line 9, Paragraph 2.1 of Page 2 of Technical Note Ec.4.2 [REP9-XXX][15] the Applicant states:
"*The flight path* ***shown is very similar to the flight path previously used*** *which, based on the feedback from Natural England, would not result in disturbance of turnstone in Pegwell Bay*"

a) We respectfully reiterate that we do not believe the Applicant has provided evidence to validate its noise contours or to refute those submitted by Five10Twelve and produced by the CAA's ERCD.

b) We submitted a detailed evidence supported submission at Deadline 9 [REP9-XXX][16] to support the above statement.

c) Further evidence of the lack of validity of the Applicant's claims regarding its own noise contours and its rebuttal of those submitted by Five10Twelve is found here at Paragraph 2.1 in the Applicant's Appendix Technical Note Ec4.2 [REP9-XXX] [17]

[12] Natural England's comments on the Report of the Implications for European Sites of 1 July 2019 TR020002-004583
[13] Natural England's Answers to the Examining Authority's Fourth Written Questions of Deadline 9
[14] *Ibid*
[15] *Ibid*
[16] TR020002-004581, Clarification Item 27, ERCD Noise Contour Comments
[17] Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019

submitted at Deadline 9 and Natural England's comments on the REIS submitted to Deadline 10 [REP10-XXX][18].

d) These submissions by Natural England and the Applicant confirm that an agreement has been reached between them on the basis that the Applicant's "***proposed flightpath is similar to that used by the previous Manston Airport***".

e) As the ExA will be aware, in its Technical Note ISH6-27 found at [REP8-015], Clarification Item 27, the Applicant sought to refute the noise contours submitted by Five10Twelve and produced by the CAA/ERCD partially on its assertion that *"it is highly unlikely that the CAA would adopt the same flight paths as previously used".*

f) This therefore serves both as evidence which supports our own assertion that the previous Manston flight paths are entirely credible whilst also providing further evidence of:

- The Applicant's willingness to shape its argument and evidence according to which point it is trying to make and to which Statutory Body or stakeholder on which day;
- We respectfully remind the Examining Authority that in [AS-119], we provided evidence to refute the Applicant's assertions and confirm that the same flight paths as previously used as "*a credible option under CAP 1616 and FASI-S*" and were accepted by the CAA (ERCD) on this basis.

Appendix Ec.4.2 [REP9-XXX][19]

6. We note that at last paragraph Page 2 and Line 1, Paragraph 1 of Page 3 of Ec.4.2 [REP9-XXX][20] the Applicant states:

"*The* ***DC8-62 and Boeing 747-200****, which comprised the majority of air transport movements, are noisier aircraft than any of the* ***fleet proposed***

[18] Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019
[19] Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019
[20] Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019

when the airport reopens. The ***Boeing 747-400*** *was the quietest of the three*" (bold added for emphasis).

a) The Applicant in its footnote at (3) states that Appendix 3.3 [APP-044] of Environmental Statement Chapter 3 [APP–033] details the proposed fleet mix

b) We respectfully draw the Examining Authority to our submissions of [REP9-XXX][21] and [AS-206] which evidence the significant difference between Turboprop places (as assessed in the ES) and Turbojets.

c) We respectfully request again that Requirement 19a of the draft DCO should reflect the fleet mix and more specifically the proportion of Turbofan (jet) aircraft and the proportion of Turboprop aircraft (*ie: to no more than 12,860 cargo aircraft movements can be by Turbofan (jet) aircraft)*[22]

d) Under the revised Noise Mitigation Plan [REP9X-XXX][23] during the daytime aircraft with a Quota Count of 4, Quota Count 8 and Quota Count 16 would be able to take off and land at the airport from 07:00-23:00 it is therefore not correct to say that noisier planes like DC8-62 and Boeing 747-200 will not take-off and land.

e) It is unclear where (if at all) the following mitigation measures are anchored: less noisy planes than ***DC8-62 and Boeing 747-200.***

f) An Updated Register of Environmental Actions and Commitments has not been submitted for Deadline 10.

Appendix Ec.4.2 [REP9-XXX][24]

7. We note that at paragraph 7, Section 3 of Ec.4.2 [REP9-XXX][25] the Applicant states:

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[21] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR020002/TR020002-004380-AS%20Five10Twelve%20Environment%20and%20Air%20Quality.pdf

[22] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR020002/TR020002-004568-Five10Twelve_Deadline%209%20-%20Comment%20on%20Requirement%2019a-%20Airport%20Operations%20-WITH%20APPENDICES.pdf

[23] Revised 2.4 Noise Mitigation Plan TR020002/D9/2.4 Examination Document 28 June 2019

[24] *Ibid*

*"The Flights will be **infrequent** with the **predictability of flight paths** again reducing the potential for disturbance, and the **loudest planes make up a relatively small proportion** of the forecast fleet and that only **certain flight directions will occur on any one day**"*

a) It is unclear where (if at all) the following mitigation measures are anchored:

- *The Flights will be **infrequent;***
- ***predictability of flight paths***
- ***loudest planes make up a relatively small proportion***
- ***certain flight directions will occur on any one day***

b) An Updated Register of Environmental Actions and Commitments has not been submitted for Deadline 10.

c) **As such, we respectfully submit the Applicant and the Examining Authority and the Secretary of State cannot rely on the 1 July 2019 submission at [REP10-XXX][26] titled Natural England's comments on the Report of the Implications for European Sites (REIS).**

d) **As such, we respectfully submit the Applicant and the Examining Authority and the Secretary of State cannot rely on Natural England's Answers to the Examining Authority's Fourth Written Questions at EC.4.2 in relation to the Turnstone Mitigation[27] [REP9-XXX].**

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[25] Applicant's Appendices to Answers to Fourth Written Questions TR020002/D9/FWQ / Appendices Examination Document 28 June 2019

[26] Natural England's comments on the Report of the Implications for European Sites of 1 July 2019 TR020002-004583

[27] Natural England's Answers to the Examining Authority's Fourth Written Questions of Deadline 9

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION

SUBMISSION TO DEADLINE 10:

Comments on Information requested by the ExA and received from the Applicant to Deadline 10

and

NOISE CONTOUR CAP

1. We note the Applicant's continued use of the a noise contour cap as a robust mitigation measure in relation to mitigation measures with Natural England and as identified in the of the Updated Register of Environmental [REP8-018].
2. We draw your attention to Paragraph 1.12

   "1.12 The forecasts for the area enclosed by the 50dB(A) Leq16hr (0700 2300) contour shall not exceed 35.8 sq km, and the area enclosed by the 40dB(A) Leq8hr (23.00-07.00) contour shall not exceed 47.4 sq km. Future calculation, monitoring and reporting of the application and any breaches to the contour is discussed in Section 7 below".
3. The Applicant has not provided a table for each Year forecasts at 2,6 and 20 and the estimated areas, population and households.
4. As the Examining Authority will be aware Five10Twelve CAA contours at [AS-120] 70%W/30%E identified 200 households at >63 SOAEL[1] in year 20 as opposed to the Applicant's 115 household at >63 SOAEL in year 20.

50 dB (A) LAeq 16 hr and 40dB(A) Leq8hr (23.00-07.00) contour shall not exceed 47.4 sq km.

5. We respectfully state that the night time period noise contour cap for one hour of flights is outrageous. It would be outrageous for 8 hours of flights. It would not provide any effective control of operations whatsoever.
6. The Applicant is using areas that marry up with Year 20 with the Fleet mix at Appendix 3.3 of [APP-044] to set a noise contour cap for Year 1 and each consecutive year.

[1] Table 6 Page 5 [AS-120]

7. Notwithstanding the above at point 4, our table commissioned from the CAA ERCD shows for 70%W/30%E at Year 20, a estimated area (km2) >51 of **30.6** (THIRTY POINT SIX KILMETRES SQUARED)**.**

8. The Applicant's proposed mitigation of 35.8 sq km for **ANY** year is higher than that amount for year 20.

9. We respectfully fail to see how this in any way works as a mitigation measure. It would not provide any effective control of operations whatsoever.

10. Pursuant to Paragraph 1.18 of [REP8-018], and using the same fleet mix as set out in Appendix 3.3 of [APP-044] which is based on the forecasts in the Azimuth report, residents would have to wait **over 20 years during the day and even longer at night until this mitigation measure of contour based noise limit capping was engaged[2].**

11. It is therefore an utterly meaningless mitigation measure and will have zero post mitigation effect unless the Applicant changes the fleet-mix significantly which would have an adverse and not assessed environmental impact.

12. The Statutory Bodies that have relied on this measure can no longer be relied upon for agreement with the proposed Scheme.

13. The fact that we are in a position to evidence why this mitigation is so terribly inappropriate is because we happen to have commissioned noise contours from the CAA ERCD at our expense.

14. We cannot afford to run independent checks on all of the Applicant's Environmental Statement nor should we be in the position of having to do so.

15. **We respectfully submit on this basis the Application must be refused.**

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[2] *Ibid*

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION

SUBMISSION TO DEADLINE 11:

Comments on Information requested by the ExA and received from the Applicant to Deadline 10

COMMENT ON RESPONSES TO EXA 4 WRITTEN QUESTIONS

– NEED-

UNDERSTANDING THE FREIGHT MARKET :

GOVERNMENT OFFICE FOR SCIENCE

1. We respectfully submit the following study by the Government Office of Science titled Understanding the UK Freight Transport System.
2. We respectfully note that at 1.1 the study states that the objective of this study is to provide an **evidence-based** review of the **current 'landscape'** of the freight transport system in the UK it is dated February 2019.
3. The methodology adopted to complete this study has involved:
   a) Desk research to analyse **existing public policy and research**
   b) Data analysis to **develop a statistical 'picture' of the current position based on official data and outputs from the GB Freight Model**, which forms the freight module of the DfT's current National Transport Model and other databases developed by MDS Transmodal
   c) **Providing observations on how the freight transport system might develop up to about 2028**
4. We respectfully attach the Study in full for your consideration and respectfully draw your attention in particular to the following sections:
   a) The Cost of Road Freight Transport at Page 22
   b) Rail Freight: volume and goods transported at Page 23
   c) Port freight: volume and goods transported at Page 27
   d) Air Freight: volume and goods transported at Page 31
   e) Waterborne Freight: volume and goods transported at Page 32
   f) Pipeline: volume and goods transported at Page 33

MANSTON AIRPORT DEVELOPMENT CONSENT ORDER EXAMINATION
ADDENDUM TO FIVE10TWELVE DEADLINE 11 SUBMISSION RELATING TO DEFRA UFP REPORT
SUBMITTED BY LOCAL BUSINESS AND INTERESTED PARTY, FIVE10TWELVE LTD

1. Five10Twelve has previously submitted evidence at Deadline 11 relating to **Air Quality, Ultra-Fine Particles and the Precautionary Principle** and the 2018 DEFRA report, Ultrafine Particles (UFP) in the UK.

2. Another 2018 report, published by the Division of Environmental Health at the University of Southern California, (USC), has subsequently come to our attention, which we attached herewith.

3. The author's claim that this report, **Short-Term Effects of Airport-Associated Ultrafine Particle Exposure on Lung Function and Inflammation in Adults with Asthma,** is *"the first to demonstrate increased acute systemic inflammation following exposure to airport-related UFPs"*.

4. As such, we feel this evidence is of material significance to the examination and we respectfully submit this to the ExA for its consideration as an Additional Submission.

5. As per our previous submission to deadline 11 and the DEFRA UFP report, it is our contention that the Applicant has not fully considered airport and specifically aviation-related UFPs or their impact and, as such, we feel confident that the ExA will of course be mindful of the Precautionary Principle and Waddenzee with regards to this and other issues.

6. For this - amongst other issues as we have robustly evidenced and commented elsewhere - we maintain our strong objection to the Applicant's proposals and respectfully request that the DCO is refused.

Appendix A

7. Noise and Vibration

7.1 Introduction

7.1.1 This chapter of the Environmental Statement (ES) has been prepared by Bickerdike Allen Partners LLP and assesses the likely significant effects of the Proposed Development with reference to noise and vibration. The chapter should be read in conjunction with **Chapter 2: Description of the Proposed Development**. The chapter considers the noise and vibration associated with the following activities at Bristol Airport:

- Flights into and out of Bristol Airport (air noise and vibration);
- Aircraft operations at Bristol Airport (ground noise);
- Bristol Airport related road traffic movements (road traffic noise); and
- Construction of the infrastructure associated with the Proposed Development (construction noise and vibration).

7.1.2 The operational noise and vibration is assessed for 2017 and for future years, both with and without the Proposed Development.

7.1.3 This chapter commences by describing the noise related planning context against which the Proposed Development will be considered. It goes on to present and discuss the baseline noise environment at Bristol Airport and then considers the likely significant effects of changes to air, ground, road traffic and construction noise and vibration in both the 'with' and 'without the Proposed Development' scenarios. Within these sections the assessment criteria and methodology are presented, the baseline noise conditions discussed where relevant, and assessments are made of any effects (beneficial and adverse) associated with the Proposed Development. Mitigation measures are also described, where appropriate, as are cumulative and residual effects.

7.1.4 The assessment of noise and vibration involves a significant amount of technical detailed work and to seek to maintain this chapter as concise and informative as possible, this chapter is supplemented by a series of appendices which provide further detail on each of the specific topics. These are referenced throughout this chapter to aid an understanding of the topic being described. The appendices supporting this noise chapter are as follows:

- **Appendix 7A** – Glossary;
- **Appendix 7B** – Relevant legislation, policy, technical guidelines and assessment criteria;
- **Appendix 7C** – Baseline Noise and Vibration;
- **Appendix 7D** – Air Noise and Vibration;
- **Appendix 7E** – Ground Noise;
- **Appendix 7F** – Road Traffic Noise; and
- **Appendix 7G** – Construction Noise and Vibration.

Noise indices

7.1.5 The $L_{Aeq,T}$ index is the average noise exposure level that occurs over a time period T. In the case of aircraft noise therefore, it accounts for the sound energy produced both by the number of aircraft

events and the noisiness of each aircraft event, over a defined time period. It is the primary metric for quantifying community effects of aircraft noise in the UK, specifically $L_{Aeq,16h}$ covering the daytime period from 07:00 to 23:00 and $L_{Aeq,8h}$ covering the night-time period from 23:00 to 07:00. The convention is to assess aircraft movements over three summer months, specifically a 92 day period from 16 June to 15 September inclusive. Summer in this chapter refers to this 92-day period unless stated otherwise.

7.1.6 The L_{den} is a unit that considers an average annual day of aircraft traffic (although it can be applied equally to either rail or road traffic) over a 24-hour period, providing greater emphasis, by way of adding noise penalties of 5 dB and 10 dB to noise levels arising from aircraft traffic in the evening (19:00 to 23:00) and night (23:00 to 07:00) periods respectively. For many airports, the L_{den} equates approximately to the $L_{Aeq,16h}$ index by the relationship $L_{den} = L_{Aeq,16h} + 2$ dB. The precise relationship however depends on the distribution of aircraft traffic over the 24-hour period.

7.1.7 The L_{night} equates approximately to the $L_{Aeq,8h}$ index commonly used to rate night noise in the UK with the exception that it is based on an average annual night of aircraft movements rather than an average summer night.

7.1.8 The L_{A90} is a unit that is often used to describe the background noise level at a location. It is defined as the noise level that is exceeded for 90% of the time.

7.1.9 Similarly, the L_{A10} is the noise level that is exceeded for 10% of the time. In the UK, the convention for assessing road traffic noise is in terms of $L_{A10,18h}$, This is the L_{A10} for the 18-hour period between 06:00 and midnight.

7.1.10 The Government, as set out in the Aviation Policy Framework (APF) [1] and supported by SoNA [2], confirms that the current convention in the UK is to assess the effect of daytime aircraft noise in terms of daytime $L_{Aeq,16h}$ noise contours determined from an average summer day of aircraft movements. As a result, emphasis on the assessment of daytime noise in this chapter is placed on the UK methodology and $L_{Aeq,16h}$ unit. This unit has been used historically within the UK over the past 30 years to assess the effects of aircraft noise.

7.1.11 For night-time, the recent publication of the Government's response[3] to the airspace change consultation[4] confirms the use of $L_{Aeq,8h}$ noise exposure contours determined from an average summer night of aircraft movements for assessing aircraft noise effects at night. These contours are also now prepared and published annually for the designated airports such as Heathrow, Stansted and Gatwick, along with daytime $L_{Aeq,16h}$ contours. The L_{night} index is also referenced, alongside the $L_{Aeq,8h}$ index, as both are very similar.

7.1.12 In Europe, noise indicators based on the L_{Aeq} unit, known as the L_{den} and L_{night}, are used to assess environmental noise effects and are used in the UK to prepare Strategic Noise Maps and Noise Action Plans. Noise contours, in terms of L_{den} and L_{night}, are therefore produced on a five-yearly basis for all major airports, including Bristol Airport. The development of criteria by which to judge this European index is in its relative infancy compared to the body of knowledge built around the $L_{Aeq,16h}$ unit, although guidance is continuing to emerge, particularly regarding noise exposure and potential health effects.

[1] Department for Transport (2013). Aviation Policy Framework.
[2] Civil Aviation Authority (2017). Survey of noise attitudes 2014: Aircraft, CAP 1506.
[3] Department for Transport (2017). Consultation Response on UK Airspace Policy: A framework for balanced decisions on the design and use of airspace. [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/653801/consultation-response-on-uk-airspace-policy-web-version.pdf [Checked 7/09/2018].
[4] Department for Transport (2017). UK Airspace Policy: A framework for balanced decisions on the design and use of airspace. [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/588186/uk-airspace-policy-a-framework-for-balanced-decisions-on-the-design-and-use-of-airspace-web-version.pdf

7.1.13 While average exposure noise contours of this type are well established and important at demonstrating trends in total noise around an airport, it is recognised in the APF that people do not always experience aircraft noise in an averaged manner and that the L_{Aeq} indicator does not necessarily reflect all aspects of the perception of aircraft noise. Supplementary indices are therefore considered as part of this air noise assessment which reflect how aircraft noise may be experienced in different localities. The purpose of this is to ensure a better understanding of noise effects and to inform the development of targeted noise mitigation measures.

7.1.14 Night-time aircraft noise can be evaluated in a number of different ways. The common method is to rate night noise in terms of noise exposure, using the $L_{Aeq,8h}$ index and the L_{night} index (for the period 23:00 to 07:00). It is also important however to consider the typical noise levels of individual aircraft, using noise indices such as the Single Event Level (SEL) and/or the L_{ASmax}.

7.1.15 The SEL is a measure of the noise energy produced during a noise event, such as an aircraft passby, averaged over a reference time of a single second. It therefore accounts for both the level and duration of the noise event. This is commonly used in the UK to describe noise produced by single aircraft (and rail) events, particularly at night.

7.1.16 The L_{ASmax} in contrast reflects what a person hears as the maximum noise level during an aircraft passby and is an index that is most understandable to people without the need for technical understanding. Like the SEL, it is used to rate the noise of an individual event, particularly at night.

7.1.17 L_{Amax} is commonly expressed in either "fast" or "slow" time weighting, denoted L_{AFmax} and L_{ASmax} respectively. For aircraft noise, the convention is to use L_{ASmax} whereas for other noise sources, L_{AFmax} is used.

7.1.18 The N index is becoming more commonly used to describe aircraft noise, often using the N70 parameter for daytime and N60 parameter for night-time aircraft noise assessment. This index describes the number of times in a defined period, such as the daytime or night-time, that a receptor will experience a given maximum noise level as a result of an aircraft passby. For example, an N70 of 20 means that a receptor will experience 20 aircraft events producing 70 dB L_{ASmax} or more during the defined period of time. This allows an understanding of how, for a given noise level and above, the number of flights during the daytime might alter when comparing two scenarios, such as with or without an airport development. There are no specific criteria for rating the acceptability of N70 or N60 contours although they further assist a comparison of two different operational scenarios.

7.1.19 Noise annoyance ratings are also a useful way of explaining how a given noise environment is likely to affect the local community, by identifying those likely to be 'highly annoyed' by aircraft noise. The measure considers the general population and it is accepted that some people would be more annoyed or less annoyed for a given daytime noise exposure level. This method of assessment offers some advantages over simply banding a population into "low", "moderate" and "high" annoyance categories since it recognises that even at relatively low levels of aircraft noise, some people can by highly annoyed. It can therefore be usefully used as a means of evaluating differences between scenarios. Similar ratings for sleep disturbance also exist for night-time activities.

7.1.20 While noise exposure contours take account of both the noisiness of aircraft events and the number of operations that occur during a day or night, they only provide an 'average' value. While this is required by Government for planning purposes, it does not reflect the change that occurs over a day. It is therefore also relevant to consider how the noise level might vary at a given receptor in a given day, particularly when comparing two scenarios. This is often represented by considering the following:

- Single mode contours produced assuming either 100% westerly operations or 100% easterly operations. There are no specific criteria available to rate noise levels associated with single mode contours. However, such contours show the noise exposure levels expected for a given day when operations occur from a single runway direction; and
- The variation in noise level at representative locations over a typical day, for example, on an hourly basis.

7.1.21 Consideration is given to both these methods within this noise chapter and accompanying appendices.

7.1.22 In undertaking an assessment for an ES, it is necessary to establish those effects that are considered to be adversely or beneficially significant. The thresholds to be adopted for this purpose are discussed later in the Assessment Criteria (**Section 7.3**) and Significance Criteria (**Section 7.9**) sections of this chapter.

Aircraft movements and scenarios

7.1.23 Three key scenarios have been considered in this chapter:

- Baseline (taken to be 2017);
- 10 million passengers per annum (mppa) Without Proposed Development in 2026. For air noise, a scenario of 10 mppa in 2021 has also been assessed since this is when this passenger capacity is expected to be reached; and
- 12 mppa With Proposed Development in 2026.

7.1.24 If the Proposed Development does not proceed, Bristol Airport would be constrained from 2021 onwards to a limit of 10 mppa. This would constrain Bristol Airport to operating no more aircraft movements in 2026 than occurred in 2021.

7.1.25 To reflect this, a sensitivity scenario for air noise has been included for 10 mppa in 2026 (Without Proposed Development) assuming that fleet modernisation occurs at the same rate as for growth to 12 mppa in 2026. In practice, the likelihood that more modern, quieter aircraft will be allocated to Bristol Airport will be reduced compared to the 12 mppa scenario since no potential for growth will be present for the airlines. Airlines are already securing flights to destinations and associated 'slots' at airports as far ahead as summer 2020 at the time of writing. If an airline can be assured growth at another airport it may seek to deliver a competitive advantage to secure capacity now. As airports are coming under increased pressure to reduce noise impacts, securing more modern aircraft fleets coupled with growth is a key way in which this can occur sustainably. Therefore, the 10 mppa 2026 scenario is a worst-case comparison for the 12 mppa scenario as the expectation of aircraft modernisation is similar.

7.1.26 As a result, in the case of air noise, the noise effects in the 10 mppa in 2021 scenario are likely to reflect the noisiest that will arise at Bristol Airport if it is constrained to 10 mppa. Moving forward in time would not alter the amount of aircraft movements or passenger throughput without additional development but noise levels would be likely to reduce as a result of gradual on-going fleet replacement with more modern and quieter aircraft.

7.1.27 The number of summer aircraft movements associated with each of the key scenarios for the daytime and night-time periods is given in **Table 7.1**, alongside the total number of annual movements.

Table 7.1 Annual aircraft movements for assessment scenarios

Scenario		Number of Aircraft Movements		
		92-day Summer Daytime (07:00-23:00)	92-day Summer Night-time (23:00-07:00)[1]	Annual Total
Key scenarios	**Baseline 2017**	18,924	2,735	73,562
	10 mppa 2021 (Without Proposed Development)	19,294	4,022	86,973
	12 mppa 2026 (With Proposed Development)	22,540	4,639	97,393
Air noise sensitivity scenario	**10 mppa 2026 (Without Proposed Development)**	19,294	4,022	86,973

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

7.1.28 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 12 mppa application seeks to keep the annual limit of 4,000 but remove the segregation of summer and winter periods. In this chapter, the assessment of the 12 mppa scenario is on the basis that this change is approved. Therefore the comparisons to the without development scenarios offer a worst case comparison.

7.1.29 The 12 mppa application does not seek any change to the 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. The QC budgets are to remain at 1,260 in the summer and 900 in the winter.

7.2 Limitations of this assessment

7.2.1 Air noise and ground noise assessments in the future have been based on forecast aircraft movement data, while assessments for 2017 have been based on actual data. The forecasts used in this assessment have been prepared by Bristol Airport Limited (BAL) and verified by Mott McDonald, independent aviation consultants.

7.2.2 The road traffic noise assessment has been based on traffic counts undertaken in 2018 to determine current conditions as 2017 information is not available. It has been assumed that conditions in 2017 were identical. The baseline year has been referred to as 2017 throughout this chapter for consistency with other noise sources.

7.2.3 The assessment of construction noise is based on detailed construction plant schedules and programmes of works provided by BAL, supplemented with additional plant where relevant based on professional judgement.

7.3 Relevant legislation, planning policy and technical guidance

Legislative context

7.3.1 The following legislation is relevant to the assessment of the effects on noise and vibration receptors:

- *EU Regulation 598-2014*[5] sets out, for airports where a noise problem has been identified, the process to be followed for the introduction of noise-related operating restrictions in a consistent manner on an airport-by-airport basis, so as to help improve the noise climate and to limit or reduce the number of people significantly affected by potentially harmful effects of aircraft noise, in accordance with the Balanced Approach[6];
- *Environmental Noise Directive (END) 2002/49/EC 2002*[7] aims to define a common approach across the European Union with the intention of avoiding, preventing or reducing on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise including from aviation;
- *The Control of Pollution Act 1974*[8] provides a means for regulating construction noise and vibration;
- *The Aeroplane Noise Regulations 1999*[9] require that all civil propeller and jet aeroplanes registered in the UK shall have a noise certificate;
- *Aerodrome (Noise Restrictions) (Rules and Procedures) Regulations 2003*[10] apply to larger civil airports in the EU. Where it is proposed to introduce noise-related operating restrictions, the competent authority (currently BAL itself) is required to undertake a detailed assessment of the noise situation in the locality, and the full range of possible measures to address any noise problems identified. An EIA can be used under this legislation for introducing any noise-related changes that occur as a result of infrastructure or significant airport operational changes;
- *The Civil Aviation Act 2006*[11] includes a number of measures aimed at strengthening the powers available to control noise. These included provisions for airport operators to fix charges in respect of an aircraft or a class of aircraft based on the noise or amount of emissions produced by the aircraft. The Act also gave airport operators statutory powers to introduce noise control schemes for the purpose of avoiding, limiting or mitigating the effect of noise connected with the taking off or landing of aircraft;

[5] European Commission (2014). Regulation (EU) No 598/2014 of the European Parliament and of the Council of 16 April 2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach and repealing Directive 2002/30/EC, [online]. Available at: https://publications.europa.eu/en/publication-detail/-/publication/b6947ca7-f1f6-11e3-8cd4-01aa75ed71a1/language-en [Checked 21/08/2018].

[6] 'Balanced Approach' as defined in EU Regulation 598-2014 is the process developed by the International Civil Aviation Organization under which the range of available measures, namely the reduction of aircraft noise at source, land-use planning and management, noise abatement operational procedures and operating restrictions, is considered in a consistent way with a view to addressing the noise problem in the most cost-effective way on an airport-by-airport basis;

[7] European Commission (2002). Directive 2002/49/EC Directive Of The European Parliament and of the Council of 25th June 2002 relating to the assessment and management of environmental noise, [online]. Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32002L0049&from=EN [Checked 21/08/2018].

[8] Control of Pollution Act (1974), c.40. [Online]. Available at: http://www.legislation.gov.uk/ukpga/1974/40/pdfs/ukpga_19740040_en.pdf [Checked 21/08/2018].

[9] The Aeroplane Noise Regulations (1999). No. 1452. [online]. Available at: http://www.legislation.gov.uk/uksi/1999/1452/contents/made [Checked 30/08/2018].

[10] The Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations (2003) SI 1986/925. [Online]. Available at: http://www.legislation.gov.uk/uksi/2003/1742/made [Checked 25/09/2018].

[11] Civil Aviation Act (2006), c34. [online]. https://www.legislation.gov.uk/ukpga/2006/34/contents [Checked 30/08/2018].

- *The Civil Aviation Act 2012*[12] placed a new duty on the Civil Aviation Authority (CAA) to make information about the environmental performance of the aviation sector and measures taken to limit adverse environmental effects available to the general public, and;
- *Environmental Noise (England) Regulations 2006 (as amended)*[13] transpose the *European Environmental Noise Directive (Directive 2002/49/EC)*[2] into English law. They require operators of non-designated major civil airports, such as Bristol Airport, to make and submit strategic noise maps to the Secretary of State every five years starting in 2007 which reflect the noise situation in the preceding calendar year. Regulation 18 places a duty on the operators of major airports, as the competent authority, to draw up a Noise Action Plan for places near the airport and submit this to the Secretary of State. There is then a continuing obligation on airport operators to review (and revise, if necessary) the Noise Action Plan every five years or sooner where a major development occurs.
- *The Town and Country Planning (Environmental Impact Assessment) Regulations 2017*[14] set out the process of Environmental Impact Assessments to be carried out in England, in accordance with corresponding European *Directive 2014/52/EU*[15].

7.3.2 Further details of how this legislation relates to noise and vibration is given in **Appendix 7B**.

Planning policy context

7.3.3 There are several policies and guidance at the national and local level that will be relevant to the noise assessment contained in this ES. In addition to policy referenced in **Chapter 5: Legislative and Policy Overview**, policy directly applicable to this noise assessment is listed in **Table 7.2** below.

Table 7.2 Relevant policies and their implications for noise and vibration

Policy reference	Implications
Noise Policy Statement for England (NPSE) 2010[16]	
Paragraph 1.7	Provides the framework for noise management decisions to be made that ensure noise levels do not place an unacceptable burden on society.
Paragraph 2.20	Introduces the concepts of NOEL (No Observed Effect Level), LOAEL (Lowest Observed Adverse Effect Level) and SOAEL (Significant Observed Adverse Effect Level).
National Planning Policy Framework (NPPF) 2018[17]	
Paragraph 180	States that planners should seek to mitigate and minimise potential adverse noise impacts from a new development.

[12] Civil Aviation Act (2012), c19. [Online]. http://www.legislation.gov.uk/ukpga/2012/19/contents/enacted [Checked 30/08/2018].
[13] The Environmental Noise (England) Regulations (2006). No. 2238. [Online]. http://www.legislation.gov.uk/uksi/2006/2238/contents/made [Checked 30/08/2018].
[14] The Town and Country Planning (Environmental Impact Assessment) Regulations 2017. [Online]. Available at: http://www.legislation.gov.uk/uksi/2017/571/pdfs/uksi_20170571_en.pdf [Checked 23/11/2018].
[15] European Commission (2014). Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. [Online]. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0052&from=EN [Checked 23/11/2018].
[16] Defra (2010). Noise Policy Statement for England, [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf [Checked 10/04/2018].
[17] Ministry of Housing, Communities and Local Government (2018). National Planning Policy Framework, [Online]. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf [Checked 08/10/2018].

Policy reference	Implications
Aviation Policy Framework (APF) 2013[1]	
Paragraph 3.12	Defines the Government's objectives and policies on the impacts of aviation in the UK and states that the Government's overall objective on noise is to "Limit and where possible reduce the number of people in the UK significantly affected by aircraft noise".
Paragraph 3.13	Guidance provided on the noise metric used to rate airborne noise (summer $L_{Aeq,16h}$ and $L_{Aeq,8h}$).
Paragraph 3.17	Interpretation given of the 57 dB $L_{Aeq,16h}$ contour as an average level of summer daytime aircraft noise marking the approximate onset of significant community annoyance.
Paragraph 3.36 to 3.38	Government expectations and guidance with respect to noise levels where airport operators are to provide exposed households assistance with the cost of moving and acoustic insulation.
Paragraph 3.39 to 3.41	Government expectations and guidance where households are exposed to increased noise levels due to new developments.
UK Airspace Policy: A framework for balanced decisions on the design and use of airspace 2017 consultation[3]	
Paragraph 9	States that although the Government's current aviation policy is set out in the APF[1], the policies set out within this document provide an update to some of the policies on aviation noise contained within the APF, and should be viewed as the current government policy.
Paragraph 2.39	Removal of the 3 dB minimum change requirement for financial assistance towards acoustic insulation to residential properties in the 63 dB $L_{Aeq,16h}$ level or above.
Paragraph 2.70	A level of 54 dB $L_{Aeq,16h}$ is acknowledged to correspond to the onset of significant community annoyance and replaces the 57 dB $L_{Aeq,16h}$ level in the APF.
Paragraph 2.72	For assessing and comparing noise impacts of airspace changes, LOAEL is taken as 51 dB $L_{Aeq,16h}$ and 45 dB L_{night}, for daytime and night-time noise respectively. 45 dB $L_{Aeq,8h}$ is considered appropriate as the LOAEL for airspace change assessment.
Airports National Policy Statement (NPS)[18]	
Section 2	Sets out the Government's policy on the need for new airport capacity in the South East of England

Technical guidance

7.3.4 A summary of the technical guidance used to assess the likely significant effects of the Proposed Development with respect to noise and vibration is given in **Table 7.3**. Details of technical guidance are given in **Appendix 7B.**

Table 7.3 Technical guidance relevant to noise and vibration

Technical guidance	Relevance to this assessment
General	
WHO *Guidelines for Community Noise*[19]	Sets out noise targets which represent goals for minimising the adverse effects of noise on health.

[18] Department for Transport (2018). Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England. [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714106/airports-nps-new-runway-capacity-and-infrastructure-at-airports-in-the-south-east-of-england-web-version.pdf [Checked 30/08/2018].

[19] Berglund, B. et al (1999). Guidelines for community noise. [Online]. Available at: http://apps.who.int/iris/bitstream/handle/10665/66217/a68672.pdf?sequence=1&isAllowed=y [Checked: 30/08/2018].

Technical guidance	Relevance to this assessment
WHO *Night Noise Guidelines*[20]	Effects on health and sleep from transportation sources.
WHO Environmental Noise Guidelines for the European Region: A Systematic Review on Environmental Noise and Effects on Sleep [21]	Reports the latest findings from the WHO concerning night noise from transportation sources and its effects on health and sleep.
BS8233:2014 *Sound insulation and noise reduction for buildings – Code of practice*[22]	Provides guidance on the control of external noise. The standard presents a number of design ranges for indoor noise levels for different types of space.
Department of Education *BB93*[23]	Gives upper limits for indoor ambient noise level for new and refurbished schools, and schools formed by a material change of use.
Department of Health *HTM 08-1*[24]	Guidance on recommended internal noise levels for healthcare facilities.
Air noise	
IEMA *Guidelines on Environmental Noise Impact Assessment*[25]	Significance rating for a change in air noise level.
Civil Aviation Authority *Survey of Noise Attitudes 2014*[26]	Methods to determine noise annoyance.
Report of a Field Study of Aircraft Noise and Sleep Disturbance[27]	Eligibility threshold for a sound insulation scheme due to night time aircraft noise.
Environmental Noise: Valuing impacts on: sleep disturbance, annoyance, hypertension, productivity and quiet[28]	Percentage of those people likely to be highly sleep disturbed.
Airborne aircraft vibration	

[20] World Health Organisation Europe (2009). Night Noise Guidelines for Europe, [Online]. Available at: http://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf [Checked 7/09/ 2018].
[21] Basner, M. et al. (2018). WHO Environmental Noise Guidelines for the European Region: A Systematic Review on Environmental Noise and Effects on Sleep. Int. J. Environ. Res. Public Health 2018, 15, 519. [Online]. Available at: https://www.mdpi.com/1660-4601/15/3/519 [Checked 25/09/2018].
[22] British Standards Institution (2014). BS 8233:2014 Sound insulation and noise reduction for buildings – Code of practice. [Online]. Available at: https://shop.bsigroup.com/ProductDetail/?pid=000000000302415798_ga=2.85437209.1462736480.1535108011-979344642.1535108011 [Checked: 24 /08/2018].
[23] Department of Education (2015). Acoustic design of schools: performance standards Building bulletin 93, [Online]. Available at: https://www.gov.uk/government/publications/bb93-acoustic-design-of-schools-performance-standards [Checked 24/08/2018].
[24] Department of Health (2013). Specialist Services, Health Technical Memorandum 08-01: Acoustics, [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/144248/HTM_08-01.pdf [Checked 24/08/2018].
[25] Institute of Environmental Management and Assessment (2014). Guidelines on Environmental Noise Impact Assessment. London: IEMA.
[26] Civil Aviation Authority (2017). Survey of noise attitudes 2014: Aircraft, CAP 1506, [Online]. Available at: https://publicapps.caa.co.uk/docs/33/CAP%201506%20FEB17.pdf [Checked 30/08/2018].
[27] Ollerhead, J.B. et al (1992). Report of a Field Study of Aircraft Noise and Sleep Disturbance: A Study Commissioned by the Civil Aviation Policy Directorate of the Department of Transport from the Department of Safety, Environment and Engineering, Civil Aviation Authority. London: HMSO.
[28] Department for Environment Food and Rural Affairs (2014). Environmental Noise: Valuing impacts on: sleep disturbance, annoyance, hypertension, productivity and quiet. [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/380852/environmental-noise-valuing-imapcts-PB14227.pdf [Checked 26/09/2018].

Technical guidance	Relevance to this assessment
Aviation Noise Metric – Research on the Potential Noise Impacts on the Historic Environment by Proposals for Airport Expansion in England[29]	Summarises research into vibration effects from aircraft.
Airports and the Environment[30]	Description of potential vortex damage to buildings due to aircraft.
Ground noise	
National Noise Incidence Study[31]	Percentage of population exposed to noise levels which exceed the guideline for 'serious' community annoyance.
Road traffic noise	
Design Manual for Roads and Bridges[32]	Road traffic noise assessment criteria.
Construction noise and vibration	
BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites. Noise*[33]	Provides methods to predict, measure and assess the impact of construction and demolition noise.
BS 5228-2:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites. Vibration*[34]	Recommends basic methods to control vibration on construction and open sites with significant vibration levels arising from work activities/operations.

7.4 Data gathering methodology

Study area

7.4.1 The study area is based on the largest extent of likely effects due to noise. This area is different for different noise and vibration sources considered.

7.4.2 The largest ZoI considered for the assessment is for air noise. This zone consists of a rectangle that extends 20km to the east, 25km to the west, 4km to the north and 4km to the south of the Bristol Airport runway and is shown in **Figure 7.7**.

7.4.3 The only properties likely to potentially experience significant levels of vibration from airborne aircraft are those closest to aircraft in flight, which are the dwellings bordering Felton Common.

7.4.4 For ground noise the ZoI considered consists of a 6km square centred on the Bristol Airport runway.

[29] Historic England (2014). Aviation Noise Metric – Research on the Potential Noise Impacts on the Historic Environment by Proposals for Airport Expansion in England, [Online]. Available at: https://research.historicengland.org.uk/Report.aspx?i=15740 [Checked 26/11/2018]
[30] Anne Paylor (1994). Airports and the Environment.
[31] BRE (2002). The National Noise Incidence Study 2000/2001 (United Kingdom): Volume 1 – Noise Levels, Client report number 206344f, [Online]. Available at: http://randd.defra.gov.uk/Document.aspx?Document=10280_NIS1206344f.pdf [Checked 7/09/2018].
[32] Highways England (2018). Design Manual for Roads and Bridges, [Online]. Available at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/index.htm [Checked 24/04/ 2018].
[33] British Standards Institution (2008). BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise, [Online]. Available at: https://shop.bsigroup.com/ProductDetail?pid=000000000030258086 [Checked 24/08/2018].
[34] British Standards Institution (2008). BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Vibration, [Online]. Available at: https://shop.bsigroup.com/ProductDetail/?pid=000000000030258089 [Checked 2/10/2018].

7.4.5 For road traffic noise the ZoI considered consists of a rectangle that extends approximately 1km to the east, 2km to the west, 1km to the north and 2km to the south of the Bristol Airport runway. The receptors considered are shown in **Figure 7F.2**.

7.4.6 For construction noise and vibration, the ZoI considered consists of the immediate vicinity of the construction sites. The receptors considered are shown in **Figure 7.2**.

Desk study

7.4.7 An initial desk top study has been undertaken to review the existing airport including Google Earth™ imagery and Ordnance Survey (OS) mapping of the surrounding environment to determine the context of the proposal. The desk top study identified the main scope of the noise surveys undertaken to assess the existing environment and the location of the closest noise sensitive receptors to the proposed operations for the impact assessment. Dwelling data and data regarding noise sensitive community buildings has been acquired from the sources listed below. A summary of the organisations that have supplied data, together with the dates the data was supplied and the nature of that data is as follows:

- National Air Traffic Services – June 2018:
  - Geographical information about the location and height of the runway have been taken from the latest version of the UK Aeronautical Information Package (AIP) for Bristol Airport.
- OS – May 2018:
  - Local topography based on the OS Landform Panorama Digital Terrain Model (DTM) product processed for use in the air noise modelling software;
  - 1:50,000 base map; and
  - AddressBase Plus product to identify non-residential property types.
- BAL – May to October 2018:
  - Current and future aircraft types and movement information, arrival and departure flight tracks;
  - Current (2017) and forecast (2026) road traffic numbers; and
  - Construction noise information.
- CACI Ltd – October 2017:
  - Dwelling counts and populations.

Survey work

7.4.8 The noise climate around Bristol Airport includes noise from aircraft activity, as well as non-aircraft related activities. The baseline at any given location will depend on its proximity to Bristol Airport and aircraft flight paths as well as to major or minor roads and any other local noise sources. The A38 in particular is a major contributor to the baseline noise environment close to Bristol Airport, with the M5 and A370 also contributing significantly to the noise environment to the west of Bristol Airport. Some noise is also produced by traffic on minor roads, for example Downside Road, alongside departing and arriving aircraft at Bristol Airport and aircraft activity on the ground.

7.4.9 Noise monitoring locations have been selected to obtain representative ambient and background noise levels at those noise sensitive receptor locations close to Bristol Airport, that is, at receptors most at risk of being affected by aircraft operations from the development of Bristol Airport.

7.4.10 Details of the noise survey work is given in **Appendix 7C** and a summary is presented in this section.

Long-term noise monitoring

7.4.11 Day and night-time noise surveys were undertaken at four locations around Bristol Airport to establish the baseline noise environment. The locations are representative of the communities in closest proximity to Bristol Airport, which therefore are likely to experience the greatest noise effect from Bristol Airport operations.

7.4.12 The surveys were carried out during the period 13 March 2018 to 5 April 2018, where each survey lasted at least three weeks. Each noise survey comprised unattended, free-field and continuous monitoring of 5-minute periods. Observations were made at each monitoring location of the noise climate prevailing at the time that measurements were started.

7.4.13 Noise levels have been measured in terms of $L_{Aeq,T}$, which represents the average noise level, and L_{AF90}, which represents the background noise level, for the 16 hour day (07:00 to 23:00), 12 hour day (07:00 to 19:00) and 8 hour night (23:00 – 07:00) periods.

7.4.14 Details of the long-term noise monitoring locations are given in **Table 7.4** and are shown in **Figure 7C.1**.

Table 7.4 Long-term noise monitoring locations

Receptor	Location	Dates of noise survey
A	Cooks Bridle Path, Downside	14 March 2018 to 4 April 2018
B	Downside Road, Lulsgate Bottom	13 March 2018 to 5 April 2018
C	School Lane, Lulsgate Bottom	13 March 2018 to 3 April 2018
D	Red Hill (A38), Redhill	14 March 2018 to 5 April 2018

Ground noise monitoring

7.4.15 A daytime attended noise survey was undertaken at Bristol Airport on 26 July 2018 to measure the ground noise of taxiing arriving and departing aircraft.

7.4.16 Measurements were free-field, of 10 second duration and recorded in terms of $L_{Aeq,T}$, SEL and L_{AFmax}, with observations made of the aircraft type at each time.

7.4.17 The ground noise monitoring location was at the corner of Winters Lane to the north of the runway and is shown in **Figure 7C.2**.

Road traffic noise monitoring

7.4.18 A daytime attended noise survey was undertaken at Bristol Airport on 26 July 2018 to measure road traffic noise at four locations around Bristol Airport. The locations are representative of the communities in closest proximity to the roads affected by Bristol Airport, which therefore are likely to experience the greatest change in road traffic noise from Bristol Airport operations.

7.4.19 The principles of the Department of Transport's *Calculation of Road Traffic Noise*[35] (*CRTN*) shortened measurement method were used, with three measurements of 5-minute duration taken

[35] Department of Transport (1988). Calculation of Road Traffic Noise. Department of Transport Welsh Office. London: HMSO.

in three consecutive hours at each location. Values of $L_{A10,T}$ were obtained at each location, along with other environmental noise indices including $L_{Aeq,T}$, $L_{A90,T}$ and L_{AFmax}.

7.4.20 Details of the road traffic noise monitoring locations are given in **Table 7.5** and are shown in **Figure 7C.2**.

Table 7.5 Road traffic noise monitoring locations

Receptor	Location
R1	Downside Road
R2	A38 / Downside Road intersection
R3	A38 / North Side Road roundabout
R4	A38 / road to Old Barn Lane intersection

7.5 Overall baseline

Noise

7.5.1 The locations at which the baseline noise conditions have been assessed are shown in **Figure 7C.1** and **Figure 7C.2.** The results are summarised in **Table 7.6**, **Table 7.7** and **Table 7.8** for these locations in terms of the ambient noise level (L_{Aeq}), maximum noise level (L_{AFmax}) and background noise level (L_{A90}). Detailed results are given in **Appendix 7C.**

7.5.2 As well as airborne and ground-borne noise from Bristol Airport, the surrounding community is affected by noise from the local road network.

7.5.3 All noise sources affect the L_{Aeq} metric which, commonly used to denote the ambient noise level, signifies the single steady average noise exposure level which is equivalent in energy terms to that produced by the various fluctuating noise levels that occur in the given measurement period. The L_{AFmax} metric is the peak noise level recorded during the measurement period. The L_{A90} metric denotes the level of noise which is exceeded for 90% of the time and represents the prevailing background noise level in the absence of any noise from airborne aircraft.

Table 7.6 Current baseline noise measurements – long -term summary

Location	16-hour day (07:00 to 23:00)		8-hour night (23:00 to 07:00)		Dominant daytime noise source
	L_{Aeq} dB(A)	Average $L_{AF90,5m}$ dB(A)	L_{Aeq} dB(A)	Average $L_{AF90,5m}$ dB(A)	
A Cooks Bridle Path, Downside	53	38	49	37	Aircraft
B Downside Road, Lulsgate Bottom	58	49	54	47	Aircraft
C School Lane, Lulsgate Bottom	59	47	54	42	Aircraft
D Red Hill (A38), Redhill	50	42	47	37	Road traffic

Table 7.7 Current baseline noise measurements – ground noise summary

Location	Average $L_{Aeq,10s}$ dB(A)	Average SEL dB(A)	Average L_{AFmax} dB(A)	Dominant noise source
G1 Winter's Lane (corner N of Runway)	82	92	84	Aircraft taxiing

Table 7.8 Current baseline noise measurements – road traffic noise summary

Location	$L_{Aeq,15m}$ dB(A)	L_{A10} dB(A)	L_{A90} dB(A)	L_{AFmax} dB(A)	Dominant noise source
R1 Downside Road	69	71 – 73	42 – 47	87 – 92	Road traffic
R2 A38 / Downside Road intersection	75	78 – 79	63 – 65	86 – 89	Road traffic
R3 A38 / North Side Road roundabout	69	69 – 71	59 – 60	82 – 89	Road traffic
R4 A38 / road to Old Barn Lane intersection	72	75 – 77	47 – 52	83 – 86	Road traffic

7.5.4 **Table 7.6** indicates that the general ambient noise level around Bristol Airport is in the range of 50 to 59 dB L_{Aeq} during the daytime, with an underlying background noise level in the range 38 to 49 dB L_{A90}. During the night, ambient noise levels are lower and lie in the range 47 to 54 dB L_{Aeq}, with an underlying background noise level in the range 37 to 47 dB L_{A90}.

7.5.5 The noise environment at any given location in the immediate vicinity of Bristol Airport depends on its proximity to Bristol Airport and the A38. The A38 generates a consistent and steady noise around the area and is a contributor to the background noise level. Superimposed on this are departing and arriving aircraft at Bristol Airport, along with noise from aircraft activity on the ground.

Vibration

7.5.6 The baseline vibration conditions for most dwellings in the vicinity of Bristol Airport are generally dictated by local road traffic conditions. For dwellings along major roads, there is potential for perceptible vibration levels to be produced by passing heavy vehicles such as buses and Heavy Goods Vehicles (HGVs). For dwellings located away from busy roads, vibration levels will be low and the occupants are unlikely to be aware of any vibration within their premises from outside sources.

7.5.7 Dwellings that are situated close to Bristol Airport and are in line with the runway have the potential to experience perceptible vibration due to airborne aircraft. Some dwellings bordering Felton Common to the east of the runway fall into this category.

7.6 Consultation

7.6.1 North Somerset Council (NSC) have been consulted regarding the methodology of the assessment. BAL met with NSC on 11 October and 23 October 2018. **Table 7.9** provides a summary of the points raised by NSC and the responses given.

Table 7.9 Summary of issues raised during consultation regarding noise and vibration

Issue raised	Consultee(s)	Response and how considered in this chapter	Section Ref
NSC highlighted that while the scoping report referred to most relevant policies at both a local and national level, some were missing	NSC	Additional local and national policies referred to in final ES chapter.	**Section 7.3, Appendix 7B**
NSC noted that BAL 'do not intend to increase the number of 'night-time' flights per annum, which is limited to 4,000, but they do wish to include greater flexibility to their distribution, which is restricted to 3,000 in the summer time and 1,000 in the winter time. If this leads to a higher concentration of night-time flights in the summer season, which is when more residents may choose to sleep with windows open, the potential impacts on sleep disturbance and human health should be examined.'	NSC	The assessment of 12 mppa has assumed that the 3,000-summer restriction is lifted (but 4,000 annual remains). The comparisons to 12 mppa are therefore worst-case comparisons as the combined effect of both the increase in movements and relaxation of summer restriction is assessed.	**Section 7.10 and Section 7.11**
NSC requested a simplified version of the ES chapter on noise be prepared that can be used to engage with local communities	NSC	A summary version of the ES chapter on noise will be prepared following issue of the ES that can be used to engage with local communities. Bristol Airport has prepared a fact sheet for this purpose.	**n/a**
NSC wish to understand changes in aircraft fleet and modernisation between the 10 mppa and 12 mppa scenarios particularly with respect to past aircraft type adoption	NSC	Changes in aircraft fleet and modernisation between the 10 mppa and 12 mppa scenarios particularly with respect to past aircraft type adoption are given explicitly in **Appendix 7D**.	**Appendix 7D**
NSC requested an explanation for Significant Observed Adverse Effect Level (SOAEL) is provided	NSC	Request was based on summary report (Summary Findings of ES Air Noise Assessment 10.10.18) provided to NSC which did not include a definition of SOAEL. SOAEL is defined in this chapter and associated appendices.	**Section 7.9, Appendix 7B**
NSC raised a concern about noise due to car parking activities (such as doors slamming)	NSC	Assessment of noise due to car parking activities is included in **Appendix 7F**.	**Appendix 7F**

Issue raised	Consultee(s)	Response and how considered in this chapter	Section Ref
at unwelcome hours due to increased car parking capacity			
NSC requested that changes in road traffic noise levels at Defra-defined Noise Important Areas are presented	NSC	Changes in noise level at Noise Important Areas have been included in **Appendix 7F**.	**Appendix 7F**

7.7 Scope of the assessment

Assessment activities

Air noise and vibration

7.7.1 Air noise contours have been prepared in terms of the usual UK noise indicator for daytime airborne noise, the $L_{Aeq,16h}$ index, and for night-time airborne noise, the $L_{Aeq,8h}$ index, using the *Federal Aviation Administration (FAA) Aviation Environmental Design Tool (AEDT)*[36].

7.7.2 Consideration has been given to other sources of aircraft performance data, such as those available from the Civil Aviation Authority (CAA) on the performance of future aircraft types, as well as aircraft performance information relating to operations of relevant aircraft types. In this assessment, this has included the Airbus A320neo and A321neo, and also the Boeing B738MAX aircraft.

7.7.3 The likelihood of vibration effects due to airborne aircraft have been assessed for the dwellings bordering Felton Common.

Ground noise

7.7.4 A ground noise assessment has been undertaken for the area around Bristol Airport where aircraft ground operations, such as engine running on stands and at hold positions, taxiing, manoeuvring and the operation of auxiliary power units (APUs) while on stands, will give rise to the greatest potential noise effects.

7.7.5 Ground noise contours have been prepared in terms of the daytime $L_{Aeq,16h}$ index and the night-time $L_{Aeq,8h}$ index using Datakustik CadnaA[37] noise modelling software.

7.7.6 Consideration has been given to survey work of aircraft ground operations, both at Bristol Airport and at other airports where similar aircraft types operate.

Road traffic noise

7.7.7 Road traffic noise calculations at representative noise sensitive receptors have been undertaken using the UK recognised method of assessment set out in CRTN[35].

7.7.8 Road traffic noise contours have been prepared in terms of the $L_{A10,18h}$ index using Datakustik CadnaA[37] noise modelling software.

Construction noise and vibration

7.7.9 The construction plant noise emission details as set out in tables within BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites*[33] (BS 5228-1) along with the associated described methodologies have been used to assess and predict construction noise for different phases of the Proposed Development at key noise sensitive receptors.

7.7.10 For the vibration assessment, information from BS 5228-2:2009+A1:2014[34] (BS 5228-2) has been used where relevant to predict vibration levels at key noise and vibration sensitive receptors.

[36] Federal Aviation Administration (2017). Aviation Environmental Design Tool (AEDT) Version 2d, [Online]. Available at: https://aedt.faa.gov/2d_information.aspx [Checked 28/08/2018].
[37] DataKustik GmbH (2018). CadnaA - State-of-the-art Noise Prediction Software 2017 Version, [Online]. Available at: https://www.datakustik.com/en/products/cadnaa/ [Checked 1/10/2018].

Spatial scope

7.7.11 The spatial scope of the assessment application site together with the Zones of Influence (ZoI) that have formed the basis of the study area is described in **Section 7.4**.

7.7.12 The largest ZoI considered for the assessment is for air noise. This zone consists of a rectangle that extends 20km to the east, 25km to the west, 4km to the north and 4km to the south of the Bristol Airport runway and is shown in **Figure 7.7**.

Temporal scope

7.7.13 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 (2019-2026) and operational periods (2017, 2021 and 2026). The air, ground and road traffic noise assessments consider the following scenarios:

- Baseline year (2017);
- 10 mppa in 2021 (air noise only). This aircraft mix and number of movements corresponds to Bristol Airport reaching its current passenger limit;
- 12 mppa. This aircraft mix and number of movements corresponds to implementation of the Proposed Development in 2026; and
- 10 mppa in 2026. This aircraft mix and number of movements corresponds to the 10 mppa in 2021 scenario but assumes that aircraft modernisation occurs at the same rate as under the 12 mppa scenario. For the air noise assessment this is regarded as a sensitivity case as there is significant uncertainty regarding how much additional aircraft modernisation would occur beyond 2021 in the event that the Proposed Development is not implemented (refer to paragraph 7.1.25). For ground and road traffic noise aircraft modernisation does not affect the assessment.

Potential receptors

7.7.14 Potential noise receptors considered include dwellings as well as non-residential receptors, as follows:

- Residential receptors;
- Schools;
- Hospitals or residential healthcare facilities;
- Places of worship, and;
- Amenity areas.

Residential receptors

7.7.15 For the purposes of dwelling and population counts for air noise, the residential receptors have been identified using a 2017 dataset supplied by CACI Ltd. This data consists of dwelling count and population by postcode. CACI derive this data from the latest available census information and adjust it to account for developments that have been built out since the latest census.

7.7.16 For the purposes of dwelling counts for ground noise, the residential receptors have been identified using the OS AddressBase Plus product, which provides details of individual dwellings.

7.7.17 For the purposes of dwelling counts for road traffic noise, representative residential receptors have been identified from details of the location and layout of buildings around Bristol Airport supplied by BAL, and from the inspection of maps of the area.

7.7.18 Specific residential receptors used for the air noise assessment are given in **Table 7.10**. Similarly, **Table 7.11** gives the specific residential receptors used for the ground noise and construction noise assessments. These are shown in **Figure 7.1** and **Figure 7.2**. These receptors have been chosen as representative of the local communities most sensitive to noise effects from the Proposed Development.

Table 7.10 Specific residential receptors – air noise

Number	Air noise residential receptor
1	Henley Park, Yatton
2	Bishops Road, Cleeve
3	Fountain Treeworks, Brockley
4	Cooks Bridle Path, Downside
5	Downside Road, Downside
6	School Lane, Lulsgate Bottom
7	Hillview Gardens, Felton
8	Market Place, Winford
9	Chew Magna, North Wick
10	Church Road, Norton Malreward
11	Lye Mead, Winford
12	Red Hill, Redhill
13	Wrington Hill, Wrington
14	Southlands Way, Congresbury

Table 7.11 Specific residential receptors – general

Designator	Ground and construction residential receptor
A	Cooks Bridle Path, Downside
B	Downside Road (West), Lulsgate Bottom
C	School Lane, Lulsgate Bottom
D	Red Hill (A38) (North), Redhill
E	Winters Lane (South), Redhill
F	Downside Road (South), Downside
G	Downside Road (North), Downside

Designator	Ground and construction residential receptor
H	Downside Road (East), Lulsgate Bottom
I	Bridgwater Road (A38), Lulsgate Bottom
J	Red Hill (A38) (South), Redhill
K	Winters Lane (North), Redhill

Non-residential receptors

7.7.19 Specific non-residential receptors used for the air noise and ground noise assessments are given in **Table 7.12**, **Table 7.13** and **Table 7.14** for schools, places of worship and amenity areas respectively. These are shown in **Figure 7.3**, **Figure 7.4**, and **Figure 7.5** respectively. No hospitals or residential healthcare facilities were identified within the study area.

Table 7.12 Specific non-residential receptors – schools

Designator	Non-residential receptor - school
S1	Winford Primary, Winford
S2	St. Andrew's Primary, Congresbury
S3	Yatton Junior, Yatton
S4	Marksbury Primary, Marksbury
S5	St. Anne's Primary, Hewish
S6	Chew Magna Primary, Chew Magna
S7	Wrington Primary, Wrington
S8	Court de Wyck Primary, Cleeve
S9	Pensford Primary, Pensford
S10	Dundry Primary, Dundry
S11	Stanton Drew Primary, Stanton Drew
S12	Woodspring School, Weston-Super-Mare

Table 7.13 Specific non-residential receptors – places of worship

Designator	Non-residential receptor place of worship
W1	St. Thomas A Becket's Church, Pensford
W2	Marksbury Methodist Church, Marksbury
W3	St. Barnabas Church, Claverham
W4	St. Dunstan And St Anthony Church, Claverham
W5	Chew Magna Baptist Church, Chew Magna

Designator	Non-residential receptor place of worship
W6	Sacred Heart Church, Chew Magna
W7	All Saints Church, Publow
W8	St. James Church, Regil
W9	Holy Trinity Church, Cleeve
W10	St. Margaret's Church, Queen Charlton
W11	St. Mary and St Peters Church, Winford
W12	St. Mary's Church, Compton Dando
W13	Congresbury Methodist Church, Congresbury
W14	Chewton Keynsham Church, Chewton Keynsham
W15	Dundry Baptist Church, Dundry
W16	St. Nicholas Church, Brockley
W17	St. Andrews Church of England, Hartcliffe
W18	Wrington United Reformed Church, Wrington
W19	Holy Saviour's Church, Hewish
W20	Yatton Methodist Church, Yatton
W21	St. Andrews Church, Congresbury
W22	Holy Trinity Church, Norton Malreward
W23	St. Katherine's Church, Felton
W24	All Saints Church, Wrington
W25	All Saints Church, Kingston Seymour
W26	Claverham Free Church, Claverham
W27	The Church of Saint Mary The Virgin, Yatton
W28	Christ Church, Redhill
W29	St. Michael, Dundry
W30	Gospel Hall - Pensford Gospel Church, Pensford
W31	St. Michael's Church, Burnett
W32	St. Mary's Church, Stanton Drew
W33	St. Andrew's Church, Chew Magna
W34	Winford Baptist Chapel, Winford
W35	Horsecastle Chapel, Yatton

Table 7.14 Specific non-residential receptors – amenity areas

Designator	Non-residential receptor amenity area
A1	The Glebe Field, Wrington
A2	Yatton Village Green, Yatton
A3	Glebelands Gardens, Yatton
A4	Bishport Avenue Open Space, Hartcliffe
A5	Streamcross Playing Field, Claverham
A6	Crosscombe Walk Open Space, Hartcliffe
A7	Court Farm Road Open Space, Whitchurch
A8	Cadbury Hill, Yatton
A9	Vee Lane Play Area, Felton
A10	Manor Road Playing Field, Keynsham
A11	Marksbury Playground, Marksbury
A12	Chew Magna Playing Field, Chew Magna
A13	Orchid Drive Play Area, Keynsham
A14	Publow Lane Recreation Ground, Publow
A15	The Mead Play Area, Keynsham
A16	Hamilton Way Play Area, Whitchurch
A17	Congresbury Millennium Green, Congresbury
A18	Hangstones Playing Field, Yatton
A19	Rock Road Playing Field, Yatton
A20	Land at Saxon Court, St. Georges
A21	Holmoak Road Playing Field, Keynsham
A22	Chalfield Close Play Area, Keynsham
A23	Whitchurch Playground, Whitchurch
A24	Felton Common, Felton

Likely significant effects

7.7.20 The noise and vibration receptors that have been taken forward for assessment are summarised in **Table 7.15,** along with the potential likely significant effects that might arise as a result of the Proposed Development.

Table 7.15 Noise receptors scoped in for further assessment

Receptor	Relevant assessment criteria	Likely significant effects
Air noise		
Residential	NPPF[17], NPSE[16], APF[1], SoNA201420[26], WHO[19 20 21]	People exposed to significant air noise could experience worsening conditions, or new people become similarly exposed.
Schools	BB93[23]	Communication and learning could be affected adversely by any increase in air noise.
Places of Worship	As Residential	Increased risk of disturbance to people and activities.
Amenity Areas	BS 8223[22], WHO[19]	Increased risk of disturbance to people and activities.
Airborne aircraft vibration		
Residential	Historic England[29]	Perceptible vibration e.g. windows rattling.
Ground noise		
Residential	WHO[19]	People exposed to significant ground noise could experience worsening conditions, or new people become similarly exposed.
Schools	BB93[23]	Communication and learning could be affected adversely by any increase in ground noise.
Places of Worship	n/a	Increased risk of disturbance to people and activities.
Amenity Areas	BS 8223[22], WHO[19]	Increased risk of disturbance to people and activities.
Road traffic noise		
All Receptors	*Noise Insulation Regulations*[38 39], BS 8233[22]	People exposed to significant road traffic noise could experience worsening conditions, or new people become similarly exposed.
Construction noise and vibration		
All Receptors	BS 5228[33 34]	People could become exposed to significant construction noise levels, over a relatively prolonged period.

7.8 Environmental measures embedded into the development proposals

7.8.1 A range of environmental measures have been embedded into the development proposals as outlined in **Section 2.3**. **Table 7.16** outlines how these embedded measures will influence the noise and vibration assessment. A detailed account of the embedded mitigation through existing noise controls and mitigation procedures in place at Bristol Airport is also described.

[38] The Noise Insulation Regulations (1975). No. 1736. [online]. Available at: http://www.legislation.gov.uk/uksi/1975/1763/contents/made [Checked 4/10/2018].
[39] The Noise Insulation (Amendment) Regulations (1988). No. 2000. [online]. Available at: https://www.legislation.gov.uk/uksi/1988/2000/contents/made [Checked 4/10/2018].

7.8.2 In general, these controls and procedures are in place and have therefore been accounted for in the assessment. The exception is the noise insulation grants. These grants allow homeowners to reduce the noise levels inside dwellings as they provide funds towards the cost of noise insulation works. However, as the convention for aircraft noise assessment is to assess it in terms of the external noise levels, this mitigation is not accounted for in the assessment.

Table 7.16 Summary of the embedded environmental measures

Receptor	Changes and effects	Embedded measures
Dwellings exposed to ground noise to the north of Bristol Airport	Aircraft movements will increase with potentially a consequential increase in ground noise exposure.	As part of the Proposed Development, a new walkway will be constructed to the north of the existing eastern apron. This will offer screening from ground noise for receptors to the north of this location, in particular those on Downside Road.

Bristol Airport – existing planning controls

7.8.3 Bristol Airport has operated for many years under a number of planning consents and as such is already subject to planning controls and voluntary agreements relating to those consents as well as its own sustainability and noise management policies.

7.8.4 Most recently planning permission was granted in February 2011 for expansion of Bristol Airport to handle 10 mppa[40]. The current Section 106 Agreement includes planning obligations relating to the management and control of air and ground noise through the implementation of a noise control scheme and adoption of operational procedures and practices aimed at achieving ongoing improvements.

7.8.5 These are each briefly described in the following section and are given in detail in Bristol Airport's current *Noise Action Plan*[41].

7.8.6 A planning obligation required the establishment of an Airport Environmental Improvement Fund[42], the purposes of which includes the funding of initiatives to mitigate the impact of aircraft and ground noise in the local community. Bristol Airport paid an initial sum of £100,000 into the fund in 2012 with further annual payments exceeding £100,000 and increasing in line with the annual percentage increase in passenger numbers.

Air noise

7.8.7 Air noise is currently limited by a condition which states that the area enclosed by the 57 dB $L_{Aeq,16h}$ (07:00 to 23:00) summer noise contour shall not exceed 12.42km^2 using the standardised average mode (Planning condition 30).

7.8.8 Residential properties located within this 57 dB $L_{Aeq,16h}$ contour (which did not previously qualify for noise insulation in the A38 Diversion Scheme) are eligible for a grant under the noise insulation grant scheme (Planning condition 31). This grant scheme is on the same basis as the previous A38 Diversion Scheme and is described in more detail in paragraph 7.8.25.

[40] North Somerset Council (2011). Planning permission 09/P/1020/OT2, [Online]. Available at: https://planning.n-somerset.gov.uk/online-applications/ [Checked 6/09/2018].
[41] Bristol Airport (2014). Noise Action Plan 2014 to 2018, [Online]. Available at https://www.bristolairport.co.uk/~/media/files/brs/about-us/nap-14_18.ashx?la=en [Checked 27/04/2018].
[42] Bristol Airport (2018). Airport Environmental Improvement Fund, Guidelines for applying for a grant for noise insulation, [Online]. Available at: https://www.bristolairport.co.uk/~/media/files/brs/about-us/community/guidelines-2018_final.ashx?la=en [Checked 5/10/2018].

Ground noise

7.8.9 Bristol Airport has procedures in place to limit the use of Auxiliary Power Units (APUs).

7.8.10 These include requirements for the installation and availability of Fixed Electrical Ground Power (FEGP) before the use of stands for live aircraft movements (Planning condition 32) and for FEGP to be used in preference to APUs (Planning condition 33) on areas cited in these conditions.

7.8.11 Mobile diesel ground power generators and aircraft APUs cannot be used on stands 38 and 39 (Planning condition 34). As part of the application, a variation to this condition is proposed so that it only applies between the hours of 23:00 and 06:00 as per stands 34 to 37.

7.8.12 APUs cannot be used on stands 34 to 37 between the hours of 23:00 and 06:00 (Planning condition 35).

7.8.13 Planning conditions 4, 5 and 69 require the erection of 3m to 5m high noise attenuation walls around the western and eastern apron extensions, and a timber fence around the northern boundary of the north side car park.

Night flying

7.8.14 A night noise Quota Count (QC) limit is used to restrict night flying (Planning condition 36). This assigns each aircraft operation a QC score based on how loud they are. The noise classification of an aircraft is set out in a formal notice published by NATS on a regular basis.

7.8.15 The current annual quota is 2,160 points, with 1,260 points allocated for the summer season (approximately seven months, defined as the period from late March to late October when British Summer Time is in effect) and 900 points allocated for the winter season.

7.8.16 Bristol Airport reports the use of the quota at the end of every season to the Airport Consultative Committee and publishes it on Bristol Airport's website.

7.8.17 The number of take-offs and landings between 23:30 and 06:00 are limited to 3,000 in the summer season and 1,000 in the winter season (Planning condition 38). As part of the application Bristol Airport is seeking to amend this condition to a limit of 4,000 for two adjoining seasons.

7.8.18 The total number of take-offs and landings between 06:00 and 07:00 and between 23:00 and 23:30 are limited to 10,500 in any calendar year (Planning condition 39).

Noise monitoring

7.8.19 Aircraft noise is continually measured using noise monitors located at each end of the runway, near Felton and Congresbury. These monitors are positioned in accordance with ICAO standards for monitoring noise from aircraft arriving and departing using runway 27.

7.8.20 The Felton monitor is therefore located 2,289m from the touchdown point for arriving aircraft using runway 27 and the Congresbury monitor is 6,500m from the start of roll point for departing aircraft using runway 27.

7.8.21 A further monitor is located at Littleton Hill, 6,500m from the start of roll point for departing aircraft using runway 09.

7.8.22 A portable noise monitor can be used to record noise at specific locations in response to queries from the local community. Mobile noise monitoring has occurred at over 12 sites during 2018 including Felton, Congresbury, Winford, Wrington and Cleeve at the time of writing.

7.8.23 The monitoring system, known as the Aircraft Noise Operation Management System (ANOMS) also takes radar data from air traffic control (ATC) enabling the aircraft track to be recorded and compared with the published routes.

7.8.24 Processed data from the noise monitors are published annually in Bristol Airport's *Operations Monitoring Report* [43] which provides a year by year comparison of noise results.

Noise insulation grants

7.8.25 As part of the Bristol Airport Environmental Improvement Fund, grants are available from Bristol Airport to cover some or all of the costs of new glazing and ventilators for properties most closely overflown and impacted by noise from Bristol Airport flights. Depending on location a property could be eligible for a grant of 100% (up to a maximum of £5,000) or 50% (up to a maximum of £2,500).

7.8.26 Eligible properties are within the 63 dB, 60 dB and 57 dB noise contours. If a property is within the 63 dB contour, the grant can cover 100% of new double glazed windows or ventilators up to a sum of £5,000. If a property is within the 60 dB and 57 dB contours, the grant can cover 50% of new double-glazed windows or ventilators up to a sum of £2,500.

7.8.27 As there is a limit of annual funding grant applications are prioritised according to categories based on the contour the property is in, and whether it has had a grant before. Should the fund be oversubscribed in any one category, priority is given to those living closest to the extended centreline of the runway i.e. those closest to overflying aircraft.

Bristol Airport – noise abatement procedures

7.8.28 Details of opening hours and noise abatement procedures are given in the latest version of the UK Aeronautical Information Package (AIP) for Bristol Airport[44].

7.8.29 Bristol Airport offers a continuous day and night service. Prior permission is required for take offs and landings between 23:00 and 07:00 (22:00 and 06:00 BST). A night surcharge applies to all landings between 22:00 and 07:00 (21:00 to 06:00 BST).

7.8.30 The following procedures are followed to minimise the noise impact of departing and arriving aircraft around Bristol Airport unless otherwise instructed by ATC:

- Operators of all aircraft using Bristol Airport are to ensure that their aircraft conform to the noise abatement techniques laid down for the type of aircraft and that operations are conducted in a manner calculated to cause the least disturbance practicable in areas surrounding Bristol Airport; and
- When operating Instrument Flight Rules (IFR), any aircraft carrying out a visual approach must not join the final approach track at an altitude of less than 2,200ft (QNH[45]).

[43] Bristol Airport (2017). 2017 Operations Monitoring Report, [online]. Available at https://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwjb-r7GgZDdAhUEElAKHevOC5cQFjAAegQIABAC&url=https%3A%2F%2Fwww.bristolairport.co.uk%2F~%2Fmedia%2Ffiles%2Fbrs%2Fabout-us%2Fenvironment%2F2017-operations-monitoring-report.ashx%3Fla%3Den&usg=AOvVaw08RjZl1qAodXxwf_UpeuOC [Checked 28/08/2018]. (Use the airport website link please: https://www.bristolairport.co.uk/about-us/environment/sustainability

[44] National Air Traffic Services (2017). IAIP Bristol – EGGD Textual data and Charts related to the Airport, [Online]. Available at: http://www.nats-uk.ead-it.com/public/index.php%3Foption=com_content&task=blogcategory&id=36&Itemid=85.html [Checked 28/08/2018].

[45] QNH is a code indicating the atmospheric pressure adjusted to mean sea level. An altitude given in terms of QNH is the altitude above mean sea level, measured using atmospheric pressure.

7.8.31 Aircraft using the Instrument Landing System (ILS) in Instrument or Visual Meteorological Conditions (IMC or VMC) shall not descend below the altitude specified above before intercepting the glide path nor thereafter fly below it. Aircraft approaching without assistance from ILS or radar shall follow a descent path which will not result in its being at any time lower than the approach path which would be followed by an aircraft using the ILS glide path.

7.8.32 The Noise Preferential Routeings (NPR) given in **Table 7.17** are compatible with ATC requirements and shall apply in both VMC and IMC. The tracks are to be flown by all departing aircraft of more than 5,700kg maximum certified weight, unless otherwise instructed by ATC or unless deviations are required in the interests of safety.

7.8.33 The NPRs are incorporated in the ATC Standard Instrument Departure procedures (SIDs).

Table 7.17 Noise Preferential Routeings (NPRs)

Take-off runway	Details
09	Climb straight ahead to I-BON 4.7 nm DME to be no lower than 3000ft QNH at this point before commencing the turn
27	Climb straight ahead to I-BTS 4.5 nm DME to be no lower than 3000ft QNH at this point before commencing the turn.

7.8.34 The obligations of NPRs cease when an altitude of 4,000ft QNH or above has been reached.

7.8.35 Subject to ATC instructions, inbound aircraft are to maintain as high an altitude as practical and adopt a continuous descent profile, when appropriate.

7.8.36 Every aircraft using Bristol Airport shall, after take-off or 'go around' be operated in the quietest possible manner.

7.8.37 Pilots and engineers should restrict the use of Auxiliary Power Units (APU) to the minimum time necessary. Between 23:30 to 05:59 (22:30 to 04:59 BST) except when immediately prior to departure, APUs may only be run subject to approval from Airside Operations.

7.8.38 In order to avoid overflying Felton Village, when departing runway 09 and requiring to turn left, all aircraft shall climb ahead to 1nm DME before commencing the left turn.

7.8.39 Noise abatement procedures for light aircraft are given in

7.8.40 **Table** 7.18.

Table 7.18 Noise abatement procedures for light aircraft

Take-off runway	Details
09	(1) Practice engine failures after take-off by single-engine aircraft are not permitted. (2) Circuit direction is normally right hand only. However, ATC may require non-standard circuit direction for traffic integration.
27	(1) All pilots should arrange their flight so as to minimise noise nuisance. (2) Circuit direction is normally left hand.

7.9 Assessment methodology

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

7.9.2 The general assessment methodology involves the following:

- Derivation of assessment criteria for each type of noise source;
- Computation of existing and future noise levels under the various scenarios;
- Assessment of magnitude of impacts (absolute) on residential and non-residential receptors, for each scenario;
- Determination of the change in noise levels, and associated impacts (relative) as a result of the introduction of the Proposed Development;
- Consideration of the likely significant effects of changes in noise levels from Without to With Proposed Development;
- Description of the potential effects (beneficial and adverse) associated with the Proposed Development; and
- Description of any mitigation measures, where appropriate, in relation to the Proposed Development and describe any residual effects.

7.9.3 While the technical assessment methodology adopted for a given source of noise is generally unique (each of which is described in the relevant section later in this chapter), there are some common concepts that apply across all noise topics based on Government guidance through the Noise Policy Statement for England (NPSE)[16].

7.9.4 The Government, through the NPSE, and the introduction of the Significant Observed Adverse Effect Level (SOAEL), has presented the concept of significance thresholds to rate health effects and quality of life. It is generally accepted that "significance" in this context differs from that used in an ES. This is because it refers to the significance of the absolute noise level, whereas an ES assesses the significance of the proposed change. For example, a receptor may be exposed to significant levels of noise regardless of any development, but if the noise level remains the same then the receptor would not be said to be significantly impacted by the development.

7.9.5 The thresholds for assessing health effects and quality of life are important, particularly when considering and comparing different scenarios as well as establishing the need for and extent of

noise mitigation. The NPSE introduces the concept of the NOEL (No Observed Adverse Effect Level), LOAEL (Lowest Observed Adverse Effect Level), and SOAEL. The National Planning Policy Guidance also introduces the concept of the UAEL (Unacceptable Adverse Effect Level). It is appropriate to consider what level of noise at Bristol Airport might be attributed to these levels, in light of emerging guidance on the effects of noise on health and also Government guidance.

7.9.6 The NOEL, LOAEL, SOAEL and UAEL can vary depending on the source, receptor, and time period (e.g. day or night), and in this way the sensitivity of the receptor is embedded into the criteria. For example, the SOAEL for a dwelling at night will be lower than during the day, to reflect the fact that dwellings are more sensitive to noise at night.

7.9.7 The technical guidance, summarised in **Table 7.3** and described in detail in **Appendix 7B**, has been used to develop noise and vibration assessment criteria and also used to derive values of LOAEL, SOAEL and UAEL as given in NPSE[16] and National Planning Practice Guidance (NPPG)[46], where appropriate. The definition of these is as follows:

- LOAEL – Lowest observed adverse effect level. This is the level above which adverse effects on health and quality of life can be detected; and
- SOAEL – Significant observed adverse effect level. This is the level above which significant adverse effects on health and quality of life occur.
- UAEL – Unacceptable adverse effect level. Noise above this level should be prevented.

7.9.8 Further guidance on how planning authorities should take account of the acoustic environment and the mitigation strategies which should be applied in relation to the above terms is provided in the NPPG[46] .

7.9.9 The advice is that noise above the SOAEL should be avoided using appropriate mitigation while taking into account the guiding principles of sustainable development.

7.9.10 Where noise is between LOAEL and SOAEL, the advice is to take all reasonable steps to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. Noise in this category is described as an observed adverse effect which is noticeable and intrusive.

7.9.11 NPSE states that it is not possible to give a single objective noise-based measure that defines a SOAEL that is applicable to all sources of noise for all situations. It acknowledges that the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It also acknowledges that further research is required to increase understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, it states that not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

7.9.12 Where any adverse noise effects are predicted, these are identified and if these cannot be avoided, mitigation measures are recommended to ensure no significant residual effects on health and quality of life arise. This approach is considered consistent with the principal aims of the NPSE. It is important to note that findings against the LOAEL and SOAEL are measures of the effect of noise on health and quality of life, and not environmental impact assessment findings.

7.9.13 During the course of this assessment (October 2018), the World Health Organization (WHO) published their updated *Environmental Noise Guidelines*[47]. These guidelines strongly recommend

[46] Defra (2014). National Planning Policy Guidance, Planning Practice Guidance, Noise, [Online] Available at: https://www.gov.uk/guidance/noise--2 [Checked 21/08/2018].
[47] 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: 25/10/2018].

that aircraft noise does not exceed 45 dB L_{den} or 40 dB L_{night} outside a dwelling. These recommendations are extremely stringent but can be considered in the context of the noise levels assessed and reported here as occurring now and in the future around Bristol Airport. They are aspirational targets and have not yet been adopted as policy. As a result, this assessment still relies on previous advice from the World Health Organisation as relevant to this assessment as this has informed Government policy that applies today.

7.9.14 The assessment criteria for different noise sources is given in the following sections. Full details of how this assessment criteria is developed is given in **Appendix 7B**.

Air noise and vibration assessment criteria

Air noise

7.9.15 Air noise encompasses that produced by aircraft during their departure and arrival at Bristol Airport. It is produced when an aircraft starts its departure, travels along the runway and climbs into the air as well as when an aircraft approaches Bristol Airport, touches down and slows to taxiing speed on the runway. It therefore includes reverse thrust noise when this takes place.

7.9.16 The assessment methodology for the calculation of air noise is set out in detail in **Appendix 7D**, along with the assumptions used to rate air noise and the results of the assessment.

Residential receptors – absolute levels

7.9.17 The Government, in the APF[1], acknowledges research in recent years which suggests that the balance of probability is that people are now relatively more sensitive to aircraft noise than in the past. At that time, the Government considered there was insufficient evidence to indicate a clear threshold noise level denoting the "onset of significant community annoyance". As a result, they retained within the APF the 57 dB $L_{Aeq,16h}$ contour as the average level of daytime aircraft noise marking the approximate onset of significant public annoyance.

7.9.18 In 2017, following the Government's response to the UK Airspace Change consultation, the Government set out policies that provide an update to some of the policies on aviation noise contained within the APF. They advised that these should be viewed as the current government policy. Specifically, it advised that a level of 54 dB $L_{Aeq,16h}$ is now acknowledged to correspond to the onset of significant community annoyance and replaces the 57 dB $L_{Aeq,16h}$ level in the APF.

7.9.19 The Government also advise that some adverse effects of annoyance can now be seen to occur down to 51 dB $L_{Aeq,16h}$ and that this should be used as the LOAEL when assessing and comparing noise impacts of airspace changes.

7.9.20 Based on Government guidance as described above, the following contour values are relevant in terms of assessing daytime airborne aircraft noise:

- 51 dB $L_{Aeq,16h}$ which provides a threshold below which there are no observed adverse effects from air noise. This represents the LOAEL; negligible effect;
- 54 dB $L_{Aeq,16h}$ which currently provides an indication of the onset of significant community annoyance; minor effect;
- 63 dB $L_{Aeq,16h}$ which denotes moderate levels of community annoyance, commonly used at airports and recommended by the Government as an eligibility criterion for sound insulation grant schemes. As a result, this value is commonly considered to represent the SOAEL; moderate effect; and

- 69 dB $L_{Aeq,16h}$ which denotes high levels of community annoyance where UK Government guidance is for consideration to be given by airports to assist in the costs of re-locating people from exposed dwellings, or, under certain circumstances, to offer to purchase such dwellings. This represents the UAEL; very substantial effect.

7.9.21 Night-time aircraft noise can be evaluated in a number of different ways. The common method is to rate night noise in terms of noise exposure, using the $L_{Aeq,8h}$ index (for the period 23:00 to 07:00). The $L_{Aeq,16h}$ and $L_{Aeq,8h}$ indices are the primary indicators used in this assessment, in line with those recommended by UK Government in the APF and the recent response to the air space change consultation.

7.9.22 Alongside the primary indicators, a number of supplementary indicators as recommended in the APF have been used to better describe the changes in the air noise environment between the different scenarios. These are as follows:

- L_{den}, which is an annual average 24-hour metric that penalises movements occurring in the evening (19:00 to 23:00) and night (23:00 to 07:00) periods by 5 dB and 10 dB respectively;
- L_{night}, which is an annual average 8-hour night (23:00 to 07:00) metric;
- 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;
- N70 (daytime) and N60 (night-time) contours, which demonstrate the areas exposed to a given number of events above the specified L_{ASmax} value;
- Single mode contours, which assume either 100% easterly or westerly operations and show the noise exposure levels expected for a given worst-case day with operations occurring in a single direction; and
- Variation in noise level at representative locations, both between scenarios and over the day.

7.9.23 These supplementary indicators have been provided for information and do not form the primary basis of the assessment of significance. They do however provide context to the significance, helping to show how the noise environment will change between one scenario and another. Further information on how these supplementary indicators can be interpreted is given in **Appendix 7B**.

7.9.24 The WHO[20] sets out night noise guidelines in terms of L_{night} which are commonly used in Europe to rate the acceptability of environmental noise at night. While the guideline value of 40 dB L_{night} is set out as an environmental goal to aspire towards, 55 dB L_{night} has been suggested as an interim target. The UK Government also recognise 45 dB L_{night} as representing the LOAEL while adopting the 45 dB $L_{Aeq,8h}$ index for this purpose for consistency with the $L_{Aeq,16h}$ daytime noise index.

7.9.25 The $L_{Aeq,8h}$ index differs only slightly from the L_{night} index in that it relates to an average summer day of aircraft activity, as opposed to an average annual day. As summer activity is generally higher than at other times of the year, the adoption of the $L_{Aeq,8h}$ unit, in place of the L_{night} unit represents a conservative approach. Similarly, on this basis, 55 dB $L_{Aeq,8h}$ is adopted as the SOAEL in this assessment.

7.9.26 It is also important however to consider the noise of individual aircraft, using noise indices such as the SEL and/or the L_{ASmax}.

7.9.27 The WHO guidelines provide advice that for a good sleep, indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night. Accounting for sleeping with a

bedroom window slightly open (and a reduction from outside to inside of 15 dB), this translates to an outside sound pressure level of 60 dB L_{Amax}. (approx. 70 dB(A) SEL for aircraft noise).

7.9.28 In the UK, where night noise is considered sufficiently high, a value of 90 dB(A) SEL (approx. 80 dB L_{ASmax}) is commonly used as the eligibility threshold for a sound insulation scheme, often based on the noisiest or most common aircraft operation occurring once or more on average per night. This threshold was developed based on research published in 1992 by the Department of Transport[48].

7.9.29 On the basis of the above, the absolute noise values used to assess the impact magnitude of air noise at residential receptors are given in **Table 7.19**.

Table 7.19 Air noise impact assessment criteria (absolute) – residential, outdoors

Subjective description of Impact	Daytime criteria[1] $L_{Aeq,16h}$ dB	Night-time criteria[2] $L_{Aeq,8h}$ dB	L_{ASmax} dB	SEL dB(A)	Description
Negligible	51 (LOAEL)	45 (LOAEL)	60	70	More than 10-15 events per might
Very minor	54	48			
Minor	57	51			
Minor/Moderate	60	54			
Significant - Moderate	63 (SOAEL)	55 (SOAEL)	80	90	More than one event per night
Significant - Substantial	66	60			
Significant – Very Substantial	69 (UEL)	63 (UEL)	90	100	More than one event per night

Note: 1. Equivalent L_{den} criterion value, ≈ $L_{Aeq,16h}$ + 2 dB.
2. Approximately equivalent to L_{night} value.

Non-residential receptors – absolute levels

7.9.30 Absolute noise criteria for non-residential receptors are given in **Table 7.20** and their derivation is explained in **Appendix 7B**.

[48] Ollerhead, J.B. et al (1992). Report of a Field Study of Aircraft Noise and Sleep Disturbance: A Study Commissioned by the Civil Aviation Policy Directorate of the Department of Transport from the Department of Safety, Environment and Engineering, Civil Aviation Authority. London: HMSO.

Table 7.20 Air noise impact assessment criteria (absolute) – non-residential, outdoors

Receptor	External noise level threshold
Schools[23]	55 dB $L_{Aeq,30min}$ (daytime)
Places of worship[22]	As per daytime residential – see **Table 7.19**.
Amenity areas[22]	55 dB $L_{Aeq,T}$

Relative levels

7.9.31 In addition to the absolute noise level, the relative change in noise level between operational scenarios is used to assess air noise. A potential impact rating for a change in level is given in **Table 7.21**. A semantic scale of this type, based on the *Institute of Environmental Management and Assessment noise impact guidelines*[49], has been accepted in various airport Public Inquiries.

Table 7.21 Air noise impact ratings - change in 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

Magnitude of effect and significance

7.9.32 The magnitude of an effect from changing from one scenario to another, such as from without to with the Proposed Development, is established from a consideration of both the absolute noise level after the change along with the magnitude of the change in noise level that occurs at a receptor.

7.9.33 The effect of a change in noise level tends to increase with the absolute level of noise experienced at a receptor. If, for example, the daytime noise level at a dwelling were to change from 45 dB to 50 dB $L_{Aeq,16h}$, (below the LOAEL) the overall effect for the occupants would be less than if the daytime noise level were to increase by the same amount from 63 dB to 68 dB $L_{Aeq,16h}$ (above the SOAEL).

7.9.34 There is no clearly accepted method of how to rate the magnitude of the effect of a change in the absolute air noise level and the associated change in noise level. Some guidance has however been provided in the NPPG[46] which states among "What factors influence whether noise could be a concern?" the following:

> *"In cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring even though little or no change in behaviour would be likely to occur."*

[49] Guidelines for Environmental Noise Impact Assessment, Institute of Environmental Management & Assessment, October 2014

7.9.35 **Table 7.22** shows how the primary air noise indicators are interpreted into magnitude of effect. This is based on the information presented in this chapter and professional judgement.

Table 7.22 Summary of magnitude of effect – air noise

Receptor Type	Outdoor noise level, dB	Magnitude of effect				
		Very low	Low	Medium	High	Very High
		Change in noise level, dB(A)				
Residential Day (07:00-23:00)	$51 \leq L_{Aeq,16h} < 63$	0-2	2-3	3-6	6-9	>9
	$L_{Aeq,16h} \geq 63$	0-1	1-2	2-4	4-7	>7
Residential Night (23:00-07:00)	$45 \leq L_{Aeq,8h} < 55$	0-2	2-3	3-6	6-9	>9
	$L_{Aeq,8h} \geq 55$	0-1	1-2	2-4	4-7	>7
Schools	$L_{Aeq,30min} \geq 55$	0-2	2-3	3-6	6-9	>9
Places of worship	$51 \leq L_{Aeq,16h} < 63$	0-2	2-3	3-6	6-9	>9
	$L_{Aeq,16h} \geq 63$	0-1	1-2	2-6	6-9	>9
Amenity Areas	$L_{Aeq,T} \geq 55$	0-2	2-3	3-6	6-9	>9

7.9.36 A potential significant effect (adverse or beneficial) is considered to arise if in **Table 7.22** the magnitude of the effect is rated as medium or higher. Additionally, a change in the number of dwellings exposed to 90 dB(A) 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.

Airborne aircraft vibration

7.9.37 Low frequency noise from airborne aircraft has the potential to cause perceptible vibration levels within dwellings. For this reason, the most appropriate noise metric to assess the likelihood of these effects is the maximum C-weighted noise level, denoted L_{Cmax}. C-weighting gives more weight to low frequency noise rather than the more commonly used A-weighting, which approximates the average human hearing response to different frequencies of noise.

7.9.38 This vibration effect is most obviously characterised by effects such as windows rattling. As discussed in the Historic England report[29], aircraft passbys that produce a maximum noise level above 97 dB L_{Cmax} are likely to produce an audible rattle of windows. While it is appreciated that low frequency noise from aircraft can induce perceptible vibration levels in lightweight structures and loose-fitting components, the levels are below those at which even minor cosmetic damage would be likely to occur.

7.9.39 Vibration effects due to airborne aircraft can vary depending on the specific details of the building, for example, the room dimensions which can cause resonance effects at certain frequencies. Resonances increase the sound level in parts of the room and decrease it in others which can influence the any consequential vibration.

7.9.40 The noise level of 97 dB L_{Cmax} has been taken as a threshold for potential significance of vibration effects due to airborne aircraft events. Whether a significant effect occurs between scenarios will depend on the number of dwellings affects and the frequency of the events.

7.9.41 The other potential effect from airborne aircraft vibration is vortex damage to buildings. This is best explained by an extract from the *Airports and the Environment*[30] report:

"Less of an environmental problem, but one that affects community relations, is that of vortex damage to properties within neighbouring communities. Vortices, which are circulating currents of air created by the passage of aircraft, are generally dispersed by wind and air turbulence before they reach the ground. However, in certain weather conditions they can reach ground level and can dislodge unsecured roofing tiles."

7.9.42 This effect is both rare and unpredictable as specific conditions are required for it to occur. It has been known to occur recently at a property in the vicinity of Bristol Airport. In this case the damage was rectified by Bristol Airport. As the strength of vortices is influenced by the size of aircraft, and the Proposed Development does not affect which aircraft are able to use Bristol Airport, it is not expected that there will be any significant effect on the occurrence of vortex damage.

Ground noise assessment criteria

7.9.43 Ground noise encompasses that produced by aircraft activities on the ground, such as during taxiing, manoeuvring, holding on the runway prior to departure, and running engines on the stand. Noise from engine running for test and maintenance purposes is also considered as ground noise.

7.9.44 The assessment methodology for ground noise is set out in detail in **Appendix 7E**, along with the assumptions used to rate ground noise and the results of the assessment.

7.9.45 There is no definitive agreement on the method of assessment of aircraft ground noise. Various methods have been adopted in the past, and these have led to the assessment of ground noise in terms of the equivalent continuous sound level, $L_{Aeq,T}$, for various time periods. As is convention, consideration is given in this assessment to the $L_{Aeq,16h}$ metric for the daytime period of 07:00 to 23:00 and the $L_{Aeq,8h}$ metric for the night-time period of 23:00 to 07:00.

7.9.46 The ground noise level assessed at various receptors can be compared to the existing ambient environmental noise and published guidelines for the assessment of environmental noise. The WHO have previously recommended a guideline value of 50 dB $L_{Aeq,16h}$ to prevent 'moderate' community annoyance and 55 dB $L_{Aeq,16h}$ for 'serious' community annoyance[19].

7.9.47 To put these guidance criteria into context over half of the population is exposed to levels which exceed the 55 dB L_{Aeq} guideline for 'serious' community annoyance. This was confirmed by the results of the Defra funded 2000/2001 National Noise Incidence Study[50].

7.9.48 The ambient noise levels in the area around Bristol Airport have been measured to lie in the range 50 dB(A) to 60 dB(A) $L_{Aeq,16h}$ during the daytime with an underlying background noise level in the range 35 dB(A) to 50 dB(A) L_{AF90} (refer to **Section 7.5**). During the night-time, ambient noise levels

[50] BRE (2002). The National Noise Incidence Study 2000/2001 (United Kingdom): Volume 1 – Noise Levels, Client report number 206344f, [online]. Available at: http://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwi-t-mQ16jdAhVJUlAKHTMiD-kQFjAAegQIABAC&url=http%3A%2F%2Frandd.defra.gov.uk%2FDocument.aspx%3FDocument%3D10280_NIS1206344f.pdf&usg=AOvVaw2R14Uu8gQF3HgMnuM0z5ui [Checked 7/09/2018].

have been measured to lie in the range 45 dB(A) to 55 dB(A) with underlying background noise levels in the range 35 dB(A) to 45 dB(A) L_{AF90}. The background noise levels better reflect the noise environment in the absence of aircraft noise and other intermittent environmental noise sources.

7.9.49 Based on the standards in BS 8233 for dwellings, the WHO levels would ensure that the recommended indoor noise levels of 35 dB $L_{Aeq,16h}$ within living rooms and 30 dB $L_{Aeq,8h}$ within bedrooms, would be achieved with windows partly open.

7.9.50 If windows are closed, an additional protection of around 10 dB can be expected. If ground noise were to rise above these levels, some form of additional mitigation, such as sound insulation treatment to the dwelling, would be required to protect people inside dwellings from the effects of ground noise.

7.9.51 Sound insulation can only provide so much protection to a dwelling, typically around 35 dB, and once the noise level outside a dwelling rises beyond a certain value, mitigation in itself will not provide sufficient protection.

Residential receptors – absolute levels

7.9.52 The absolute noise values used to assess ground noise at residential receptors are given in **Table 7.23**. These $L_{Aeq,T}$ levels are based on the BS8233 and WHO guidance and professional judgement.

Table 7.23 Ground noise assessment criteria – absolute, daytime and night-time

Action	Effect Level	Daytime external noise level, dB $L_{Aeq,16h}$	Night-time external noise level, dB $L_{Aeq,8h}$
Mitigate and reduce to a minimum	Lowest Observed Adverse Effect Level (LOAEL)	50	45
Avoid	Significant Observed Adverse Effect Level (SOAEL)	60	55
Prevent	Unacceptable Adverse Effect Level (UAEL)	70	65

Non-residential receptors – absolute levels

7.9.53 Absolute noise criteria for non-residential receptors are given in **Table 7.24**.

Table 7.24 Ground noise assessment criteria – non-residential – absolute

Receptor	External noise level threshold
Schools[23]	55 dB $L_{Aeq,30min}$ (daytime)
Places of worship[22]	As per daytime residential – see **Table 7.23**
Amenity areas[22]	55 dB $L_{Aeq,T}$

Relative levels

7.9.54 In addition to the absolute noise level, the relative change in noise level between operational scenarios is used to assess air noise. A potential impact rating for a change in level is given in

Table 7.25. A semantic scale of this type, based on the *Institute of Environmental Management and Assessment noise impact guidelines*[51], has been accepted in various airport Public Inquiries.

Table 7.25 Ground noise impact ratings - change in 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

Magnitude of effect and significance

7.9.55 **Table 7.26** shows how this is interpreted into magnitude of effect. This is based on the IEMA *Guidelines on Environmental Noise Impact Assessment*[25] and professional judgement.

Table 7.26 Summary of magnitude of effect – ground noise

Receptor Type	Outdoor noise level, dB	Magnitude of effect				
		Very low	Low	Medium	High	Very High
		Change in noise level, dB(A)				
Residential Day (07:00-23:00)	$50 \leq L_{Aeq,16h} < 60$	0-2	2-3	3-6	6-9	>9
	$L_{Aeq,16h} \geq 60$	0-1	1-2	2-4	4-7	>7
Residential Night (23:00-07:00)	$45 \leq L_{Aeq,8h} < 55$	0-2	2-3	3-6	6-9	>9
	$L_{Aeq,8h} \geq 55$	0-1	1-2	2-4	4-7	>7
Schools	$L_{Aeq,30min} \geq 55$	0-2	2-3	3-6	6-9	>9
Places of worship	$50 \leq L_{Aeq,16h} < 60$	0-2	2-3	3-6	6-9	>9
	$L_{Aeq,16h} \geq 60$	0-1	1-2	2-6	6-9	>9
Amenity Areas	$L_{Aeq,T} \geq 55$	0-2	2-3	3-6	6-9	>9

[51] Guidelines for Environmental Noise Impact Assessment, Institute of Environmental Management & Assessment, October 2014

7.9.56 A potential significant effect (adverse or beneficial) is considered to arise in the above table if the magnitude of the effect is rated as medium or higher. Whether a significant effect arises will depend on context, such as the number of noise sensitive receptors affected and the how often it occurs.

Road traffic noise assessment criteria

7.9.57 Road traffic noise includes noise from road vehicles accessing Bristol Airport as well as that from other road vehicles, not related to Bristol Airport, using the surrounding roads.

7.9.58 The assessment methodology for road traffic noise is set out in detail in **Appendix 7F**, along with the assumptions used to rate road traffic noise and the results of the assessment.

7.9.59 The criteria used in the road traffic noise assessment considers the noise criteria within the *Noise Insulation Regulations 1975 (as amended 1988)* and the *Design Manual for Roads and Bridges* (DMRB)[32].

7.9.60 Road traffic noise is commonly measured and assessed in the UK in terms of the L_{A10} index over the 18-hour period from 06:00 to 24:00. This index, known as $L_{A10,18h}$, is used to rate the potential impacts of road traffic noise arising for example from a change in a highway. Legislation exists in the form of the Noise Insulation Regulations to offer sound insulation to people who are significantly affected by the introduction of a new highway or changes to a highways scheme where the noise level rises above a certain value as a result of the change in traffic flow. Under this legislation, the trigger level for introducing a noise insulation scheme is expressed as a façade level of 68 dB $L_{A10,18h}$. This can be approximately converted back to an $L_{Aeq,16h}$ index by applying a correction of -3 dB(A) to convert from the façade level to a free-field level, and by applying a further correction of -2 dB(A) to convert from $L_{A10,18h}$ to $L_{Aeq,16h}$ for road traffic noise. The resulting trigger level in this case is 63 dB $L_{Aeq,16h}$. This is 5 dB lower than the equivalent $L_{A10,18h}$ value.

7.9.61 The absolute values for impact assessment, and for establishing the LOAEL, SOAEL and UAEL can therefore be determined based on the same principles as described for ground noise above, using the guideline standards for noise levels within dwellings recommended in BS 8233.

Absolute levels

7.9.62 The absolute noise values used to assess road traffic noise between operational scenarios at all receptors are given in **Table 7.27**.

Table 7.27 Road traffic noise assessment criteria – absolute, daytime and night-time

Action	Effect Level	Daytime facade noise level, dB $L_{A10,18h}$
Mitigate and reduce to a minimum	Lowest Observed Adverse Effect Level (LOAEL)	55
Avoid	Significant Observed Adverse Effect Level (SOAEL)	68
Prevent	Unacceptable Adverse Effect Level (UAEL)	75

Relative levels

7.9.63 The subjective importance of changes in road traffic noise level on people relates to the magnitude of the change and, to some extent, when it occurs. A significance rating for a change in level is taken from the DMRB[32].

7.9.64 DMRB provides objective assessment criteria in terms of changes in noise for both the 'short-term' and the 'long-term'. Evidence suggests that residents are much more likely to perceive very small changes in average daytime noise level (1 to 3 dB(A)) following the opening of a major road infrastructure project. Over time, people become accustomed to the change and respond to any changes in traffic flow and associated change in noise conditions with reduced sensitivity.

7.9.65 The only new roads being built as part of the Proposed Development are within Bristol Airport. The receptors affected by these roads will be affected to a greater extent by road traffic on Downside Road. Therefore, the long-term changes in noise level are the only changes relevant to this assessment. These are indicative as the impact of a relative change in level also depends on the absolute level associated with it and the noise conditions prior to the change.

Magnitude of effect and significance

7.9.66 **Table 7.28** shows how this is interpreted into magnitude of effect. This is based on DMRB.

Table 7.28 Summary of magnitude of effect – road traffic noise

Receptor Type	Outdoor noise level, dB	Magnitude of effect				
		Very low	Low	Medium	High	Very High
		Change in noise level, dB(A)				
Residential	$L_{A10,18h} \geq 55$	0-2	2-3	3-5	5-10	>10

7.9.67 A potential significant effect (adverse or beneficial) is considered to arise in **Table 7.28** if the magnitude of the effect is rated as medium or higher. Whether a significant effect arises will depend on context, such as the number of noise sensitive receptors affected and the how often it occurs.

Construction noise and vibration assessment criteria

7.9.68 Construction noise and vibration relates to that produced by construction traffic accessing and departing from the construction sites as well as that produced by demolition, piling and

construction plant operating at the construction sites during each phase of the construction project. The effects of construction noise and vibration have been assessed taking account of their magnitude and also the likely sequence period and daily duration over which they will occur for the affected receptors.

7.9.69 The assessment methodology for construction noise and vibration is set out in detail in **Appendix 7G**, along with the assumptions used to rate construction noise and vibration and the results of the assessment.

7.9.70 In the UK, BS 5228-1[33] is the current guidance and approved code of practice document for the control of construction noise. This provides guidance on methods of controlling noise and provides methods to predict, measure and assess the impact of construction and demolition noise. The guidance in the document can be considered to present recommendations for best practical means to control noise on site.

7.9.71 An informative Annex is included in BS 5228-1 that provides guidance on objectively assessing the significance of construction noise. It advises that a pragmatic approach needs to be taken when assessing the noise effects of any construction project and suggests the guidance provided in the annex would generally only apply to projects of significant size, and lesser projects might not need to be assessed or might only require general consideration of noise effects and mitigation. For large infrastructure projects for example, it highlights historically the procedure that has developed in the UK based on the use of fixed noise limits and also additionally introduces alternative methods used to rate the potential significance of construction noise, based on prevailing ambient noise conditions.

7.9.72 There are no universally recognised or mandatory UK standards or guidelines that set out limits for construction noise. The historical use of fixed noise limits for projects of significant size is described in BS 5228-1 which sets out a subjective principle as follows:

"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut."

7.9.73 It also goes on to describe external noise limits as:

"Noise levels, between say 07:00 and 19:00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:

- *70 decibels (dBA) in rural, suburban and urban areas away from main road traffic and industrial noise;*
- *75 decibels (dBA) in urban areas near main roads in heavy industrial areas."*

7.9.74 BS 5228-1 also provides details of alternative methods of assessment to determine the potential for a significant noise effect, reproduced in **Table 7.29**, by testing the construction noise level against the prevailing baseline noise level (that is, the noise level in the absence of construction noise). If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect.

Table 7.29 Example threshold of potential significant effect at dwelling

Assessment category and threshold value period	$L_{Aeq,T}$ Threshold value dB(A)		
	Category A[1]	Category B[2]	Category C[3]
Daytime (07:00–19:00) and Saturdays (07:00–13:00)	65	70	75
Night-time (23:00 – 07:00)	45	50	55

1. Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.
2. Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.
3. Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

7.9.75 A further alternative method is available where noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq,T}$ from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in a significant effect.

7.9.76 BS 5228-1 also provides examples of noise thresholds used for the introduction of both sound insulation treatment (or the reasonable costs thereof) and temporary re-location. It is stated in BS 5228-1 that:

"If the contractor has applied best practicable means to the provision of mitigation, i.e. all reasonable measures have been taken to reduce the noise levels, but levels are still such that widespread community disturbance or interference with activities or sleep is likely to occur, there are two further provisions that can be made if the construction activities are likely to continue for a significant period of time either continuously or sporadically."

7.9.77 The first provision is noise insulation. For eligibility for sound insulation the daytime Monday to Friday (08:00-18:00) and Saturday morning (08:00-13:00) threshold is 75 dB $L_{Aeq,10h/5h}$ at 1 metre outside the most exposed window or door of the façade of any eligible dwelling. This level also needs to be exceeded for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any six consecutive months.

7.9.78 The second provision is temporary or permanent re-housing. For eligibility for temporary rehousing the daytime Monday to Friday (08:00-18:00) and Saturday morning (08:00-13:00) threshold is at least 85 dB $L_{Aeq,10h/5h}$. This level also needs to be exceeded for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any six consecutive months.

7.9.79 Typical daytime ambient noise levels around Bristol Airport lie between 50 dB $L_{Aeq,16h}$ and 60 dB $L_{Aeq,16h}$ during the daytime and 45 dB $L_{Aeq,8h}$ and 55 dB $L_{Aeq,8h}$ during the night-time (see **Appendix 7C**). On this basis, based on the ABC method in BS 5228-1, a value of 65 dB $L_{Aeq,12h}$ would be appropriate as a threshold for potentially significant effects to be indicated for the Proposed Development construction works during the daytime and 55 dB $L_{Aeq,8h}$ during the night-time. These criteria should be considered a target not normally to be exceeded at 1m from the façade of any noise sensitive residential or business receptors.

7.9.80 Based on the above and taking account of the ambient noise levels around Bristol Airport, the criteria adopted to assess the impact of construction noise are given in **Table 7.30**.

Table 7.30 Construction noise assessment criteria – absolute

Action	Effect Level	Daytime outdoor noise level, dB $L_{Aeq,12h}$	Night-time outdoor noise level, dB $L_{Aeq,8h}$
Mitigate and reduce to a minimum	Lowest Observed Adverse Effect Level (LOAEL)	55	45
Avoid	Significant Observed Adverse Effect Level (SOAEL)	65	55
Prevent	Unacceptable Adverse Effect Level (UAEL)	85	75

7.9.81 In summary, the threshold for a potentially significant effect from construction noise adopted in this assessment is 65 dB $L_{Aeq,12h}$ for the daytime (07:00-19:00) and 55 dB $L_{Aeq,8h}$ for the night-time (23:00-07:00).

Construction vibration

7.9.82 Vibration levels due to construction works associated with the Proposed Development have been assessed using the significance criteria given in BS5228-2[34] in terms of peak particle velocity (PPV).

7.9.83 Vibration criteria are given for both human and building response, where human response criteria are more stringent. **Table 7.31** contains the assessment criteria used, which are based on the absolute values given in BS 5228-2.

Table 7.31 Vibration limits for human response and building damage

Vibration limit, PPV mms^{-1}	Effect	Effect
< 0.14	Vibration unlikely to be perceptible.	None
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Negligible
0.3	Vibration might be just perceptible in residential environments.	Minor
1.0	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.	Moderate
7.5	Guide value for cosmetic damage of residential buildings where dynamic loading may lead to resonance.	Significant
10.0	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.	Very Significant

7.9.84 On the basis of the above table, the threshold for a potentially significant effect from construction vibration adopted in this assessment is 1.0 mms^{-1} PPV during the daytime (07:00-23:00) and 0.3 mms^{-1} during the night-time.

7.10 Assessment of effects – air noise and vibration

7.10.1 **Section 7D.5** of **Appendix 7D** provides the detailed results of the air noise and vibration assessment. Air noise contours are presented for the primary and secondary or supplementary parameters, along with contour areas, dwelling and population counts within each contour band for residential receptors. Noise exposure values are also presented for noise sensitive non-residential receptors. The likelihood of vibration effects is also assessed. Key results are presented in this section. Note that the significance ratings arising from the effects described here are described in the section titled "Predicted air noise effects and their significance" at the end of **Section 7.10**.

7.10.2 For all tables in this section, areas are rounded to the nearest 0.1km^2. Dwelling and population counts are rounded to the nearest 50 above 100 and to the nearest 10 below 100. Below 10, the actual number is given. Where percentage changes are given, these are based on unrounded values. The counts include all those dwellings or people within a specified contour band and any higher value bands so, for example, any dwellings within a 63 dB contour would also be counted as being within a 63 dB contour as well.

Residential receptors – primary indicators

$L_{Aeq,16h}$ daytime

7.10.3 The dwelling counts within key daytime air noise contours are presented in **Table 7.32.** These contours are presented in **Figure 7D.1** to **Figure 7D.3** and **Figure 7D.26**.

Table 7.32 Air noise dwelling counts, $L_{Aeq,16h}$ average mode summer day

Contour $L_{Aeq,16h}$ dB(A)	**Number of Dwellings**			
	Baseline 2017	**10 mppa 2021**	**12 mppa 2026**	**10 mppa 2026**
51	3,250	3,150	3,100	2,200
63	20	10	10	10

7.10.4 **Table 7.32** shows that in 2017, around 3,250 dwellings are adversely affected by air noise as a result of daytime aircraft operations at Bristol Airport. This total is expected to remain much the same, although marginally reduce going forward to the 10 mppa in 2021 and the 12 mppa scenarios. The sensitivity scenario (first discussed in paragraph 7.1.25) of 10 mppa in 2026 shows a reduction of 30% compared to the 12 mppa scenario. This is due to the conservative assumption that from 2021 onwards, there is no growth in passenger numbers from 10 mppa but fleet replacement occurs as per the 12 mppa 2026 forecast.

7.10.5 Currently and in the future under any scenario, the number of residential receptors experiencing air noise at or above the SOAEL of 63 dB is very small, around 20 now reducing to around 10 in the future.

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

7.10.6 Turning to the night-time effects, **Table 7.33** shows the dwelling counts within key night-time air noise contours. These contours are presented in **Figure 7D.4** to **Figure 7D.6** and **Figure 7D.27**.

Table 7.33 Air noise dwelling counts, $L_{Aeq,8h}$ average mode summer night

Contour $L_{Aeq,8h}$ dB(A)	Number of Dwellings			
	Baseline 2017	10 mppa 2021	12 mppa 2026	10 mppa 2026
45	3,750	5,150	5,050	4,150
55	150	300	350	250

7.10.7 **Table 7.33** shows that in 2017, around 3,750 dwellings are adversely affected by air noise as a result of night-time aircraft operations at Bristol Airport. This total is expected to increase by 38% going forward to the 10 mppa in 2021 scenario. The 12 mppa scenario gives rise to a similar, albeit slightly lower, number of dwellings compared to the 10 mppa in 2021 scenario. The sensitivity scenario of 10 mppa in 2026 shows a reduction of 18% compared to the 12 mppa scenario. This is due to the conservative assumption that from 2021 onwards, there is no growth in passenger numbers from 10 mppa but fleet replacement occurs as per the 12 mppa 2026 forecast.

7.10.8 Currently, there are around 150 properties exposed to the SOAEL of 55 dB $L_{Aeq,8h}$ or more. This is predicted to increase to around 300 under the 10 mppa in 2021 scenario, with a 5% increase to around 350 under the 12 mppa scenario. The sensitivity scenario of 10 mppa in 2026 shows a reduction of 21% compared to the 12 mppa scenario. This is due to the conservative assumption that from 2021 onwards, there is no growth in passenger numbers from 10 mppa but fleet replacement occurs as per the 12 mppa 2026 forecast.

Residential receptors – supplementary indicators

L_{den} and L_{night}

7.10.9 These parameters show broadly similar results to the $L_{Aeq,16h}$ and $L_{Aeq,8h}$ metrics. The results are given in detail in **Appendix 7D**.

Annoyance

7.10.10 **Table 7.34** 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 noise insulation grant scheme.

Table 7.34 Highly annoyed population count, $L_{Aeq,16h}$ average mode summer day

Metric	Baseline 2017	10 mppa 2021	12 mppa 2026	10 mppa 2026
Population Highly Annoyed	750	750	750	550

7.10.11 This shows that in the future, levels of annoyance will remain as now under the 10 mppa 2021 scenario and 12 mppa 2026 scenarios, reducing only under the sensitivity case of 10 mppa 2026.

Sleep Disturbance

7.10.12 **Table 7.35** 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 the noise insulation grant scheme.

Table 7.35 Highly sleep disturbed population count, L_{night} average mode annual night

Metric	Baseline 2017	10 mppa 2021	12 mppa 2026	10 mppa 2026
Population Highly Sleep Disturbed	450	850	800	650

7.10.13 This shows that the number of people highly sleep disturbed will rise by around 90% from 2017 to the 10 mppa in 2021 scenario before reducing slightly, by around 5% under the 12 mppa in 2026 scenario and by around 25% under the 10 mppa in 2026 scenario. Further information on the methodology can be located in **Appendix 7B**, specifically paragraph 7B.1.139, with the detailed results presented in **Appendix 7D**, in Table 7D.28.

N70 and N60

7.10.14 These parameters help to provide context to how the aircraft noise environment might alter between scenarios. People experience aircraft noise as a series of individual events over a day, rather than as a single average noise exposure level. The N70 parameter helps to illustrate how this might change between scenarios. Further explanation on these metrics is given in paragraph 7.1.18. There are no specific criteria for rating the acceptability of N70 or N60 contours.

7.10.15 The number of dwellings exposed to various N70 and N60 contours do not vary in a consistent manner between scenarios, for example comparing the 10 mppa 2021 scenario with 12 mppa 2026 scenario shows that for both N70 and N60 the number of dwellings increase for some contour values and decrease for others. The results and further explanation of these contours are presented in detail in **Appendix 7D**.

SEL and L_{ASmax}

7.10.16 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 7.36** for each scenario.

Table 7.36 Air noise dwelling counts, $L_{Aeq,16h}$ average mode summer day

Contour, dB(A)	Number of Dwellings			
	Baseline 2017	10 mppa 2021	12 mppa 2026	10 mppa 2026
90 SEL	250	600	100	100
80 L_{ASmax}	250	650	100	100

7.10.17 **Table 7.36** demonstrates that from 2017 to the 10 mppa 2021 scenario, the number of dwellings exposed to potentially significant noise levels of individual aircraft at least once per night will increase from around 250 to around 650. Going forward to 2026, under both the 12 mppa scenario and the sensitivity scenario, this will reduce to around 100.

Single mode

7.10.18 Single mode L_{Aeq} noise contours have been produced which show how, under westerly and easterly conditions, noise exposure levels will vary during the day and night between scenarios. These represent a worst-case day for each scenario.

7.10.19 The number of dwellings exposed between scenarios varies in a similar manner to the average mode L_{Aeq} contours. The results are presented in detail in **Appendix 7D**.

Variation in noise level over the day

7.10.20 The air noise received at a receptor over a single day will vary according to the scenario being considered and also the mode of operations at Bristol Airport. In addition, the noise level will vary by the hour as a result of variations in the hourly timetabling of aircraft over a 24-hour period. **Appendix 7D** provides this detailed information, in terms of $L_{Aeq,1h}$ over the day for 14 representative residential receptors. The receptors assessed are shown in **Figure 7.1** and details are given in **Table 7.10**.

7.10.21 This analysis shows how the noise levels at a given receptor are vary over a typical day, and how this might change under the future scenarios. A description of this is given in **Appendix 7D**.

Non-residential receptors

7.10.22 **Appendix 7D** 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 of air noise around Bristol Airport.

Schools

7.10.23 **Appendix 7D** identifies only one school, Winford Primary School, as being exposed to 55 dB $L_{Aeq,16h}$ or more, under all scenarios.

7.10.24 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. 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. Even however allowing for this fact, only this one school is exposed to noise levels above 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 2021 and under the 12 mppa 2026 scenario as well as the sensitivity test.

Places of worship

7.10.25 There are 35 places of worship identified within the zone of influence of air noise around Bristol Airport. Nine of these are currently exposed to air noise at or above 51 dB $L_{Aeq,16h}$. The situation will remain broadly unchanged in both future scenarios, including the sensitivity test. None are currently exposed to a level of 63 dB $L_{Aeq,16h}$, either now or in the future.

Amenity areas

7.10.26 There are 23 amenity areas identified within the ZoI of air noise around Bristol Airport. These vary in nature from playgrounds and parks, to open spaces. Eight of these are currently exposed to a daytime noise exposure level of 50 dB $L_{Aeq,16h}$ or more. Only three amenity areas are exposed to a significant level of 55 dB $L_{Aeq,16h}$ or more currently, these being Cadbury Hill in Yatton, Vee Lane Play Area in Felton, and Felton Common.

7.10.27 This situation will remain broadly the same under the 10 mppa 2021 scenario and also the 12 mppa 2026 scenario. A reduction in the number of those exposed to 50 dB and 55 dB occurs under the sensitivity test, reducing to six and two (Vee Lane Play Area and Felton Common) respectively.

Airborne aircraft vibration

7.10.28 The assessment finds that in 2017, six dwellings which border Felton Common are exposed to maximum noise levels of 97 dB L_{Cmax} or greater. This reduces to two dwellings in all future scenarios due to the introduction of more modern, quieter aircraft types. The maximum noise level instances occur less than once per day on average in all scenarios.

7.10.29 In practice, it is appreciated that there is some variation depending on the specific characteristics of individual dwellings, and therefore it is possible that lower levels of noise may induce perceptible vibration effects. The typical aircraft operations which produce the highest L_{Cmax} noise levels currently at dwellings bordering Felton Common are departures by the Airbus A321 and Boeing 737-800 using runway 09. These two aircraft types combined carried out four runway 09 departures on an average day in 2017. Under the 10 mppa in 2021 scenario, this increases to seven, before reducing to four under the 12 mppa in 2026 scenario and three under the sensitivity scenario of 10 mppa in 2026.

7.10.30 Therefore, vibration due to airborne aircraft is expected to currently affect a small number of dwellings and this is not expected to vary significantly in the future scenarios.

Predicted air noise and vibration effects and their significance

7.10.31 This section sets out the air noise effects arising from operations at Bristol Airport by comparing the following key scenarios:

- Baseline year (2017) vs future (10 mppa in 2021);
- Future (10 mppa in 2021) vs future (12 mppa in 2026) with Proposed Development; and
- Future (10 mppa in 2026) vs future (12 mppa in 2026) with Proposed Development.

7.10.32 This section concentrates primarily on a comparison of the change from without to with the Proposed Development since this is the key comparison required as part of the ES. A subjective account of how noise conditions will change between the baseline year and 2021 has however been included to provide context, should Bristol Airport reaches its permissible capacity and the Proposed Development not proceed.

7.10.33 This section commences by presenting, for key receptors, an account of how noise levels will change under each scenario during the daytime and night-time. It then compares and discusses specific pairs of scenarios separately.

7.10.34 The assessments have all been carried out on the basis of external noise levels, as this is what the main criteria relate to. Therefore, mitigation in the form of improved sound insulation is not accounted for. This will reduce the internal noise levels for dwellings where works have been carried out, and therefore the absolute effects will be lower than assessed for those properties.

Variation in noise levels at representative residential receptors

7.10.35 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 in **Figure 7.1** and details are given in **Table 7.10**.

7.10.36 **Table 7.37** shows the daytime air noise exposure levels for 10 mppa 2021 (in brackets) and the relative change in noise level for the baseline (2017) and the 12 mppa 2026 scenario, at representative residential receptors. The sensitivity scenario of 10 mppa 2026 without the Proposed Development is also included.

Table 7.37 10 mppa in 2021 air noise exposure levels, $L_{Aeq,16h}$ average mode summer day, and relative change

	Residential receptor	Absolute level ($L_{Aeq,16h}$) dB(A) or change re: 10 mppa 2021			
		Baseline 2017	10 mppa 2021	12 mppa 2026	10 mppa 2026
1	Henley Park, Yatton	0	(53)	0	-1
2	Bishops Road, Cleeve	+1	(53)	0	-1
3	Fountain Treeworks, Brockley	0	(62)	-1	-2
4	Cooks Bridle Path, Downside	+1	(60)	0	-1
5	Downside Road, Downside	0	(60)	-1	-2
6	School Lane, Lulsgate Bottom	0	(62)	-1	-2
7	Hillview Gardens, Felton	0	(55)	0	-1
8	Market Place, Winford	0	(59)	+1	0
9	Chew Magna, North Wick	0	(54)	+1	0
10	Church Road, Norton Malreward	0	(50)	0	-1
11	Lye Mead, Winford	-1	(54)	0	-1
12	Red Hill, Redhill	0	(51)	0	-2
13	Wrington Hill, Wrington	+1	(53)	0	-1
14	Southlands Way, Congresbury	0	(53)	0	-2

7.10.37 For all 14 locations, the absolute noise levels for 10 mppa 2021 lie below the SOAEL of 63 dB. This is the case now and will remain the case for 12 mppa in 2026 with the Proposed Development.

7.10.38 The results show that the change in daytime noise level between the baseline (2017) conditions and those likely to arise for the 10 mppa in 2021 scenario is negligible at all locations. Three locations are 1 dB louder in 2017, one location is 1 dB quieter, and 10 locations have the same noise level, when compared to 10 mppa in 2021.

7.10.39 Considering the 12 mppa scenario, there is also a negligible change in noise levels from those expected for the 10 mppa in 2021 scenario. Two locations are 1 dB louder in the 12 mppa scenario, three locations are 1 dB quieter, and nine locations have the same noise level, when compared to 10 mppa in 2021.

7.10.40 For the sensitivity scenario of 10 mppa in 2026, this shows a negligible reduction in noise against 10 mppa in 2021, with 12 locations being 1-2 dB quieter under the 10 mppa in 2026 scenario, and two locations having the same noise level, when compared to 10 mppa in 2021.

7.10.41 The differences in daytime air noise between the 12 mppa 2026 and 10 mppa 2026 scenarios are also small, with increases in the range 0 to 1 dB generally occurring with the Proposed Development.

7.10.42 **Table 7.38** shows the night-time air noise exposure levels for 10 mppa 2021 (in brackets) and the relative change in noise level against the baseline (2017) and the 12 mppa 2026 scenarios, at

representative residential receptors. The sensitivity scenario of 10 mppa 2026 without the Proposed Development is also included.

Table 7.38 10 mppa in 2021 air noise exposure levels, $L_{Aeq,8h}$ average mode summer night, and relative change

	Residential receptor	Absolute level ($L_{Aeq,8h}$) dB(A) or change re: 10 mppa 2021			
		Baseline 2017	10 mppa 2021	12 mppa 2026	10 mppa 2026
1	Henley Park, Yatton	-2	(50)	0	-1
2	Bishops Road, Cleeve	-2	(50)	0	-1
3	Fountain Treeworks, Brockley	-1	(58)	0	-1
4	Cooks Bridle Path, Downside	-1	(57)	0	-1
5	Downside Road, Downside	-2	(56)	0	-1
6	School Lane, Lulsgate Bottom	-1	(58)	0	-1
7	Hillview Gardens, Felton	-2	(52)	0	-1
8	Market Place, Winford	-1	(56)	+1	0
9	Chew Magna, North Wick	-1	(51)	+1	0
10	Church Road, Norton Malreward	-1	(47)	0	0
11	Lye Mead, Winford	-2	(51)	0	-1
12	Red Hill, Redhill	-2	(48)	0	-2
13	Wrington Hill, Wrington	-2	(55)	0	-1
14	Southlands Way, Congresbury	-2	(49)	0	-1

7.10.43 For six of the fourteen locations, the absolute noise levels for 10 mppa 2021 all lie at or just above the SOAEL of 55 dB, with the remainder lying below. This is also the case for the 12 mppa 2026 scenario. This is similar to the case now with four of the fourteen receptors experiencing night noise at or above the SOAEL.

7.10.44 The results show negligible increases in noise of 1 to 2 dB at all locations, from the baseline (2017) conditions during the night and those likely to arise for 10 mppa 2021, as currently permitted.

7.10.45 Noise levels during the night will also see little variation under 12 mppa 2026 from those expected for 10 mppa 2021, with two locations experiencing a negligible increase of 1 dB and 12 locations where the noise level remains the same.

7.10.46 For the sensitivity case, this shows a reduction in noise against 10 mppa 2021, with 11 locations experiencing a negligible decrease in noise level of 1 to 2 dB and three locations where the noise level remains the same.

7.10.47 The differences in night-time air noise between the 12 mppa 2026 and 10 mppa 2026 scenarios are similar, with the majority of locations experiencing a negligible increase of 1 dB in the 12 mppa scenario.

Baseline year (2017) vs Future (10 mppa in 2021)

7.10.48 Bristol Airport is forecast to grow to its permitted passenger limit of 10 mppa by 2021, irrespective of whether the Proposed Development is permitted. This section summarises the noise effects expected (compared to 2017) as a result of this growth to Bristol Airport's permitted passenger throughput of 10 mppa and the resulting effects on the local community.

7.10.49 Annual aircraft movements are forecast to increase from 73,562 in 2017 to 86,973 in 2021. This increase will be accompanied by the replacement of some of the most common aircraft at Bristol Airport with their more modern equivalents.

7.10.50 Under the 10 mppa in 2021 scenario, while aircraft movements will increase, noise exposure levels during the day are predicted to reduce slightly due to the modernisation of the aircraft fleet, leading to a slight reduction in the number of people adversely affected by air noise. For example, the number of dwellings exposed to noise levels at or above the LOAEL reduces slightly from 3,250 to 3,150. The associated change in noise level at these receptors is negligible, with most experiencing a decrease of less than 1 dB, with some experiencing an increase of less than 1 dB. This is considered to be a very low effect. The small number of dwellings exposed to noise levels at or above the SOAEL, around 20 dwellings in 2017 falling to around 10 in 2021, experience similar changes in noise level and therefore also a very low effect.

7.10.51 As air traffic increases in the future at night, the number of dwellings that are exposed to noise levels at or above the LOAEL will rise, from 3,750 in 2017 to 5,150 in 2021. The number of dwellings exposed to noise levels at or above the SOAEL increases from 150 in 2017 to 300 in 2021. Of these dwellings, 15 will experience an increase in noise level of 2 to 3 dB and an absolute level above the SOAEL. This constitutes a moderate adverse effect for these dwellings. The remaining dwellings experience either lower absolute noise levels or lower changes in noise level, which constitutes a low or very low adverse effect.

7.10.52 In summary, the air noise effects during the day are not expected to materially change between the 2017 and 10 mppa in 2021 scenarios. Approximately 150 dwellings are exposed to significant levels of night-time air noise under the 2017 scenario. This number will increase to around 300 by 2021. Most of these dwellings, however, will experience only a low or very low effect due to negligible changes in noise level. 15 dwellings will experience a moderate adverse effect, located in the Lulsgate Bottom area close to the eastern end of the runway. All of the dwellings exposed to significant levels of external air noise, both now and in 2021, are eligible under Bristol Airport's current sound insulation scheme and therefore have the option to improve the sound insulation to reduce the internal noise levels. To date, the number of properties that have been insulated are as follows:

- 2000 – 2001: circa 261 properties;
- 2015: 14 properties;
- 2016: 40 properties;
- 2017: 8 properties; and
- 2018: 5 properties.

7.10.53 The number of dwellings exposed to a significant level of noise due to individual aircraft events at least once per night increases from 250 in 2017 to 650 under the 10 mppa in 2021 scenario. This is a potentially significant adverse effect.

Future (10 mppa in 2021) to Future (12 mppa in 2026) With Development

7.10.54 This section summarises the noise effects expected (compared to those currently permitted) as a result of growth from 10 mppa to 12 mppa by 2026. It describes and compares the effects of the two key scenarios assessed in this ES.

7.10.55 Annual aircraft movements are forecast to increase from the 86,973 in 2021, based on the permitted passenger throughput of 10 mppa, to 97,393 in 2026, relating to 12 mppa. This increase will be accompanied by a further replacement of some of the most common aircraft types at Bristol Airport with their more modern equivalents.

7.10.56 **Table 7.39** and **Table 7.40** summarise for the daytime and night-time how this change will affect residential dwellings based on the absolute levels arising under the 12 mppa in 2026 scenario and the change in noise level from the 10 mppa in 2021 scenario that is experienced. The beneficial change category includes the small number of dwellings experiencing no change in noise level.

7.10.57 Based on the criteria set out in **Table 7.22**, the number of residential and non-residential receptors experiencing a given air noise effect due to the change between the 10 mppa in 2021 and 12 mppa in 2026 scenarios is then set out in **Table 7.41**.

7.10.58 A potential significant effect (adverse or beneficial) is considered to arise in **Table 7.39** if the magnitude of the effect is rated as medium or higher. Whether a significant effect arises will depend on context, such as the number of noise sensitive receptors affected and how often it occurs.

Table 7.39 Dwellings exposed to absolute air noise and change in air noise, 10 mppa 2021 to 12 mppa 2026, daytime

Subjective description of impact	Contour band, dB $L_{Aeq,16h}$	Number of dwellings in band, 12 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Moderate	Substantial	Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Negligible	**51 (LOAEL)**	1,550	Beneficial	1,550	0	0	0	0
		650	Adverse	650	0	0	0	0
Very minor	**54**	250	Beneficial	250	0	0	0	0
		200	Adverse	200	0	0	0	0
Minor	**57**	90	Beneficial	90	0	0	0	0
		250	Adverse	250	0	0	0	0
Minor/ Moderate	**60**	40	Beneficial	40	0	0	0	0
		80	Adverse	80	0	0	0	0
Significant Moderate	**63 (SOAEL)**	0	Beneficial	0	0	0	0	0
		10	Adverse	10	0	0	0	0

Subjective description of impact	Contour band, dB $L_{Aeq,16h}$	Number of dwellings in band, 12 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Moderate	Substantial	Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Significant Substantial	**66**	1	Beneficial	1	0	0	0	0
		0	Adverse	0	0	0	0	0
Significant Very Substantial	**69 (UAEL)**	0	Beneficial	0	0	0	0	0
		0	Adverse	0	0	0	0	0
Total		1,950	Beneficial	1,950	0	0	0	0
		1,150	Adverse	1,150	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

Table 7.40 Dwellings exposed to absolute air noise and change in air noise, 10 mppa 2021 to 12 mppa 2026, night-time

Subjective description of impact	Contour band, dB $L_{Aeq,8h}$	Number of dwellings in band, 12 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Moderate	Substantial	Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Negligible	**45 (LOAEL)**	1,700	Beneficial	1,700	0	0	0	0
		350	Adverse	350	0	0	0	0
Very minor	**48**	600	Beneficial	600	0	0	0	0
		1,500	Adverse	1,500	0	0	0	0
Minor	**51**	200	Beneficial	200	0	0	0	0
		250	Adverse	250	0	0	0	0
Minor/ Moderate	**54**	30	Beneficial	30	0	0	0	0
		90	Adverse	90	0	0	0	0
Significant Moderate	**SOAEL (55)**	80	Beneficial	80	0	0	0	0
		250	Adverse	250	0	0	0	0

Subjective description of impact	Contour band, dB $L_{Aeq,8h}$	Number of dwellings in band, 12 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Moderate	Substantial	Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Significant Substantial	**60**	0	Beneficial	0	0	0	0	0
		10	Adverse	10	0	0	0	0
Significant Very Substantial	**63**	1	Beneficial	1	0	0	0	0
		0	Adverse	0	0	0	0	0
Total		2,600	Beneficial	2,600	0	0	0	0
		2,450	Adverse	2,450	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

Table 7.41 Air noise effect on number of dwellings and non-residential receptors – 10 mppa 2021 to 12 mppa 2026

Receptor Type	12 mppa outdoor noise level, dB	Beneficial[1] or adverse change	Magnitude of effect				
			Very low	Low	Medium	High	Very High
			Change in noise level, dB(A)				
Residential Day (07:00-23:00)	51 ≤ $L_{Aeq,16h}$ < 63	Beneficial	1,950	0	0	0	0
		Adverse	1,150	0	0	0	0
	$L_{Aeq,16h}$ ≥ 63	Beneficial	1	0	0	0	0
		Adverse	10	0	0	0	0
Residential Night (23:00-07:00)	45 ≤ $L_{Aeq,8h}$ < 55	Beneficial	2,500	0	0	0	0
		Adverse	2,200	0	0	0	0
	$L_{Aeq,8h}$ ≥ 55	Beneficial	80	0	0	0	0
		Adverse	250	0	0	0	0
Schools	$L_{Aeq,30min}$ ≥ 55	Beneficial	1	0	0	0	0

Receptor Type	12 mppa outdoor noise level, dB	Beneficial[1] or adverse change	Magnitude of effect				
			Very low	Low	Medium	High	Very High
			Change in noise level, dB(A)				
		Adverse	1	0	0	0	0
Places of worship	$51 \leq L_{Aeq,16h} < 63$	Beneficial	1	0	0	0	0
		Adverse	5	0	0	0	0
	$L_{Aeq,16h} \geq 63$	Beneficial	0	0	0	0	0
		Adverse	0	0	0	0	0
Amenity Areas	$L_{Aeq,T} \geq 55$	Beneficial	0	0	0	0	0
		Adverse	3	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

7.10.59 While aircraft movements will increase under the 12 mppa 2026 scenario, this is largely offset by the predicted modernisation of the aircraft fleet. Therefore, noise exposure levels are predicted to remain broadly the same, leading to no material change in the number of those people adversely affected by air noise.

7.10.60 The number of dwellings exposed to daytime noise levels at or above the LOAEL reduces slightly from 3,150 to 3,100. The associated change in noise level at these receptors is negligible, with most experiencing a decrease of less than 1 dB, and some experiencing an increase of less than 1 dB. This constitutes a very low effect. The small number of dwellings exposed to noise levels at or above the SOAEL, around 10 dwellings in both scenarios, experience similar changes in noise level and therefore also a very low effect.

7.10.61 The number of dwellings that are exposed to night-time noise levels at or above the LOAEL will decrease slightly under the 12 mppa scenario, reducing from 5,150 to 5,050. Around 2,600 will experience either no change or a negligible reduction in night noise exposure of 0 to 1 dB, and around 2,450 will experience a negligible increase of 0 to 2 dB in 2026 as compared to 2021. This constitutes a low or very low effect for these dwellings.

7.10.62 In summary, the air noise effects are not expected to materially change between the 10 mppa in 2021 and 12 mppa in 2026 scenarios. Approximately 300 dwellings are exposed to significant levels of night-time air noise under the 10 mppa 2021 scenario. This number will increase to around 350 under the 12mppa 2026 scenario. All of these dwellings, however, will experience only a low or very low effect due to negligible changes in noise level. All of the dwellings exposed to significant levels of external air noise, both in 2021 and 2026, are eligible under Bristol Airport's current sound insulation scheme and therefore have the option to improve the sound insulation to reduce the internal noise levels. All properties can also benefit from the Enhanced Sound Insulation Scheme as well.

7.10.63 The number of dwellings exposed to a significant level of noise due to individual aircraft events at least once per night decreases from 650 under the 10 mppa in 2021 scenario to 100 under the 12 mppa in 2026 scenario. This is a potentially significant adverse effect.

7.10.64 A summary of these noise effects with an overall significance finding is set out in **Table 7.42**.

Table 7.42 Summary of air noise effects, 10 mppa 2021 to 12 mppa 2026

Receptor type	$L_{Aeq,T}$ noise criterion	No Change/Beneficial or Adverse[1]	Receptor Nos. in $L_{Aeq,T}$[2]	Change in noise level	% Change in Highly Annoyed/ Sleep Disturbed[3]	Change in dwellings SEL/L_{ASmax} (night)	Significance of Effect
Residential – Day					-1% A.		**Negligible beneficial, not significant**
LOAEL	51 dB $L_{Aeq,16h}$	No change/Benef.	1,950	Negligible			
		Adverse	650	Negligible			
SOAEL	63 dB $L_{Aeq,16h}$	No change/Benef.	1	Negligible			
		Adverse	10	Negligible			
Residential – Night					-6% S.D.		**Negligible adverse, not significant**
LOAEL	45 dB $L_{Aeq,8h}$	No change/Benef.	2,500	Negligible		70 SEL/60 L_{ASmax} (min 10 events) +1,200 (+23%)	
		Adverse	2,200	Negligible			
SOAEL	55 dB $L_{Aeq,8h}$	No change/Benef.	80	Negligible		90 SEL/80 L_{ASmax} (min 1 event) -550 (-85%)	
		Adverse	250	Negligible			
Schools	55 dB $L_{Aeq,30m}$	No change/Benef.	1	Negligible			**Negligible adverse, not significant**
		Adverse	1	Negligible			
Places of Worship	As residential, day	No change/Benef.	1	Negligible			**Negligible adverse, not significant**
		Adverse	5	Negligible			
Amenity Areas	55 dB $L_{Aeq,T}$	No change/Benef.	0	Negligible			**Negligible adverse,**

Receptor type	$L_{Aeq,T}$ noise criterion	No Change/Beneficial or Adverse[1]	Receptor Nos. in $L_{Aeq,T}$[2]	Change in noise level	% Change in Highly Annoyed/ Sleep Disturbed[3]	Change in dwellings SEL/L_{ASmax} (night)	Significance of Effect
							not significant
		Adverse	3	Negligible			

1. States whether noise change is zero or a reduction (No change/beneficial) or an increase (adverse) moving from scenario A to scenario B.
2. The receptor numbers for LOAEL are those exposed to a noise level equal to or greater than LOAEL (assessed in terms of $L_{Aeq,16h}$ daytime, $L_{Aeq,8h}$ night-time) but less than SOAEL, following a move from scenario A to scenario B. Those for SOAEL, relate to receptors exposed to a noise level equal to or greater than SOAEL. For non-residential receptors, it shows the change in the number of those exposed to the specified criterion level.
3. Percentage changes based on unrounded data.

Future (10 mppa in 2026) to Future (12 mppa in 2026) With Development

7.10.65 The effect of air noise on residential receptors in 2026 without the Proposed Development has been assessed assuming that Bristol Airport is limited to a throughput of 10 mppa in 2026. This is compared in this section to the 12 mppa 2026 scenario with the Proposed Development.

7.10.66 If the Proposed Development does not proceed, Bristol Airport would be constrained from 2021 onwards to 10 mppa. The number of aircraft movements in the 10 mppa in 2026 scenario is assumed to therefore remain at 86,973, as would occur in the 10 mppa in 2021 scenario. If the Proposed Development does proceed, annual aircraft movements are forecast to increase to 97,393 in the 12 mppa in 2026 scenario.

7.10.67 It has been assumed that the same proportion of the aircraft fleet has been modernised in both 2026 scenarios. In practice it is likely that modernisation would occur at a slower rate if passenger throughput were constrained to 10 mppa. This is because the likelihood that more modern, quieter aircraft will be allocated to Bristol Airport is reduced since no potential of growth for the airline will be present. Airlines are already securing flights to destinations and associated 'slots' at airports as far ahead as summer 2020 at the time of writing. If an airline can be assured growth at another airport it may seek to deliver a competitive advantage to secure capacity now. As airports are coming under increased pressure to reduce noise impacts, securing more modern aircraft fleets coupled with growth is a key way in which this can occur sustainably. Therefore, the 10 mppa 2026 scenario is a worst-case comparison for the 12 mppa scenario as the expectation of aircraft modernisation is similar.

7.10.68 **Table 7.43** and **Table 7.44** summarise for the daytime and night-time how this change will affect residential dwellings based on the absolute levels arising under 12 mppa in 2026 scenario and the change in noise level from the 10 mppa in 2026 scenario that is experienced. The beneficial change category includes those dwellings experiencing no change in noise level.

7.10.69 Based on the criteria set out in **Table 7.22**, the number of residential and non-residential receptors experiencing a given air noise effect due to the change between the 10 mppa in 2026 and 12 mppa in 2026 scenarios is then set out in **Table 7.45**.

7.10.70 A potential significant effect (adverse or beneficial) is considered to arise in **Table 7.43** if the magnitude of the effect is rated as medium or higher. Whether a significant effect arises will depend on context, such as the number of noise sensitive receptors affected and how often it occurs.

Table 7.43 Dwellings exposed to absolute air noise and change in air noise, 10 mppa 2026 to 12 mppa 2026, daytime

Subjective description of impact	Contour band, dB $L_{Aeq,16h}$	Number of dwellings in band, 12 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Moderate	Substantial	Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Negligible	**51 (LOAEL)**	0	Beneficial	0	0	0	0	0
		2,200	Adverse	2,200	0	0	0	0
Very minor	**54**	0	Beneficial	0	0	0	0	0
		400	Adverse	400	0	0	0	0
Minor	**57**	0	Beneficial	0	0	0	0	0
		350	Adverse	350	0	0	0	0
Minor/ Moderate	**60**	0	Beneficial	0	0	0	0	0
		100	Adverse	100	0	0	0	0
Significant Moderate	**63 (SOAEL)**	0	Beneficial	0	0	0	0	0
		10	Adverse	10	0	0	0	0
Significant Substantial	**66**	0	Beneficial	0	0	0	0	0
		1	Adverse	1	0	0	0	0
Significant Very Substantial	**69 (UAEL)**	0	Beneficial	0	0	0	0	0
		0	Adverse	0	0	0	0	0
Total		0	Beneficial	0	0	0	0	0
		3,100	Adverse	3,100	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

Table 7.44 Dwellings exposed to absolute air noise and change in air noise, 10 mppa 2026 to 12 mppa 2026, night-time

Subjective description of impact	Contour band, dB $L_{Aeq,8h}$	Number of dwellings in band, 12 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Moderate	Substantial	Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Negligible	**45 (LOAEL)**	0	Beneficial	0	0	0	0	0
		2,050	Adverse	2,050	0	0	0	0
Very minor	**48**	0	Beneficial	0	0	0	0	0
		2,100	Adverse	2,100	0	0	0	0
Minor	**51**	0	Beneficial	0	0	0	0	0
		450	Adverse	450	0	0	0	0
Minor/ Moderate	**54**	0	Beneficial	0	0	0	0	0
		100	Adverse	100	0	0	0	0
Significant Moderate	**SOAEL (55)**	0	Beneficial	0	0	0	0	0
		300	Adverse	300	0	0	0	0
Significant Substantial	**60**	0	Beneficial	0	0	0	0	0
		10	Adverse	10	0	0	0	0
Significant Very Substantial	**63**	0	Beneficial	0	0	0	0	0
		1	Adverse	1	0	0	0	0
Total		0	Beneficial	0	0	0	0	0
		5,050	Adverse	5,050	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

Table 7.45 Air noise effect on number of dwellings and non-residential receptors – 10 mppa 2026 to 12 mppa 2026

Receptor Type	12 mppa outdoor noise level, dB	Beneficial[1] or adverse change	Magnitude of effect				
			Very low	Low	Medium	High	Very High
			Change in noise level, dB(A)				
Residential Day (07:00-23:00)	51 ≤ $L_{Aeq,16h}$ < 63	Beneficial	0	0	0	0	0
		Adverse	3,100	0	0	0	0
	$L_{Aeq,16h}$ ≥ 63	Beneficial	0	0	0	0	0
		Adverse	10	1	0	0	0
Residential Night (23:00-07:00)	45 ≤ $L_{Aeq,8h}$ < 55	Beneficial	0	0	0	0	0
		Adverse	4,700	0	0	0	0
	$L_{Aeq,8h}$ ≥ 55	Beneficial	0	0	0	0	0
		Adverse	250	70	0	0	0
Schools	$L_{Aeq,30min}$ ≥ 55	Beneficial	0	0	0	0	0
		Adverse	2	0	0	0	0
Places of worship	51 ≤ $L_{Aeq,16h}$ < 63	Beneficial	0	0	0	0	0
		Adverse	6	0	0	0	0
	$L_{Aeq,16h}$ ≥ 63	Beneficial	0	0	0	0	0
		Adverse	0	0	0	0	0
Amenity Areas	$L_{Aeq,T}$ ≥ 55	Beneficial	0	0	0	0	0
		Adverse	3	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

7.10.71 As aircraft movements will increase under the 12 mppa 2026 scenario, as compared to the 10 mppa 2026 scenario, with little difference in fleet mix, noise exposure levels are predicted to rise slightly.

7.10.72 The differences in daytime air noise between the 12 mppa 2026 and 10 mppa 2026 scenarios are small, with increases in the range 0 to 2 dB occurring with the Proposed Development.

7.10.73 The number of dwellings that are exposed to daytime noise levels at or above the LOAEL will rise from 2,200 to 3,100, from 10 mppa to 12 mppa, with these receptors experiencing a negligible increase of generally around 1 dB, a very low effect.

7.10.74 There are very few dwellings exposed to the SOAEL or above during the daytime, around 10 dwellings both under the 10 mppa and 12 mppa scenarios. Under the 12 mppa scenario, these properties, in the Lulsgate Bottom area, would experience a negligible increase in noise exposure level giving rise to a low or very low effect of no significance.

7.10.75 Around 4,150 dwellings are exposed to night-time air noise at or above the LOAEL under 10 mppa in 2026 and this will increase to 5,050 under 12 mppa with the Proposed Development. The change in noise for these receptors under 12 mppa would be negligible, around 1 dB, a very low effect.

7.10.76 Around 250 dwellings are exposed to night-time air noise at or above the SOAEL under 10 mppa in 2026, increasing to around 350 under 12 mppa. Again, the change in noise for these receptors under 12 mppa would be negligible, around 1 dB, a low or very low effect.

7.10.77 In summary, the air noise effects are expected to increase by a low or very low amount under the 12 mppa in 2026 scenario when compared to the 10 mppa in 2026 scenario. Around 10 dwellings are exposed to significant levels of daytime air noise under both scenarios. At night, the number exposed to significant levels of air noise increases from 250 under the 10 mppa in 2026 scenario to 350 under the 12 mppa in 2026 scenario.

7.10.78 A summary of these noise effects with an overall significance finding is set out in **Table 7.46**.

Table 7.46 Summary of air noise effects, 10 mppa 2026 to 12 mppa 2026

Receptor type	$L_{Aeq,T}$ noise criterion	No Change/Beneficial or Adverse[1]	Receptor Nos. in $L_{Aeq,T}$[2]	Change in noise exposure	% Change in Highly Annoyed/ Sleep Disturbed[3]	Change in dwellings SEL/L_{ASmax} (night)	Significance of Effect
Residential – Day					+37% A.		**Negligible adverse, not significant**
LOAEL	51 dB $L_{Aeq,16h}$	No change/Benef.	0	Negligible			
		Adverse	3,100	Negligible			
SOAEL	63 dB $L_{Aeq,16h}$	No change/Benef.	0	Negligible			
		Adverse	10	Negligible			
Residential – Night					+18% S.D.		**Negligible adverse, not significant**
LOAEL	45 dB $L_{Aeq,8h}$	No change/Benef.	0	Negligible		70 SEL/60 L_{ASmax} (min 10 events) +1,950 (+44%)	

Receptor type	$L_{Aeq,T}$ noise criterion	No Change/Beneficial or Adverse[1]	Receptor Nos. in $L_{Aeq,T}$[2]	Change in noise exposure	% Change in Highly Annoyed/ Sleep Disturbed[3]	Change in dwellings SEL/L_{ASmax} (night)	Significance of Effect
		Adverse	4,700	Negligible			
SOAEL	55 dB $L_{Aeq,8h}$	No change/Benef.	0	Negligible		90 SEL/80 L_{ASmax} (min 1 event) No change	
		Adverse	350	Negligible			
Schools	55 dB $L_{Aeq,30m}$	No change/Benef.	0	Negligible			**Negligible adverse, not significant**
		Adverse	2	Negligible			
Places of Worship	As residential, day	No change/Benef.	0	Negligible			**Negligible adverse, not significant**
		Adverse	6	Negligible			
Amenity Areas	55 dB $L_{Aeq,T}$	No change/Benef.	0	Negligible			**Negligible adverse, not significant**
		Adverse	3	Negligible			

1. States whether noise change is zero or a reduction (No change/beneficial) or an increase (adverse) moving from scenario A to scenario B.
2. The receptor numbers for LOAEL are those exposed to a noise level equal to or greater than LOAEL (assessed in terms of $L_{Aeq,16h}$ daytime, $L_{Aeq,8h}$ night-time) but less than SOAEL, following a move from scenario A to scenario B. Those for SOAEL, relate to receptors exposed to a noise level equal to or greater than SOAEL. For non-residential receptors, it shows the change in the number of those exposed to the specified criterion level.
3. Percentage changes based on unrounded data.

7.10.79 In summary, when considering the noise impacts likely to arise as a result of moving from a 10 mppa scenario under 2021 or 2026 to a 12 mppa scenario with the Proposed Development, these are predicted to be low or very low with no significant effects.

7.11 Assessment of effects – ground noise

7.11.1 **Section 7E.5** of **Appendix 7E** provides the detailed results of the ground noise assessment. Ground noise contours are presented, along with contour areas and dwelling counts within each contour band for residential receptors. Noise exposure values are also presented for noise sensitive non-residential receptors. Key results are presented in this section. Note that the significance ratings arising from the effects described here are described in the next section titled "Predicted ground noise effects and their significance". Where percentage changes are given, these are based on unrounded values.

7.11.2 For all tables in this section, areas are rounded to the nearest 0.1km^2. Dwelling and population counts are rounded to the nearest 50 above 100 and to the nearest 10 below 100. Below 10, the

actual number is given. The counts include all those dwellings or people within a specified contour band and any higher value bands so, for example, any dwellings within a 60 dB contour would also be counted as being within a 50 dB contour as well.

Residential receptors

$L_{Aeq,16h}$ daytime

7.11.3 The dwelling counts within key daytime ground noise contours are presented in **Table 7.47**. These contours are presented in **Figure 7E.3** to **Figure 7E.5**.

Table 7.47 Ground noise dwelling counts, $L_{Aeq,16h}$ average summer day

Contour $L_{Aeq,16h}$ dB(A)	Number of Dwellings		
	Baseline 2017	10 mppa 2026	12 mppa 2026
50	70	80	70
60	1	1	1
70	0	0	0

7.11.4 **Table 7.47** shows that in 2017, around 70 dwellings are adversely affected by ground noise as a result of daytime aircraft operations at Bristol Airport. This total is expected to remain much the same, although marginally increase to around 80 in the 10 mppa scenario.

7.11.5 Currently, and in the future under any scenario, only one residential receptor is predicted to experience ground noise above the SOAEL of 65 dB $L_{Aeq,16h}$, which is Core Hill, on Cooks Bridle Path to the north-west of the western stands at Bristol Airport. Core Hill was previously provided a grant of almost £9,000 as part of the 2000-2001 insulation scheme.

7.11.6 No residential receptors are exposed to unacceptable levels of daytime ground noise currently, nor will they be in the future.

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

7.11.7 Turning to the night-time effects, **Table 7.48** show the dwelling counts within key night-time ground noise contours. These contours are presented in **Figure 7E.6** to **Figure 7E.8**.

Table 7.48 Ground noise dwelling counts, $L_{Aeq,8h}$ average summer night

Contour $L_{Aeq,8h}$ dB(A)	Number of Dwellings		
	Baseline 2017	10 mppa 2026	12 mppa 2026
45	70	100	100
55	1	2	3
65	0	0	0

7.11.8 **Table 7.48** shows that in 2017, around 70 dwellings are adversely affected by ground noise as a result of night-time aircraft operations at Bristol Airport. This total is expected to increase to around 100 under both future scenarios.

7.11.9 Currently, only one residential receptor is predicted to experience ground noise above the SOAEL of 60 dB $L_{Aeq,8h}$, which is the same property as is exposed to the SOAEL in the daytime. This is predicted to increase to two dwellings under the 10 mppa scenario and increase to three dwellings under the 12 mppa scenario. The additional dwellings are The Lodge in the 10 mppa scenario and North Hill House in the 12 mppa scenario. Both of these are also on Cooks Bridle Path.

7.11.10 No residential receptors are exposed to unacceptable levels of night-time ground noise currently, nor will they be in the future.

Variation in noise levels at representative residential receptors

7.11.11 To explore by how much noise exposure levels in the day and night periods are expected to change between different scenarios, noise predictions have been undertaken comparing various scenarios and the change expected for all residential receptors, considered in different noise exposure bands. These tables depict, for each noise exposure band, the number of receptors that will experience either no change/a beneficial change in noise or an adverse change in noise. These tables are presented in **Appendix 7E**. To further demonstrate these effects, an assessment of the expected noise change between various scenarios is also provided at a series of representative residential receptors around Bristol Airport. The receptors assessed are shown in **Figure 7.2**.

7.11.12 **Table 7.49** shows the daytime and night-time ground noise exposure levels for 10 mppa 2026 (in brackets) and the relative change in noise level for the baseline (2017) and the 12 mppa 2026 scenario, at representative residential receptors.

Table 7.49 10 mppa 2026 air noise exposure levels, average summer day and night, and relative change

Receptor	Location	Daytime $L_{Aeq,16h}$ (dB)			Night-time $L_{Aeq,8h}$ (dB)		
		2017	10 mppa 2026	12 mppa 2026	2017	10 mppa 2026	12 mppa 2026
A	Cooks Bridle Path, Downside	0	(61)	+2	-3	(59)	+2
B	Downside Road, Lulsgate Bottom	0	(58)	-6	-2	(54)	-7
C	School Lane, Lulsgate Bottom	0	(52)	0	-4	(50)	-1
D	Red Hill (A38), Redhill	0	(45)	+1	-2	(41)	0
E	Winters Lane, Redhill	0	(47)	+1	-2	(44)	0
F	Downside Road, Downside	0	(53)	+1	-1	(50)	+1
G	Downside Road, Downside	0	(50)	-1	-2	(47)	-1
H	Downside Road, Lulsgate Bottom	+2	(56)	-5	-3	(53)	-6
I	Bridgwater Road (A38), Lulsgate Bottom	0	(50)	-1	-3	(47)	-1
J	Red Hill (A38), Redhill	0	(43)	0	-2	(39)	0
K	Winters Lane, Redhill	0	(50)	+1	-2	(46)	+1

7.11.13 In both the daytime and night-time periods for the 10 mppa scenario, one of the 11 locations lies at or above the SOAEL, which is Cooks Bridle Path. This is also the situation both in 2017 and under the 12 mppa scenario.

7.11.14 **Table 7.49** shows that in the daytime period, there is in general little change between the 2017 and 10 mppa scenarios, with no change for 10 of the 11 locations, and a negligible decrease of 2 dB for the 10 mppa scenario at one location. In the night-time period, there are increases from 2017 to the 10 mppa scenario. For eight of these locations this is a negligible increase of 2 dB, but for four locations this is a moderate increase of 3 to 4 dB.

7.11.15 Considering the 12 mppa scenario, in the daytime there are generally negligible changes from the 10 mppa scenario; five locations experience an increase of 1 to 2 dB, two locations experience no change, and two locations experience a decrease of 1 dB. Some locations, in particular those in Lulsgate Bottom, benefit from the additional screening resulting from the Proposed Development being built out and therefore two locations experience moderate reductions in noise level of 5-6 dB under the 12 mppa 2026 scenario. This situation is similar in the night-time period, with one location experiencing a negligible increase of 1 dB, five locations experiencing no change, and three locations experiencing a negligible decrease of 1 dB. The same two locations benefit from the additional screening, experiencing moderate or substantial decreases of 6 or 7 dB under the 12 mppa scenario.

Non-residential receptors

7.11.16 **Appendix 7E** 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

7.11.17 **Appendix 7E** identifies no schools, as being within the ZoI of ground noise around Bristol Airport.

Places of worship

7.11.18 There are two places of worship identified within the ZoI of air 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

7.11.19 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

7.11.20 This section sets out the ground noise effects arising from operations at Bristol Airport by comparing the following key scenarios:

- Baseline year (2017) vs future (10 mppa in 2026); and
- Future (10 mppa in 2026) vs future (12 mppa in 2026) With Proposed Development

7.11.21 Note that in the future, as the modernisation of the fleet will have little influence on the ground noise levels produced by aircraft, it is not necessary to consider a future 10 mppa 2021 scenario as this would be expected to give rise to the same noise effects as those under 10 mppa in 2026.

Baseline year (2017) vs Future (10 mppa in 2026)

7.11.22 Bristol Airport is forecast to grow irrespective of whether the Proposed Development proceeds. This section summarises the noise effects expected (compared to 2017) as a result of this growth to Bristol Airport's permitted passenger throughput of 10 mppa and the resulting effects on the local community.

7.11.23 Annual aircraft movements are forecast to increase from 73,562 in 2017 to 86,973 in the 10 mppa scenario.

7.11.24 Under the 10 mppa scenario, aircraft movements will remain similar in the daytime, increasing by 2% compared to 2017. Additionally, there is a reduction in the proportion of movements by propeller aircraft, which are the loudest aircraft category for ground noise. Therefore, daytime ground noise exposure levels are predicted to remain similar to now.

7.11.25 The number of dwellings exposed to noise levels at or above the LOAEL in the daytime increases slightly from 70 to 80. The associated change in noise level at these 80 receptors is negligible, with around half experiencing an increase of 1 dB or less, and the other half experiencing no change or a decrease of 1 dB or less. This is considered to be a very low effect. The one dwelling exposed to noise levels at or above the SOAEL experiences similar changes in noise level and therefore is also a very low effect.

7.11.26 At night, aircraft movements increase by around 50% compared to 2017, and are primarily made up of medium size jets both now and under the 10 mppa 2026 scenario. This results in around 100 dwellings exposed to the LOAEL or above under the 10 mppa 2026 scenario, compared to around 70 in 2017. Of these dwellings, 25 will experience a moderate increase in noise level of 3 to 4 dB. This constitutes a moderate adverse effect for these dwellings. The remainder experience an increase of 1 to 3 dB, which is considered to be a low or very low effect. One dwelling is exposed to the SOAEL under the 2017 scenario, which is Core Hill, on Cooks Bridle Path. A second dwelling becomes exposed to the SOAEL under the 10 mppa scenario, which is The Lodge, also on Cooks Bridle Path. These dwellings experience a change in noise level of 2 to 4 dB which constitutes a medium effect.

7.11.27 In summary, only one dwelling is currently experiencing significant levels of ground noise, which is expected to increase to two in the 10 mppa scenario. These dwellings also experience a minor or moderate increase in noise level, constituting a medium effect of moving from 2017 to the 10 mppa in 2026 scenario which is rated as probably significant. In practice, these dwellings are eligible under Bristol Airport's current sound insulation scheme (which is based on the air noise effect).

Future (10 mppa in 2026) to Future (12 mppa in 2026) With Development

7.11.28 This section summarises the noise effects expected (compared to that currently permitted) as a result of growth to 12 mppa in 2026. It describes and compares the effects of the two key scenarios assessed in this ES.

7.11.29 Annual aircraft movements are forecast to increase from 86,973 in the 10 mppa scenario to 97,393 in the 12 mppa scenario.

7.11.30 **Table 7.50** and **"Beneficial"** rows include a small number of dwellings with zero change.

7.11.31 **Table 7.51** summarise for the daytime and night-time how this change will affect residential dwellings based on the absolute levels arising under 12 mppa in 2026 scenario and the change in noise level from the 10 mppa in 2026 scenario that is experienced. The beneficial change category includes those dwellings experiencing no change in noise level.

7.11.32 Based on the criteria set out in **Table 7.26**, the number of residential and non-residential receptors experiencing a given air noise effect due to the change between the 10 mppa in 2026 and 12 mppa in 2026 scenarios is set out in **Table 7.52**.

7.11.33 A potential significant effect (adverse or beneficial) is considered to arise in **Table 7.52** if the magnitude of the effect is rated as medium or higher. Whether a significant effect arises will depend on context, such as the number of noise sensitive receptors affected and how often it occurs.

Table 7.50 Dwellings exposed to absolute ground noise and change in ground noise, 10 mppa 2026 to 12 mppa 2026, daytime

Subjective description of impact	Contour band, dB $L_{Aeq,16h}$	Number of dwellings in band, 12 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Significant Moderate	Significant Substantial	Significant Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Negligible	**50 (LOAEL)**	60	Beneficial	20	5	30	4	0
		10	Adverse	10	0	0	0	0
Minor	**55**	0	Beneficial	0	0	0	0	0
		3	Adverse	3	0	0	0	0
Significant Moderate	**60 (SOAEL)**	0	Beneficial	0	0	0	0	0
		1	Adverse	1	0	0	0	0
Significant Substantial	**65**	0	Beneficial	0	0	0	0	0
		0	Adverse	0	0	0	0	0
Significant Very Substantial	**70 (UAEL)**	0	Beneficial	0	0	0	0	0
		0	Adverse	0	0	0	0	0
Total		60	Beneficial	20	5	30	4	0
		10	Adverse	10	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

Table 7.51 Dwellings exposed to absolute ground noise and change in ground noise, 10 mppa 2026 to 12 mppa 2026, night-time

Subjective description of impact	Contour band dB $L_{Aeq,8h}$	Number of dwellings in band, 10 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Significant Moderate	Significant Substantial	Significant Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Negligible	**45 (LOAEL)**	80	Beneficial	40	9	30	4	0
		30	Adverse	30	0	0	0	0
Minor	**50**	0	Beneficial	0	0	0	0	0
		2	Adverse	2	0	0	0	0
Significant Moderate	**55 (SOAEL)**	0	Beneficial	0	0	0	0	0
		2	Adverse	2	0	0	0	0
Significant Substantial	**60**	0	Beneficial	0	0	0	0	0
		1	Adverse	1	0	0	0	0
Significant Very Substantial	**65 (UAEL)**	0	Beneficial	0	0	0	0	0
		0	Adverse	0	0	0	0	0
Total		80	Beneficial	40	9	30	4	0
		30	Adverse	30	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

Table 7.52 Ground noise effect on number of dwellings and non-residential receptors – 10 mppa 2026 to 12 mppa 2026

Receptor Type	12 mppa outdoor noise level, dB	Beneficial[1] or adverse change	Magnitude of effect				
			Very low	Low	Medium	High	Very High
			Change in noise level, dB(A)				
Residential Day (07:00-23:00)	50 ≤ $L_{Aeq,16h}$ < 60	Beneficial	20	5	30	4	0
		Adverse	10	0	0	0	0
	$L_{Aeq,16h}$ ≥ 60	Beneficial	0	0	0	0	0

Receptor Type	12 mppa outdoor noise level, dB	Beneficial[1] or adverse change	Magnitude of effect				
			Very low	Low	Medium	High	Very High
			Change in noise level, dB(A)				
		Adverse	0	1	0	0	0
Residential Night (23:00-07:00)	$45 \leq L_{Aeq,8h} < 55$	Beneficial	40	9	30	4	0
		Adverse	30	0	0	0	0
	$L_{Aeq,8h} \geq 55$	Beneficial	0	0	0	0	0
		Adverse	3	0	0	0	0
Schools	$L_{Aeq,30min} \geq 55$	Beneficial	1	0	0	0	0
		Adverse	0	0	0	0	0
Places of worship	$50 \leq L_{Aeq,16h} < 60$	Beneficial	0	0	0	0	0
		Adverse	0	0	0	0	0
	$L_{Aeq,16h} \geq 60$	Beneficial	0	0	0	0	0
		Adverse	0	0	0	0	0
Amenity Areas	$L_{Aeq,T} \geq 55$	Beneficial	0	0	0	0	0
		Adverse	0	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

7.11.34 Under the 12 mppa scenario, aircraft movements will increase by 17% in the daytime compared to the 10 mppa scenario. The aircraft mix is forecast to remain broadly similar, with a small shift from small to medium sized jets. Therefore, with no change in infrastructure, the noise levels would be expected to increase by a negligible amount, around 1 dB, at most locations. However, the Proposed Development includes some buildings which will provide additional screening to certain receptors, in particular those in the Lulsgate Bottom area, which leads to decreased ground noise levels.

7.11.35 The number of dwellings exposed to the LOAEL in the daytime decreases slightly from 80 under the 10 mppa scenario to 70 under the 12 mppa scenario. 25 of these dwellings experience a negligible or minor reduction in absolute noise level and 10 experience a negligible increase in noise level, which constitutes a low or very low effect of no significance. 30 dwellings experience a moderate

decrease in noise level, and 4 dwellings experience a substantial decrease in noise level. These constitute medium and high beneficial effects respectively for these dwellings. One dwelling is exposed to the SOAEL under both scenarios, which is Core Hill, on Cooks Bridle Path. This dwelling experiences a negligible increase in noise level.

7.11.36 At night the situation is broadly similar, with aircraft movements increasing by around 15% compared to the 10 mppa scenario and similar small changes in fleet mix. Therefore, negligible increases would be normally expected other than where the additional screening provided by the Proposed Development has a beneficial effect.

7.11.37 The other factor at night is the variation in the restriction of night-time APU usage on stands 38 and 39. This results in slight increases for the dwellings closest to these stands, although the increases are still less than 2 dB and therefore of negligible magnitude.

7.11.38 This results in around 100 dwellings exposed to the LOAEL or above at night under both future scenarios. Of these, around 50 experience a negligible or minor reduction in absolute noise level and 10 experience a negligible increase in noise level, which constitutes a low or very low effect of no significance. 30 dwellings experience a moderate decrease in noise level, and 4 dwellings experience a substantial decrease in noise level. These constitute medium and high beneficial effects respectively for these dwellings. Two dwellings are exposed to the SOAEL under the 10 mppa scenario, which increases to three under the 12 mppa scenario. This additional dwelling is located on Cooks Bridle Path, to the north-west of the western stands at Bristol Airport. These dwellings experience a negligible increase in noise level of 1 to 2 dB and therefore a low effect.

7.11.39 In summary, only one dwelling is exposed to significant levels of ground noise under the 10 mppa scenario in the daytime period, which is expected to remain the case under the 12 mppa scenario. Two dwellings are exposed to significant levels of ground noise in the night-time period, which is expected to increase to three under the 12 mppa scenario. These dwellings experience a negligible increase in noise level of 1 to 2 dB, constituting a low effect of moving from the 10 mppa to the 12 mppa scenario which is rated as not significant. In practice, these three dwellings are all eligible under Bristol Airport's current sound insulation scheme (which is based on the air noise effect).

7.11.40 30 dwellings experience a medium decrease in noise level as a result of moving from the 10 mppa to the 12 mppa scenario which is rated as probably significant (beneficial). 4 dwellings experience a high decrease in noise level as a result of moving from the 10 mppa to the 12 mppa scenario which is rated as significant (beneficial).

7.11.41 A summary of these noise effects is set out in **Table 7.53**.

Table 7.53 Summary of ground noise effects, 10 mppa 2026 to 12 mppa 2026

Receptor type	$L_{Aeq,T}$ noise criterion	No change/Beneficial or Adverse[1]	Receptor Nos. in $L_{Aeq,T}$[2]	Change in noise exposure	Significance of Effect
Residential - Day					**Moderate beneficial, probably significant**
LOAEL	50 dB $L_{Aeq,16h}$	No change/Beneficial	20	Negligible	
			5	Minor	
			30	Moderate	
			4	Substantial	

Receptor type	$L_{Aeq,T}$ noise criterion	No change/Beneficial or Adverse[1]	Receptor Nos. in $L_{Aeq,T}$[2]	Change in noise exposure	Significance of Effect
		Adverse	10	Negligible	
			3	Minor	
SOAEL	60 dB $L_{Aeq,16h}$	No change/Beneficial.	0	N/A	
		Adverse	1	Negligible	
Residential - Night					**Moderate beneficial, probably significant**
LOAEL	45 dB $L_{Aeq,8h}$	No change/Beneficial.	40	Negligible	
			9	Minor	
			30	Moderate	
			4	Substantial	
		Adverse	30	Negligible	
			2	Minor	
SOAEL	55 dB $L_{Aeq,8h}$	No change/Beneficial.	0	N/A	
		Adverse	3	Negligible	
Schools	55 dB $L_{Aeq,30m}$	No change/Beneficial	1	Negligible	**Negligible beneficial, probably significant**
Places of Worship	As residential, day		0	N/A	None
Amenity Areas	55 dB $L_{Aeq,T}$		0	N/A	None

1. States whether noise change is zero or a reduction (No change/beneficial) or an increase (adverse) moving from scenario A to scenario B.

2. The receptor numbers for LOAEL are those exposed to a noise level equal to or greater than LOAEL (assessed in terms of $L_{Aeq,16h}$ daytime, $L_{Aeq,8h}$ night-time) but less than SOAEL, following a move from scenario A to scenario B. Those for SOAEL, relate to receptors exposed to a noise level equal to or greater than SOAEL. For non-residential receptors, it shows the change in the number of those exposed to the specified criterion level.

7.12 Assessment of effects – road traffic noise

7.12.1 **Section 7F.5** of **Appendix 7F** provides the detailed results of the road traffic noise assessment. Noise has been assessed due to road traffic using roads in the vicinity of Bristol Airport, specifically the A38, Downside Road, West Lane, and North Side Road. Road traffic noise contours are presented, along with receptor counts within each contour band. Key results are presented in this section.

7.12.2 For all tables in this section, receptor counts are rounded to the nearest 50 above 100 and to the nearest 10 below 100. Below 10, the actual number is given. Where percentage changes are given, these are based on unrounded values.

7.12.3 **Table 7.54** shows the number of receptors exposed to the LOAEL, SOAEL and UAEL values.

Table 7.54 Number of receptors, $L_{A10,18h}$

Contour $L_{A10,18h}$ dB(A)	Number of Receptors		
	Baseline 2017	10 mppa 2026	12 mppa 2026
55	100	100	100
68	20	30	30
75	2	4	4

7.12.4 **Table 7.54** shows that currently, around 100 of the assessed receptors are adversely affected by road traffic noise in the vicinity of Bristol Airport. This total is expected to remain much the same going forward to 2026 under both scenarios.

7.12.5 Currently, around 20 of the assessed residential receptors are predicted to experience road traffic noise above the SOAEL of 68 dB $L_{A10,18h}$. This is predicted to increase to around 30 in 2026 under both scenarios.

7.12.6 Two of the assessed receptors are currently exposed to road traffic levels above the UAEL. In 2026, four receptors are exposed to this level under both scenarios. These are all located very close to the A38 and are comprised of the Forge Motel and surrounding buildings. The Forge Motel and Hathaway House have unlikely benefitted from previous noise insulation since these are commercial businesses. Other residential properties in the vicinity that have benefitted from the 2000-2001 noise insulation scheme are as follows:

- 1 School Lane, Felton;
- 2 School Lane, Felton;
- 1 Church View, School Lane, Felton;
- 2 Church View, School Lane, Felton;
- Clyde House, School Lane, Felton;
- The Cottage, School Lane, Felton; and
- End House, School Lane, Felton.

Predicted road traffic noise effects and their significance

7.12.7 This section sets out the road traffic noise effects arising from operations at Bristol Airport by comparing the following key scenarios:

- Baseline year (2017) vs future (10 mppa in 2026); and
- Future (10 mppa in 2026) vs future (12 mppa in 2026) With Proposed Development.

Baseline year (2017) vs Future (10 mppa in 2026)

7.12.8 Road traffic on roads in the vicinity of Bristol Airport is forecast to increase by around 30% from the baseline (2017) scenario to the 10 mppa 2026 scenario. This results in a negligible increase in noise exposure for the dwellings affected by road traffic noise of 1 to 2 dB for all assessed dwellings, constituting a very low effect. The number of receptors exposed to the LOAEL is around 100 in 2017

and remains similar under the 10 mppa 2026 scenario. The corresponding number of receptors exposed to the SOAEL increases from around 20 to around 30.

Future (10 mppa in 2026) to Future (12 mppa in 2026) With Development

7.12.9 This section summarises the noise effects expected (compared to those currently permitted) as a result of growth from 10 mppa to 12 mppa and the resulting effects on the local community. It describes and compares the effects of the two key scenarios assessed in this ES.

7.12.10 Road traffic on the roads in the vicinity of Bristol Airport is forecast to increase by around 15% from the baseline (2017) scenario to the 10 mppa 2026 scenario. This results in a negligible increase in noise exposure for the dwellings affected by road traffic noise of less than 1 dB for all assessed dwellings, constituting a very low effect. There are also negligible beneficial changes for a small number of dwellings as a result of infrastructure changes related to the Proposed Development. The number of receptors exposed to the LOAEL, SOAEL, and UAEL are around 100, 30, and 4 respectively under both scenarios.

7.12.11 A summary of these noise effects is set out in **Table 7.55.**

Table 7.55 Summary of road traffic noise effects, 10 mppa 2026 to 12 mppa 2026

Receptor type	$L_{Aeq,T}$ noise criterion	No change/Beneficial or Adverse[1]	Receptor Nos. in $L_{Aeq,T}$[2]	Change in noise exposure	Significance of Effect
Residential - Day					**Negligible adverse, not significant**
LOAEL	55 dB $L_{A10,18h}$	No change/Benef.	4	Negligible	
		Adverse	80	Negligible	
SOAEL	68 dB $L_{A10,18h}$	No change/Benef.	0	N/A	
		Adverse	30	Negligible	
UAEL	75 dB $L_{A10,18h}$	No change/Benef.	0	N/A	
		Adverse	4	Negligible	

1. States whether noise change is zero or a reduction (No change/beneficial) or an increase (adverse) moving from scenario A to scenario B.

2. The receptor numbers for LOAEL are those exposed to a noise level equal to or greater than LOAEL (assessed in terms of $L_{A10,18h}$) but less than SOAEL, following a move from scenario A to scenario B. Those for SOAEL, relate to receptors exposed to a noise level equal to or greater than SOAEL.

7.13 Assessment of Effects – construction noise and vibration

7.13.1 A detailed assessment of construction noise and vibration is presented in **Appendix 7G**. A summary of the key findings is presented here to describe the effects and significance of noise and vibration arising from the Proposed Development.

7.13.2 Construction will take place at different times over a period of up to seven years. Some works will occur in isolation while others will occur in phases, some of which might overlap in time. This raises the possibility of a noise sensitive receptor being affected simultaneously by different types of operations at a given site. In addition, works at multiple sites might take place at the same time. To

assess this risk, consideration has been given to the current programme of works (refer to **Chapter 2: Description of the Proposed Development**). Construction noise levels likely to arise at a series of representative noise sensitive receptors have been determined based on a single phase of works, for overlapping phases of works (where relevant) as well as in conjunction with any works packages programmed to occur at a similar time.

7.13.1 Predictions of construction noise values have been made using the methods described in BS 5228-1. Assumptions used for these calculations are described in **Appendix 7G**.

7.13.2 Noise has been predicted at representative noise sensitive receptors for each construction site of the Proposed Development and for each phase of construction activity. Where phases of construction activity at a site are expected to be concurrent, a worst-case value has been predicted alongside noise estimates for each phase. Worst-case values have also been predicted where work is provisionally scheduled to occur concurrently at different construction sites.

7.13.3 Construction sites where piling and vibratory compaction will take place have been identified. The vibration impact on the identified noise sensitive receptors has been considered with reference to guidance given in BS5228-2.

7.13.4 The Proposed Development includes a number of buildings, structures and surface works, which are summarised in

7.13.5 **Table** 7.56. Most construction works will take place during the daytime during the hours of 07:30 to 18:00 Monday to Friday and Saturday 08:00 to 13:00. There is no planned working on Sundays or Bank Holidays. Some work will need to be undertaken at night, specifically for the east taxiway link and taxiway widening fillets. These works are scheduled to occur between 23:00 and 06:00 over a 6-month period. This is the only night-time construction work scheduled.

Table 7.56 Construction sites of the Proposed Development

Development	Access route	Provisional dates	Notes
New arrivals area	North Side Road	11/2019 – 04/2020	
South terminal extension	North Side Road	11/2019 – 03/2021	
West terminal extension (Phase 2A)	North Side Road	09/2020 – 06/2021	
West terminal extension (Phase 2B)	North Side Road	11/2024 – 03/2026	
New service yard	North Side Road	11/2025 – 03/2026	
Walkway and east pier	North Side Road	09/2025 – 06/2026	
New canopy to front of existing terminal	North Side Road	09/2022 – 05/2023	
Multi-storey car park	North Side Road	09/2024 – 07/2025	
Gyratory road with internal surface car parking	North Side Road	10/2020 – 06/2021	
East taxiway link	North Side Road	01/2024 – 06/2024	Night-time
Silver Zone Car Park Extension (Phase 2	Silver Zone Car Park	04/2019 – 07/2019	
Highway improvements (A38)	A38	10/2025 – 04/2026	
Taxiway widening and fillets	North Side Road	01/2024 – 06/2024	Night-time
Silver Zone Car Park Extension (Phase 1)	Silver Zone Car Park	10/2019 – 11/2019	

7.13.6 Construction noise and vibration impacts likely to arise as a result of the Proposed Development have been assessed having regard to representative sensitive receptors in the vicinity of the proposed works. These 11 receptors, A to K, can be seen in **Figure 7.2** and are described in **Appendix 7G**.

7.13.7 Baseline noise levels for receptors A to D, used in determining the noise assessment criteria, have been taken from the baseline measurements carried out at these locations, as described in **Appendix 7C**. Typical daytime ambient noise levels around Bristol Airport lie between 50 dB $L_{Aeq,12h}$ and 60 dB $L_{Aeq,12h}$ during the daytime (refer to **Appendix 7C**) and 45 dB $L_{Aeq,8h}$ and 55 dB $L_{Aeq,8h}$ during the night-time.

7.13.8 On this basis, based on the ABC method in BS 5288-1, the threshold for a potentially significant effect from construction noise adopted in this assessment is 65 dB $L_{Aeq,12h}$ for the daytime (07:00-19:00) and 55 dB $L_{Aeq,8h}$ for the night-time (23:00-07:00).

7.13.9 The threshold adopted for a potentially significant effect from construction vibration in this assessment is 1.0 mms^{-1} PPV during the daytime (07:00-23:00) and 0.3 mms^{-1} during the night-time (23:00-07:00).

7.13.10 The construction noise levels associated with the Proposed Development have been assessed at each of the eleven representative receptors for each construction site, for each phase of work. These are tabulated in in **Appendix 7G.**

Predicted construction noise and vibration effects and their significance

7.13.11 **Section 7G.6** of **Appendix 7G** provides the detailed results of the construction noise assessment. Construction noise and vibration predictions are presented, along with receptor counts within each relevant noise band. Key results are presented in this section. This section sets out the noise and vibration effects arising due to construction related to the Proposed Development.

Daytime noise

7.13.12 On an individual site and phase basis, no significant effects from daytime construction noise are expected, with one exception.

7.13.13 Noise sensitive receptors adjacent to the A38 are predicted to be exposed to construction noise levels above the adopted daytime SOAEL and threshold for a potentially significant effect from the A38 highway improvements due to their close proximity to the construction site. The predictions indicate that this threshold is likely to be exceeded for all phases of work associated with the A38 highway improvements throughout the six-month duration of these works, with daytime noise levels lying in the range 68 to 72 dB $L_{Aeq,12h}$. As a result, a significant effect is predicted in the absence of any mitigation.

7.13.14 Certain phases of daytime construction activity are scheduled to occur concurrently at the various components of the Proposed Development. For these cases, a worst-case value has been predicted for each site, assuming all construction activities for concurrent phases are to be carried out simultaneously. These are presented **in Appendix 7G**.

7.13.15 On this worst-case basis, residential receptors at the east end of Downside Road are predicted to experience construction noise levels at the daytime threshold level of 65 dB from the construction works on the gyratory road. A potentially significant effect is therefore predicted from concurrent activity on the gyratory road in the absence of any mitigation.

7.13.16 For the case of the A38 highway improvements, residential receptors in the vicinity of the A38 are already expected to be exposed to construction noise levels greater than 65 dB from individual phases of works. These receptors are predicted to experience construction noise levels of up to 75 dB from concurrent activity on the A38 roadworks site.

7.13.17 Consideration has also been given to the cumulative effects of daytime noise from multiple construction sites where the schedule of works is expected to overlap. Worst-case values have been predicted for these periods, where all construction activities for concurrent phases have been assumed to be carried out simultaneously in a given month. These are presented in in **Appendix 7G**. As resulting levels lie below 65 dB $L_{Aeq,12h}$, no significant effects are predicted due to cumulative noise from multiple construction sites, aside from at those receptors already identified to be close to the A38 roadworks and those close to the new gyratory roadworks.

7.13.18 Where significant effects have been identified, mitigation measures are required to be deployed and these are discussed in **Section 7.16**.

Night-time noise

7.13.19 On an individual site and phase basis, no significant effects from night-time construction noise are expected.

7.13.20 Due to the sequential phasing of activity of the runway construction works, no concurrent activity at individual sites is expected during the night. However, work on the east taxiway link and taxiway widening and fillets sites is provisionally scheduled to be concurrent. In this scenario, if the noisiest phase of activity (earthworks) is assumed to take place at both sites simultaneously in a given hour

then construction levels will remain below the threshold above which any potential significant effects could arise. This is shown in in **Appendix 7G**.

Vibration

7.13.21 Vibration from piling would be expected to attenuate below the criteria for a potential significant effect over the distances (≥170m) to the nearest receptors and therefore **no significant effects** are predicted from piling vibration.

7.13.22 In practice, piling is planned to involve use of a rotary bored piling rig along with the insertion of steel casings using a vibratory technique. These methods produce less vibration than that arising from driven piles which have been assessed above.

7.13.23 In **Appendix 7G** at a distance of 20m, the closest distance between site and receptor for this activity (receptor I during the A38 works), a vibration level of 0.4mms^{-1} PPV would be expected with 50% probability of this value being exceeded. This is equivalent to a vibration level of 0.8mms^{-1} PPV with 33% chance of exceedance or 1.6mms^{-1} PPV with 5% chance of exceedance.

7.13.24 Based on the results for vibratory compaction during the daytime, vibration is most likely to remain below the limit for a possible significant effect to be indicated (1mms^{-1} PPV), although there is a slim chance of levels rising to a potential moderate significant effect but remaining below a potential substantial significant effect. Considering the low probability and context that only a few residential receptors could be affected for a short duration and assuming that Best Practicable Means, including forewarning the few receptors that could be affected, are followed it is not expected that a significant effect would occur due to vibratory compaction during the A38 works.

7.13.25 Vibratory compaction during the night-time, during the east taxiway works and taxiway widening and fillets works, will take place at large distances from the nearest noise sensitive residential receptors. As a result, vibration levels at these receptors are predicted to lie well below the threshold at which any potential significant effects might be expected.

7.14 Assessment of Effects – All noise and vibration sources

Predicted effects and their significance

7.14.1 The assessment of the effects of noise considers each type of source in isolation, such as aircraft air and ground noise, road traffic and construction noise, rather than in combination. The reason for this is that the primary research undertaken into community response and noise considers each noise source separately, not in combination. A summary of the results of the assessment of the noise and vibration from various sources is provided in **Table 7.57**. These are taken from the assessment results in **Section 7.10**, **Section 7.11**, **Section 7.12** and **Section 7.13** and relate to the change from Without to With Proposed Development in 2026. In the case of air noise, the table describes noise effects likely to occur accounting for how conditions might change under 10 mppa between 2021 and 2026.

Table 7.57 Summary of significance of adverse effects

Source	Receptor type and assessment period	Magnitude of change[2]	Significance[3]	Summary rationale
Air Noise	Residential – Day	Negligible	Not significant	A small number of dwellings are exposed to a significant air noise level. Changes due to the development are negligible and therefore not significant.
	Residential – Night	Negligible	Not significant	Although some dwellings are exposed to a significant air noise level, changes due to the development are negligible and therefore not significant.
	Schools	Negligible	Not significant	One school is exposed to a significant air noise level. Changes due to the development are negligible and therefore not significant.
	Places of Worship	Negligible	Not significant	A small number of places of worship are exposed to a significant air noise level. Changes due to the development are negligible and therefore not significant.
	Amenity Areas	Negligible	Not significant	A small number of amenity areas are exposed to a significant air noise level. Changes due to the development are negligible and therefore not significant.
Airborne Aircraft Vibration	Residential	Negligible	Not significant	A very small number of dwellings are exposed to a significant vibration level. This is expected to remain similar or reduce due to the development.
Ground Noise	Residential – Day	Negligible + moderate (beneficial)	Not significant	A very small number of dwellings are exposed to a significant ground noise level. Some dwellings experience moderate reductions in noise due to screening by the new development. Overall, changes due to the development are negligible and therefore not significant.
	Residential – Night	Negligible + moderate (beneficial)	Not significant	A very small number of dwellings are exposed to a significant ground noise level. Some dwellings experience moderate reductions in noise due to screening by the new development. Overall, changes due to the development are negligible and therefore not significant.
	Schools	Negligible	Not significant	No schools are exposed to a significant ground noise level.

Source	Receptor type and assessment period	Magnitude of change[2]	Significance[3]	Summary rationale
	Amenity Areas	N/A	Not significant	No amenity areas are exposed to a significant ground noise level.
Road Traffic Noise	Residential	Negligible	Not significant	A small number of dwellings are exposed to a significant road traffic noise level. Changes due to the development are negligible and therefore not significant.
Construction Noise	Residential	N/A	Not significant	A small number of dwellings are exposed to a significant construction noise level.
Construction Vibration	Residential	N/A	Not significant	No dwellings are exposed to significant construction vibration levels.

1. The sensitivity of receptor is defined using the criteria set out in **Section 7.9** above and is defined as low, medium, high and very high.
2. The magnitude of change on a receptor resulting from activities relating to the development is defined using the criteria set out in **Section 7.9** and is defined as negligible, minor, moderate, substantial and very substantial. The change is shown as adverse unless otherwise stated.
3. The significance of the environmental effects is based on the combination of the sensitivity of a receptor and the magnitude of change and is expressed as major (significant), moderate (probably significant) or minor/negligible (not significant), subject to the evaluation methodology outlined in **Section 7.9**.

7.14.2 From **Table 7.57** it can be seen that there are no receptors subject to significant noise and vibration effects due to any noise or vibration source between the Without Development (10 mppa 2021) and With Development (12 mppa 2026) scenarios, with the exception of construction noise, which is predicted to expose a small number of dwellings to significant levels of noise.

7.15 Consideration of optional additional mitigation or compensation

7.15.1 This assessment has shown 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. Therefore, no further mitigation is required to reduce the noise and vibration effects that are identified in this ES. However, some receptors are exposed to significant levels of noise and therefore BAL already have in place a number of mitigation measures, one of which is the noise insulation grant scheme. BAL are proposing to enhance this scheme as part of the Proposed Development.

7.15.2 The assessment has found that, with no mitigation, some receptors are likely to be exposed to significant levels of noise during the construction of the Proposed Development. Therefore, a number of measures are set out in the Outline Construction Environmental Management Plan (CEMP), which forms **Appendix 2B**. These measures, described in paragraphs 7.15.14 and 7.15.15, alongside relevant and implementable embedded measures, are considered to be likely to be effective and deliverable and address the potential significant effects of the construction of the Proposed Development.

Enhanced noise insulation grant scheme

7.15.3 As part of the Proposed Development, Bristol Airport are proposing to offer an enhanced noise insulation grant scheme.

7.15.4 In this proposed scheme, the thresholds for insulation will remain as current (refer to paragraph 7.8.25), i.e. daytime 57 dB $L_{Aeq,16h}$ for the 50% grant and 63 dB $L_{Aeq,16h}$ for the 100% grant. It is noted that in all scenarios the night-time 55 dB $L_{Aeq,8h}$ contour is completely enclosed within the daytime 57 dB $L_{Aeq,16h}$ contour. Therefore, people exposed to significant levels of night-time noise will also benefit from the scheme.

7.15.5 The minimum specification of the ventilators that can be installed as part of the scheme will also be improved. These provide a benefit as with sufficient ventilation, residents are not required to open windows and therefore can experience the full acoustic benefit of the glazing.

7.15.6 The grant amount available will increase by 50%, i.e. up to £7,500 for those properties within the 63 dB $L_{Aeq,16h}$ contour and up to £3,750 for those properties within the 60dB & 57 dB $L_{Aeq,16h}$ contour.

7.15.7 For a limited time, all properties within the 57 dB $L_{Aeq,16h}$ contour for the 12 mppa 2026 scenario will be eligible to use the grant amount towards 100% of the cost of works, rather than 50%. This is intended to incentivise uptake in the short-term in order to encourage implementation of mitigation measures prior to BAL reaching 12 mppa by 2026.

7.15.8 BAL will also contact all properties within the forecast eligibility contour to make them aware of the scheme and the offer being provided. Furthermore, BAL will advertise the scheme in the constituencies where the eligibility contour reaches twice a year in order to encourage uptake.

Construction noise and vibration mitigation

7.15.9 The assessment of construction noise effects has shown that daytime construction works in the north-east area of Bristol Airport, specifically the roadworks required for the new gyratory road with internal surface parking may have a significant effect on residential properties located at the east end of Downside Road.

7.15.10 *BS5228-1* suggests that site hoardings may provide a noise reduction from 5 dB, when plant is just visible over the noise barrier, to 10 dB, when the plant is not visible over the noise barrier. On the assumption that a conventional solid timber site hoarding is installed along the northern edge of the gyratory road site, near Downside Road, with a minimum height of 2.4m, then noise at the most affected receptors is predicted to be mitigated to below the threshold for a potentially significant effect to be indicated. This is shown in **Appendix 7G** and will be secured as part of the CEMP (**Appendix 2B**).

7.15.11 Further roadworks constituting the A38 highway improvements also pose a risk to the amenity of residential properties situated close to the road, with noise levels predicted to reach up to 75 dB in the worst-case, where there is concentrated activity on site.

7.15.12 Using the same assumptions for screening as for the gyratory road, temporary barriers surrounding stationary plant such as hand-held road breakers would be predicted to mitigate noise at affected receptors. Further mitigation would be required for those residences directly adjacent to the road due to their close proximity to the works. Additional temporary solid road-side site hoardings to screen these receptors would be predicted to mitigate noise levels below the threshold for a potentially significant effect for these receptors as well. This is shown in **Appendix 7G** and will be secured as part of the CEMP (**Appendix 2B**).

7.15.13 No significant effects are expected to arise from construction vibration and therefore no vibration mitigation will be required.

Recommendations relating to the Outline Construction Environmental Management Plan

7.15.14 Measures to be considered in implementing Best Practicable Means, adopted as part of the CEMP (**Appendix 2B**) will be consistent with the recommendations in BS 5228-1[33], including:

- Project supervision – the Proposed Development will include the designation of a Project Environmental Manager to supervise the implementation of the works;
- Community Relations – keeping local people informed of progress and treating complaints fairly and expediently;
- Site Personnel Training – informing site personnel about the need to minimise noise and advising on the proper use and maintenance of tools and equipment and the positioning of machinery to reduce noise emission to the neighbourhood;
- Site Location – setting noise emission limits with due regard to the proximity of noise sensitive premises;
- Noise Monitoring – to ensure compliance with noise emission limits applicable to relevant items of plant or around the boundary of a site;
- Programme - Details of operations with an indication of the expected duration of each phase and key dates. Local residents may be willing to accept higher levels of noise if they know that the activity causing the noise will only last for a short time; and
- Type of Plant – consideration will be given to using quiet techniques taking account of practical site constraints and best practicable means. Where reasonably practicable, quiet working

methods will be employed, including use of the most suitable plant, reasonable hours of working for noisy operations, and economy and speed of operations.

7.15.15 Many of the work sites relating to the Proposed Development are located at a reasonable distance from the nearest residential receptor and the effects of construction noise and vibration will therefore be negligible. For some sites however, such as for the highway improvements to the A38, some works will take place in close proximity to dwellings. In such cases, it will be particularly important to establish a procedure by which consultation between the contractor and local residents can take place regularly, to keep them informed of progress and steps being taken to protect them from any significant effects of noise and vibration.

7.16 Conclusions of significance evaluation

Air noise and vibration

7.16.1 The Proposed Development will allow a greater number of passenger movements at Bristol Airport compared to the Without Development scenario (approximately 2 mppa beyond current permission).

7.16.2 The number of dwellings exposed to significant levels of aircraft air noise during the daytime period will generally stay the same as now and as for the Without Development scenarios (either 2021 or 2026). This is primarily due to the change in aircraft utilising Bristol Airport, with more modern, quieter types being introduced in the future.

7.16.3 The number of dwellings exposed to significant levels of air noise during the night will increase compared to the 2017 baseline and will be slightly more for the Proposed Development compared to the Without Development scenarios. This is due to an increase in the numbers of aircraft operating at Bristol Airport during the night in the future, and in the Proposed Development compared to the Without Development scenarios.

7.16.4 The change in air noise levels between the Without Development scenarios and the Proposed Development scenario is **negligible** (0 to 2 dB) for all dwellings in both the day and night periods.

7.16.5 Bristol Airport will continue to implement the various current air noise mitigation measures and will provide an enhanced noise insulation grant scheme, which includes all those dwellings exposed to significant levels of air noise as per the 12 mppa with development scenario.

7.16.6 More people will become affected by aircraft noise at night as Bristol Airport continues to grow within its permitted limits, irrespective of whether the Proposed Development goes ahead or not. The Proposed Development will give rise to a **negligible adverse** effect compared to if the Proposed Development does not go ahead and so will have **no significant effect** on the surrounding noise climate.

7.16.7 The number of people exposed to significant levels of vibration due to airborne aircraft in 2017 is very small. This is expected to remain similar or reduce in the future due to the introduction of more modern, quieter aircraft types. No significant effects are expected due to the Proposed Development.

Ground noise

7.16.8 The principle difference between future ground noise levels under the Proposed Development, as compared to those without the Proposed Development, is the change in the distribution of ground noise around the area and therefore the change in the population that will be exposed to ground noise, resulting in increased ground noise levels for some and decreases for others.

7.16.9 There is a small increase in the number of dwellings exposed to the ground noise during the day and night in the future compared to now for both the Proposed Development and Without Development scenarios. In the future, there is an increase of one in the number of dwellings exposed to the ground noise SOAEL if the Proposed Development occurs compared to if it doesn't, and a slight decrease in the number of dwellings exposed to the LOAEL in the daytime for the Proposed Development compared to the Without Development scenarios. In the future with the Proposed Development, some receptors will benefit from the additional screening provided by infrastructure leading to some significant reductions in ground noise. For all other receptors, any changes in ground noise arising from the Proposed Development as compared to Without Development in the future will experience a **negligible** change in noise level of **no significance**.

7.16.10 More people will become affected by ground noise at night as Bristol Airport continues to grow within its permitted limits, irrespective of whether the Proposed Development goes ahead or not. The Proposed Development will give rise to a **negligible adverse effect** compared to if the Proposed Development does not go ahead and so will have **no significant effect** on the surrounding noise climate.

Road traffic noise

7.16.11 The Proposed Development will change the road traffic noise levels around Bristol Airport. There is a small increase in the number of dwellings exposed to road traffic noise in the future compared to 2017 for both the Proposed Development and Without Development scenarios. There is no change in the number of dwellings exposed to road traffic noise if the Proposed Development occurs or not. The Proposed Development will give rise to a **negligible adverse effect** compared to if the Proposed Development does not go ahead, which is **not significant**.

Construction noise and vibration

7.16.12 The construction noise and vibration assessment has been carried out using predictions to a number of representative noise and vibration sensitive receptors. Accounting for the use of best practicable means and some specific mitigation measures, the construction of the Proposed Development will give rise to a **negligible adverse effect** which is **not significant**.

7.16.13 It has been recommended that the Principal Contractor develop and implement a site-specific Construction Noise and Vibration Management and Mitigation Strategy (refer to **Appendix 2B**) covering demolition and new construction. This will ensure that best practicable means are used to mitigate construction noise effects.

7.17 Implementation of environmental measures

7.17.1 **Table 7.58** describes the environmental measures accompanying the Proposed Development and the means by which they will be implemented. Full details of these are given in **Section 7.8**.

Table 7.58 Summary of environmental measures to be implemented – relating to noise and vibration

Environmental measure	Responsibility for implementation	Compliance mechanism	ES section reference
Fixed 57dB $L_{Aeq,\ 16hr}$ summer Air Noise Contour at 12.42 sq km	Bristol Airport	Planning condition[40]	**n/a**
Noise Control Scheme providing noise violation limits and penalties	Bristol Airport	Section 106 Agreement	**n/a**

Environmental measure	Responsibility for implementation	Compliance mechanism	ES section reference
for Air Noise, specification and adoption of noise and track keeping system and associated community engagement			
Fixed Shoulder Period movement limits	Bristol Airport	Planning condition[40]	**n/a**
Air noise – night noise quota count used to restrict night flying	Bristol Airport	Planning condition[40]	**Section 7.8.**
Air noise – enhanced noise insulation grants	Bristol Airport	Section 106 Agreement	**Section 7.8.**
Ground noise – limits on APU use	Bristol Airport	Planning condition[40]	**Section 7.8.**
Air and ground noise – noise abatement procedures	Bristol Airport	Aeronautical Information Package (AIP) for Bristol Airport[44.]	**Section 7.8.**

£1.8 million fund for noise insulation to accompany airport development

Created: 12th Feb 2019

Nearly £2 million will be available to local residents living near Bristol Airport as part of an enhanced noise insulation scheme accompanying development plans currently being considered by North Somerset Council.

As part of proposals to increase capacity from 10 million to 12 million passengers a year by the mid-2020s, the amount available to households will increase by 50 per cent up to a maximum of £7,500 per property.

In addition, upgraded mechanical ventilation will be included in the scope of the scheme for the first time, enabling residents to keep windows closed in order to experience the full benefit of the high-performance acoustic double-glazing.

The current scheme, which remains open, has granted in excess of £200,000 to 70 local properties, but requires residents in the 'outer' qualifying noise contour to contribute 50 per cent of the costs of installation. Under the new proposals, grants will cover 100 per cent of costs up to £7,500 (in the 63dB LAeq 16hr contour) and £3,750 (in the 60dB and 57db contours). This is intended to encourage take up to ensure as many eligible properties as possible benefit from noise insulation.

James Shearman, Head of Sustainability at Bristol Airport, said:

"These proposals represent Bristol Airport's most comprehensive noise insulation grant scheme to date and will see us supporting local residents with increased funding for a wider range of noise insulation improvements.

"This scheme goes beyond Government policy recommendations and will be amongst the most comprehensive and wide-ranging offered by a UK airport, demonstrating our commitment to reducing and mitigating the impacts of development on our neighbours."

Local resident, Jackie Abbott, said:

"Having our windows replaced has made a real difference, making it much quieter – particularly at night."

North Somerset Council is currently consulting on Bristol Airport's planning application to increase capacity to 12 million passengers a year. This includes several other proposals relating to noise, retaining many of the current limits on night flying, for which the annual limit of 4,000 movements would be retained – although flexibility on the way this is allocated between summer and winter seasons is being sought. The overall Quota Count system, based on noise ratings for different aircraft types, will remain in place in order to incentivise the use of quieter, modern aircraft.

Bristol Airport is the ninth busiest airport in the UK and the fifth busiest outside London. More than £160m has been invested in facilities and infrastructure since 2010, contributing to Bristol being named 'Best Airport' in the 5-10 million passengers category at the ACI Europe Awards in June (ACI Europe represents over 500 airports in 45 countries across the continent).

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Appendix 01

Short-Term Effects of Airport-Associated Ultrafine Particle Exposure on Lung Function and Inflammation in Adults with Asthma

Division of Environmental Health, Department of Preventive Medicine, Keck School of Medicine, University of Southern California, Los Angeles, CA, USA

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Short-Term Effects of Airport-Associated Ultrafine Particle Exposure on Lung Function and Inflammation in Adults with Asthma

Rima Habre, ScD[1], **Hui Zhou, PhD**[1], **Sandrah P. Eckel, PhD**[2], **Temuulen Enebish, MPH**[1], **Scott Fruin, DEnv**[1], **Theresa Bastain, PhD**[1], **Edward Rappaport, MPH**[1], and **Frank Gilliland, MD, PhD**[1]

[1]Division of Environmental Health, Department of Preventive Medicine, Keck School of Medicine, University of Southern California, Los Angeles, CA, USA

[2]Division of Biostatistics, Department of Preventive Medicine, Keck School of Medicine, University of Southern California, Los Angeles, CA, USA

Abstract

Background: Exposure to ultrafine particles (UFP, particles with aerodynamic diameter less than 100nm) is associated with reduced lung function and airway inflammation in individuals with asthma. Recently, elevated UFP number concentrations (PN) from aircraft landing and takeoff activity were identified downwind of the Los Angeles International Airport (LAX) but little is known about the health impacts of airport-related UFP exposure.

Methods: We conducted a randomized crossover study of 22 non-smoking adults with mild to moderate asthma in Nov-Dec 2014 and May-Jul 2015 to investigate short-term effects of exposure to LAX airport-related UFPs. Participants conducted scripted, mild walking activity on two occasions in public parks inside (exposure) and outside (control) of the high UFP zone. Spirometry, multiple flow exhaled nitric oxide, and circulating inflammatory cytokines were measured before and after exposure. Personal UFP PN and lung deposited surface area (LDSA) and stationary UFP PN, black carbon (BC), particle-bound PAHs (PB-PAH), ozone (O_3), carbon dioxide (CO_2) and particulate matter ($PM_{2.5}$) mass were measured. Source apportionment analysis was conducted to distinguish aircraft from roadway traffic related UFP sources. Health models investigated within-subject changes in outcomes as a function of pollutants and source factors.

Results: A high two-hour walking period average contrast of ~ 34,000 particles.cm^{-3} was achieved with mean (std) PN concentrations of 53,342 (25,529) and 19,557 (11,131) particles.cm^{-3} and mean (std) particle size of 28.7 (9.5) and 33.2 (11.5) at the exposure and control site, respectively. Principal components analysis differentiated airport UFPs (PN), roadway traffic (BC, PB-PAH), PM mass ($PM_{2.5}$, PM_{10}), and secondary photochemistry (O_3) sources. A standard deviation increase in the 'Airport UFPs' factor was significantly associated with IL-6, a circulating

Corresponding Author Rima Habre, MSc, ScD, Assistant Professor of Clinical Preventive Medicine, Division of Environmental Health, USC Keck School of Medicine, 2001 N Soto St, Rm 102M, Los Angeles, CA 90089 (Fedex 90032), Phone: +1 (323) 442-8283, habre@usc.edu

Competing Financial Interests

The authors declare no competing financial interests.

marker of inflammation (single-pollutant model: 0.21, 95% CI=0.08 – 0.34; multi-pollutant model: 0.18, 0.04 – 0.32). The 'Traffic' factor was significantly associated with lower Forced Expiratory Volume in 1 second (FEV_1) (single-pollutant model: −1.52, −2.28 – −0.77) and elevated sTNFrII (single-pollutant model: 36.47; 6.03 – 66.91; multi-pollutant model: 64.38; 6.30 – 122.46). No consistent associations were observed with exhaled nitric oxide.

Conclusions: To our knowledge, our study is the first to demonstrate increased acute systemic inflammation following exposure to airport-related UFPs. Health effects associated with roadway traffic exposure were distinct. This study emphasizes the importance of multi-pollutant measurements and modeling techniques to disentangle sources of UFPs contributing to the complex urban air pollution mixture and to evaluate population health risks.

INTRODUCTION

Exposure to ultrafine particles (UFP, particles with aerodynamic diameter < 100 nm) in ambient air is associated with decreased lung function and increased airway inflammation in individuals with asthma (Buonanno et al. 2013; Heinzerling et al. 2016; McCreanor et al. 2007). While fresh fuel combustion and roadway traffic sources have long been recognized as major primary sources of UFPs (Hofman et al. 2016; Kukkonen et al. 2016), only recently have measurement campaigns shown aircraft traffic activity to be a significant source of UFPs, with elevated particle number (PN) concentrations in close proximity to runways (Hsu et al. 2012; Hsu et al. 2013; Westerdahl et al. 2008) and further downwind of airports (ACI Europe 2012; Choi et al. 2013; Hsu et al. 2014; Hudda et al. 2014; Hudda and Fruin 2016; Hudda et al. 2016; Keuken et al. 2015). In Los Angeles, CA, Hudda et al. (2014) showed that PN concentrations downwind of the Los Angeles International Airport (LAX) are at least twice as high as background during most hours of the day with a 4- to 5-fold increase up to 10 km under typical westerly wind conditions.

Inflammation and oxidative stress are thought to be the main pathways of UFP toxicity. Because of their smaller size and diffusion-driven behavior in the lungs once inhaled, UFPs deposit efficiently in the alveolar region (Delfino et al. 2005). Once there, they can evade macrophage clearance, enter lung cells, cross the epithelial barrier into the blood and lymphatic circulation, elicit systemic effects and reach other organs (Elder et al. 2006; Geiser 2010; Nemmar et al. 2004; Samet et al. 2009). They can also damage airway epithelial cells and macrophages via reactive oxygen species production from redox reactions occurring in the mitochondria (Li et al. 2003; Nel 2005). UFPs are also retained very effectively in the lungs and can remain there for long periods of time (Araujo and Nel 2009). Surface coating is important in determining mucus penetration potential and retention time in the lungs, where biodegradable, hydrophilic or negatively charged UFPs can evade adhesive interactions with the mucus mesh or diffuse through pores, reach the adherent mucus layer and evade rapid clearance (Lai et al. 2009; Schuster et al. 2013; Xu et al. 2013). Möller et al (2008) showed that most inhaled carbon UFPs are retained in the lung periphery and conducting airways without substantial systemic translocation 48 hours after exposure. In addition, their large surface area to mass ratio and ability to carry reactive oxygen generating species such as metals (Vitkina et al. 2016) and PAHs (Delfino et al. 2010) on their surface (redox potential) makes them more toxic than larger particles such as $PM_{2.5}$

(particles with aerodynamic diameter < 2.5 μm) on an equal mass basis (Ayres et al. 2008; Cho et al. 2005; Gong et al. 2014; Nel et al. 2001; Sioutas et al. 2005). Weichenthal et al (2007) provide an excellent review of in vitro, in vivo and population studies of UFPs, their composition and mode of action.

Epidemiological evidence of UFP health effects is limited compared to $PM_{2.5}$, likely due to their highly dynamic and variable nature in space and time which complicates exposure assessment (2013). Wichmann and Peters (2000) provide a review of the epidemiological evidence on short-term health effects of UFPs and explain the potentially independent physiological pathways by which UFPs induce toxicity compared to $PM_{2.5}$ also demonstrated in Gong et al (2014) Generally longer exposure-response lag times are observed in panel studies for UFPs, possibly related to their longer retention time in the lungs. Buonanno et al. (2013) found daily UFP alveolar-deposited surface area dose to be associated with exhaled nitric oxide, a marker of pulmonary inflammation, in asthmatic children. Delfino et al. (2009) found “quasi-UFPs” (particles with aerodynamic diameter < 0.25 μm) to be significantly associated with the inflammation markers IL-6 and soluble TNF-α. Roadway traffic studies also suggest that fresh combustion products in exhaust - of which UFP is a large component - play a major role in asthma attacks and chronic bronchitis (Brauer et al. 2002; Kunzli et al. 2000), cause acute decreases in lung function that is more pronounced in asthmatics (McCreanor et al. 2007), and may be a cause of asthma (Brauer et al. 2002; Gauderman et al. 2005; McConnell et al. 2006). Knibbs et al (2011) reviewed 10 studies of commuter exposure in-transit and found UFP exposure during commuting can elicit acute effects in both healthy and health-compromised individuals. Lanzinger et al (2016) found 0–5 day lag central site UFP levels were associated with respiratory mortality independent of particle mass in five central European cities.

Cardiovascular effects have also been reported especially in individuals with existing metabolic or cardiovascular conditions. Lag 4-day PN was associated with total and cardio-respiratory mortality in Germany (Stolzel et al. 2007). Thrombogenic effects and platelet activation were seen in patients with coronary heart disease (Ruckerl et al. 2006). An increase in pulse wave velocity and augmentation index was seen in individuals with chronic obstructive pulmonary disease (Sinharay et al.) and immediate changes in heart rate variability were found in diabetics or people with impaired glucose metabolism (Peters et al. 2015).

However, very few studies have investigated the effects of UFPs resulting from aviation activity on asthma and respiratory health. Children living in 17 Massachusetts communities within a 5-mile radius of the Boston Logan International Airport were 3 to 4 times more likely to experience respiratory symptoms indicative of undiagnosed asthma compared to low exposure areas (Massachusetts Department of Public Health 2014). Schlenker and Walker (2011) estimated that one standard deviation increase in daily air pollution levels attributable to runway congestion at the 12 largest airports in California leads to an additional $1 million in hospitalization costs for respiratory and heart related admissions, for the 6 million individuals living within 10km. However, these studies relied on spatially coarse estimates of residential exposure that suffer from exposure measurement error in estimating personal exposures.

To our knowledge, no studies to date have assessed personal exposure to real-life, airport-related UFPs, distinctly from roadway traffic-related UFPs, and investigated their effect on acute respiratory health in asthmatics. To this end, we conducted a quasi-experimental panel study designed to capture the high UFP plume downwind of LAX reported in Hudda et al. (2014). We hypothesized that short-term exposure to LAX-related UFPs results in acute decreased pulmonary function and increased pulmonary and systemic inflammation in adult asthmatics following mild walking activity.

METHODS

Study Design

We conducted a randomized crossover study of 22 adults in two phases, Nov-Dec 2014 and May-July 2015, modeled after the McCreanor et al. (2007) quasi-experimental design. Eligibility criteria included the following: Non-current smokers (zero cigarettes smoked in the last month, regardless of earlier smoking history), English-speaking (individuals who can speak and understand English for the sake of communicating with study staff and answering questions, since it was not feasible to translate study materials into other languages), and adults aged 18 years or older with mild to moderate asthma as defined by symptoms-based National Heart, Lung and Blood Institute (NHLBI) criteria. Participants were mainly recruited as a convenience sample by advertising to University of Southern California (USC) staff and students.

Participants conducted mild, scripted walking activity for two hours, resting every 15 minutes, on two occasions in two public parks inside and outside of the high LAX UFP zone reported in Hudda et al. (2014). We selected Jesse Owens Park as the ‘exposure’ site because of its location downwind of LAX, ~10 km to the east along the dominant daytime westerly wind direction (supplement Figure S1). Jesse Owens is in a dense urban area near busy, major roadways (W Century Blvd to the south and S Western Ave to the east). We selected Kenneth Hahn State Recreational Area as the ‘control’ site, ~9 km northeast of LAX, as it is located on a hill at the periphery of the high UFP plume, surrounded by greenness and further away from immediate traffic. The order of the visits to the control and exposure sites was randomized, and the visits were separated by at least one week to minimize carryover effects.

We transported participants to and from the walking sites in a 2015 Toyota Prius hybrid car, under recirculating air and closed window conditions, along pre-designated routes to minimize UFP exposure from traffic. To ensure maximum LAX UFP impacts, we visited the exposure site on days with stable midday westerly wind conditions, to the extent logistically possible. We conducted all walking exposures midday (~ 12–2PM) to control for diurnal variations and ensure maximum wind direction stability. The USC Institutional Review Board approved all study procedures (IRB protocol number HS-14–00504), and all participants provided written informed consent and were compensated for their contribution to the study.

Health Outcomes Assessment

Participants reported to the USC Health Sciences Campus in the morning on both study days. In the first visit, we collected detailed demographics, medical history, environmental conditions at the residence, and commuting and time activity patterns using an interviewer-administered questionnaire. We measured height (stadiometer), weight and body composition (Tanita scale) and resting heart rate at baseline. In addition, on each visit, we administered a questionnaire asking about the prior week's activities, asthma control and severity, as well as their morning commute and dietary intake on the day of the visit.

Respiratory testing and blood draws were performed on each visit before and after exposure at generally similar, consistent times visit-to-visit for each person and across participants (~10.30 AM and 4.00 PM). We conducted multiple flow exhaled nitric oxide testing (FeNO) using our previously developed protocol at 30, 50, 100 and 300 ml/s expiratory flow rates using the EcoMedics CLD88-SP with DeNOx (Linn et al. 2009). Immediately prior to each maneuver, the participant breathed through a DeNOx scrubber for ≥ 2 tidal breaths followed by inhalation to total lung capacity and exhalation at the target flow rate. Analyzer zero checks against air drawn through a zero-NO filter (Sievers Division, GE Analytical Instruments, Boulder, CO) were done twice daily. A Morgan SpiroAir-LT rolling seal spirometer was used for pulmonary function testing (forced vital capacity (FVC), forced expiratory volume in 1 second (FEV_1), peak expiratory flow rate (PEFR), and maximum mid-expiratory flow (MMEF)) and calibrated twice daily with a 3L syringe and tested for leaks. Each participant was asked to perform seven maximum effort maneuvers per test.

An Immunocap antigen-specific IgE panel (Quest Diagnostics, Inc.) for the 16 most common Southern California upper respiratory allergens was conducted using the first blood sample to determine atopic status at baseline. A complete blood count was also obtained using the morning blood draw on each visit. In addition, pre- and post-exposure blood samples on both visits were analyzed for the following inflammatory cytokines and pro-thrombotic clotting factors: high-sensitivity Interleukin 6 (IL-6) and soluble tumor necrosis factor receptor II (sTNFrII) using ELISA kits (R&D Systems, HS600B and DRT200 respectively), and von Willebran factor (vWF) and fibrinogen using the Millipore Luminex magnetic bead panel (HCVD3MAG-67K).

Air Pollution Exposure Assessment

During transport to and from the parks, we measured ultrafine particle number (PN) concentrations using a DiscMini diffusion charger (Testo AG) and condensation particle counter (CPC 3007, TSI Inc) to verify low traffic-related UFP exposure conditions inside the vehicle. During the walking exposure period at the parks, we measured 'personal' PN, particle size and lung deposited surface area (LDSA) using the DiscMini and PN using the CPC carried by the research assistant walking alongside the participants. Relative humidity and temperature were measured using an Onset HOBO data logger. We also used a mobile monitoring platform to measure PN (CPC 3007, TSI Inc), black carbon (BC, AE51, Magee Scientific), particle-bound PAHs (PB-PAH, PAS 2000, EchoChem Analytics), ozone (O_3, Model 205, 2B Technologies), carbon dioxide (CO_2, Li-820, LI-COR Biosciences) and particulate matter mass in four size fractions (PM_1, $PM_{2.5}$, PM_4 and PM_{10}, DRX 8534, TSI

Inc) at each park in a stationary location to obtain more detailed characterization of the air pollution mixture. All exposures were continuously logged at a 10 second time resolution. The DiscMini was considered the primary source of personal PN exposure data as it also provided particle size and LDSA data. Unless otherwise stated, all subsequent references to PN correspond to DiscMini data. Agreement between the personal DiscMini and CPC measurements in terms of PN by particle size bins are shown in the Figure S2.

Statistical Analysis

Air Pollution Exposures—We inspected all air pollutant measurement data for outliers and errors at the original 10 second time resolution and averaged up to one minute for use in source apportionment analyses (described below). We then calculated average concentration for the transport periods to and from the park (inside the vehicle) and the walking period at the parks (exposure time) for use in health models.

Because of the highly correlated multi-pollutant nature of the data, we conducted a source apportionment analysis on the one-minute, walking-period data (shown in red in Figure 1) to disentangle the impact of the airport from other major sources of UFPs contributing to the complex air pollution mixture in this urban area (mainly traffic). We used principal components analysis (PCA) with an oblique (promax) rotation in SAS 9.4 (SAS Institute Inc., NC). Ten variables were included in the PCA (PM_1, $PM_{2.5}$, PM_{10}, BC, PB-PAH, CO_2, PN (personal DiscMini), PN (stationary CPC), particle size, and O_3). Four distinct 'source factors' were resolved based on their eigenvalues (profiles), physical interpretability and least factor smearing. Walking-period average PCA-derived factor scores (eigenvectors) were then calculated for each day and used as the main exposures of interest in the health models, in addition to the measured pollutants.

Spirometry and Exhaled Nitric Oxide—Pulmonary function test indices (FVC, FEV_1, PEFR, MMEF) were assigned based on criteria described in the 2005 ATS/ERS (Miller et al. 2005). Age, height, gender and race specific percent predicted values were calculated based on equations from Knudson et al (1983).

FeNO data processing was based on the ATS/ERS guidelines for FeNO at 50 ml/s (ATS/ERS 2005) and an airway turnover search window (Puckett et al. 2010) similar to previous studies (Eckel et al. 2016). $FeNO_{50}$ and $FeNO_{300}$ were calculated as the average of reproducible maneuvers at 50 ml/s and 300 ml/s, respectively. Multiple flow FeNO data were input to nonlinear mixed effects models (based on the deterministic, steady-state two compartment model of NO in the lower respiratory tract) to estimate parameters quantifying airway ($D_{aw}NO$ – airway wall tissue diffusing capacity ($pl(s{\cdot}ppb)^{-1}$), $C_{aw}NO$ – airway wall concentration (ppb)) and alveolar (C_ANO –alveolar region concentration (ppb)) sources of NO and to predict $FeNO_{50}$ (Eckel and Salam 2013; Eckel et al. 2014). We used predicted $FeNO_{50}$ rather than measured $FeNO_{50}$ in health models to minimize the number of missing observations.

Health Models—Single-, two- and multi-pollutant ANCOVA (Analysis of Covariance) models examining within-subject changes in outcome related to the exposures were fit as follows:

$$Y_{ij,POST} = \beta_0 + \beta_1 * Y_{ij,PRE} + \beta_2 * \text{Exposure(s)}_{ij} + U_i + \varepsilon_{ij} \quad \text{eq. (1);}$$

; where $Y_{ij,POST}$ is the outcome measured post-exposure for participant i on day j, $Y_{ij,PRE}$ is the outcome measured pre-exposure, Exposure(s)_{ij} is one or more continuous measure(s) of the walking-period average air pollution concentration or source factor contribution on day j, U_i is a fixed intercept for every participant, and ε_{ij} is a normally distributed random error term with variance σ^2 ($\varepsilon_{ij} \sim N(0,\sigma^2)$). β_0 is a fixed intercept, β_1 is the parameter estimate capturing visit-to-visit variability in the baseline outcome, and β_2 is the main parameter of interest capturing the effect of air pollution exposure(s) (Metcalfe 2010).

Outcomes were examined for normality and log-transformed where appropriate (FeNO parameters). Multi-pollutant models of measured concentrations were adjusted for PN, BC, $PM_{2.5}$ and O_3 – the key source tracers identified in the source apportionment modeling. Whereas multi-pollutant models of sources were adjusted for all four modeled source factors. All reported effect sizes are scaled to a standard deviation (SD) increase in the exposure of interest.

Outliers were examined and excluded as appropriate for the different sets of health outcomes (1 to 3 data points depending on outcome). The model focuses on within-participant changes in health outcomes and includes an intercept for each participant, thus there is no need to adjust for time-constant individual-level covariates such as age or gender. Given the limited sample size, a list of binary variables was selected *a priori* based on the literature, with at least 40% of participants in a cell, to investigate interactions with the main exposures of interest (PN, LDSA and Airport UFPs factor) in single- and multi-pollutant models: asthma control, allergic status (reported or measured using specific IgE panel), race and ethnicity, physical activity levels, body mass and composition and commuting patterns (further details in Table S1). Models with significant interaction terms were reported. For all hypothesis tests, the threshold of statistical significance was defined as p-value<0.05; analyses were conducted in SAS 9.3 (SAS Institute Inc., Cary, NC, USA).

RESULTS

The majority of the 22 participants in the study were female (16, 73%), white (9, 43%) and Hispanic (9, 43%). The mean age was 27 years (range 18–60) and mean BMI 24.8 kg/m^2 (17.4–46.7). The average Asthma Control Test (ACT) score was 18.7 (11–22) at recruitment and 20.6 (11–25) on the day of the first visit. All participants reported a doctor diagnosis of asthma at mean age of 13 years (3–58) (Table 1).

The top 5 most common upper airway allergens as measured with a specific IgE response were dust mites (d1 and d2), followed by dog (e5) and cat (e1) dander and Bermuda grass (g2), respectively. Baseline levels of cytokines, spirometry and FeNO parameters are shown in Table 2 with average change in post-exposure value compared to pre-exposure at each of the sites. Predicted $FeNO_{50}$ was highly correlated with measured $FeNO_{50}$ (r=0.99).

Table 3 shows the distribution of air pollutant concentrations during the walking period at the two sites. UFP PN (stationary and personal) was significantly higher at the exposure site per study design, with an average two-hour walking period PN contrast of ~34,000 particles.cm^{-3} between the two sites. Figure 1 shows the time-resolved personal PN (DiscMini) measurements for each study day grouped by site. Figure S3 shows the distribution of PN and LDSA inside the vehicle during participant transport to and from the exposure sites. Particle size was lower at the exposure site (28.7 vs 33.2 nm) and LDSA was higher (64.8 vs 28.8 cm^2) consistent with the smaller particle size and greater lung deposition efficiency of airport-related UFPs. Particle mass concentrations in the 1, 2.5, 4 and 10 μm size fractions were slightly but not significantly higher, while the combustion-related pollutants BC, CO_2 and PB-PAHs were significantly higher at the exposure site. No differences in O_3 concentration or meteorological parameters were observed (Table 3). The second phase of the study (May-July 2015) was characterized by breezier conditions and warmer temperatures compared to the first phase (Nov-Dec 2014) and generally more stable and predictable wind direction patterns (Figure S4).

The source apportionment analysis resolved four distinct source factors characterized by the following species in their loading profiles in parentheses: Airport UFPs (personal and stationary PN, smallest particle size) consistent with jet emissions (Shirmohammadi et al. 2017), PM Mass (PM_1, $PM_{2.5}$ and PM_{10} mass) consistent with heavier particles and wind-blown dust, Traffic (BC, CO_2, PB-PAH and lowest O_3) consistent with fresh combustion emissions and O_3 quenching, and secondary photochemistry ($PM_{2.5}$ mass and O_3) consistent with secondary formation. The contributions of these modeled source factors were all significantly higher at the exposure site except for ‘PM Mass’ (Table 3). The ‘Secondary Photochemistry’ and ‘PM Mass’ factors were most highly correlated (Table S2). The average contributions of the ‘Airport UFPs’ and ‘Secondary Photochemistry’ factors were higher in the second phase while ‘Traffic’ was higher in the first phase of the study likely due to cooler temperatures and less vertical mixing (Figure S5).

Single- and multi-pollutant health analysis results are reported in Tables 5 and 6, respectively, while two-pollutant results are included in Supplement Table S3. Adjustment for day-level, time-varying potential confounders such as relative humidity and temperature was explored but did not have any influence on the magnitude of main effects in PN and ‘Airport UFPs’ models.

The strongest evidence for associations were for the ‘Airport UFPs’ source with IL-6, $PM_{2.5}$ and ‘Traffic’ with FEV_1, and ‘Traffic’ with sTNFrII. The ‘Airport UFPs’ source – characterized by high PN and low particle size, our main hypothesized exposure of interest - was significantly associated with IL-6 in all models (0.18, 0.04–0.32 in multi-pollutant model) and was robust to all adjustments. The correlation between DiscMini and CPC PN measurements varied by particle size (Figure S2), and health model results were slightly different by instrument (Table S5) with generally stronger IL-6 effects seen with the CPC. Contrary to what we expected, IL-6 had a stronger association with PN than LDSA. None of the other systemic or pulmonary inflammation or lung function metrics were positively associated with PN or the ‘Airport UFPs’ source in our study.

For lung function, measured PM (PM_1, $PM_{2.5}$, PM_4 and PM_{10}) and the modeled 'PM Mass' source were all associated with lower FEV_1 and MMEF in single-pollutant models. For example, a 1 SD increase in $PM_{2.5}$ (7.6 μg/m^3) was associated with 1.45% and 2.98% drop in % predicted FEV_1 and MMEF, respectively. Effect estimates were even larger for PM_{10} (2.02% and 5.56%, respectively). Similarly, in multi-pollutant models, $PM_{2.5}$ was associated with 1.92% and 5.31% drop in % predicted FEV_1 and MMEF, respectively. Measured $PM_{2.5}$ was more strongly associated with lower FEV_1 and MMEF compared to the modeled 'PM Mass' source in all models. FEV_1 was also negatively associated with BC (−1.60, −2.68 – −0.51) in single-pollutant models and the modeled 'Traffic' source in the single-pollutant model (−1.52, −2.28 – −0.77).

sTNFrII had consistent and significant positive associations with the modeled 'Traffic' source factor in single- and multi-pollutant models, and with measured BC and PB-PAH in single-pollutant models. In single-pollutant models, sTNFrII increased by: 36.5 pg/ml (95% CI 6.0 – 66.9) per SD increase in 'Traffic', 49.4 pg/ml (10.2 – 88.6) per SD (292 ng/m^3) increase in BC, and 30.2 pg/ml (1.6 – 58.9) per SD (1.5 μg/m^3) increase in PB-PAHs. In multi-pollutant models, the 'Traffic' effect increased to 64.4 pg/ml (6.3 – 122.5).

Less consistent associations were observed with the other measured pollutants or modeled source factors and other health outcomes. A significant negative association of $PM_{2.5}$ mass with IL-6 was found in single- and multi-pollutant models; however, the 'PM mass' source factor and IL-6 association was marginally significant (negative) in single-pollutant models but positive and non-significant in multi-pollutant models. PN exposure was associated with decreased log(C_{AW}NO) in single- and two-pollutant models; however, this association became non-significant in multi-pollutant models. Finally, O_3 exhibited results that were contrary to the expected direction in single- and two-pollutant models with FEV_1 and sTNFrII and with FEV_1 in multi-pollutant models. Similarly, 'Secondary Photochemistry' exhibited associations in the opposite direction of what is expected for IL-6 (single-pollutant model) and C_ANO (adjusted for 'Airport UFPs'); however, all associations became non-significant in multi-pollutant models.

Models with significant interaction terms ($p<0.05$) are reported in Figure S6 and Table S4. Given the limited sample size, multiple tests, and underpowered statistical analysis of interactions, these results should only be interpreted qualitatively. While interaction results were generally inconsistent, Hispanic ethnicity was associated with poorer % predicted PEFR following 'Airport UFPs' exposure compared to non-Hispanic ethnicity; whereas, being non-Hispanic was associated with higher log(D_{AW}NO) response following PN exposure. Finally, having high muscle mass (> median 45.1kg) and being sick in the last month were 'protective' following 'Airport UFPs' and PN exposure, respectively.

DISCUSSION

We conducted a crossover panel study with a quasi-experimental design modeled after the McCreanor et al. (2007) study to investigate the effects of real-life exposure to airport-related UFPs on acute respiratory and systemic outcomes in 22 adults with asthma. Air pollution measurements and modeled source factor contributions reflected expected patterns

at the two sites, and across both seasons of the study. We found significant increases in markers of systemic inflammation associated with 'Airport UFPs' (IL-6) and 'Traffic' (sTNFrII) exposure and a significant decrease in FEV_1 associated with measured PM and BC and modeled 'Traffic' exposure. The robust IL-6 effects we found with the 'Airport UFPs' source, which would have been masked by considering PN alone, suggest that some characteristic of the airport-related air pollution mixture as a whole might be more important for IL-6 response than particle number concentration. This could be the smaller particle size and alveolar deposition potential of airport-related UFPs (compared to overall PN which comingles airport and traffic contributions) or other gaseous, volatile or non-volatile components of the mixture that we did not measure or account for. To our knowledge, this is the first study to document acute systemic inflammation following airport-related UFPs exposure.

Most previous studies have investigated total or traffic-related personal UFP exposures. Buonanno et al. (2013) conducted personal monitoring for two days and found daily UFP alveolar-deposited surface area dose to be associated with increased exhaled nitric oxide and decreased FEV_1 (-0.0025 ± 0.0012 % per 100 mm^2 alveolar deposited surface area dose) in children with asthma and children with house dust mite allergies but no asthma. However, these children's daily UFP dose was dominated by indoor microenvironments (15% indoor home, 19% sleeping and 18% school) with a likely substantially different composition due to indoor UFP sources (Deffner et al. 2016; Gu et al. 2015; Vu et al. 2017; Wallace 2006; Weichenthal et al.) as compared to our study.

Steenhof et al (2013) exposed 31 healthy volunteers to air pollution for 5 hours while exercising at 3 of 5 sites in the Netherlands (2 traffic, 1 underground train station, 1 farm and 1 urban background site) and found NO_2 effects on proinflammatory cytokines measured in nasal lavage but no PN effects, while Janssen et al (2015) found significant associations between measures of oxidative potential from 3 a-cellular assays with increased eNO and IL-6 in nasal lavage 2 hours post exposure at all four outdoor sites (not including the underground metal-rich site). While not directly comparable to our study, these findings support the role of oxidative stress in acute inflammatory response following urban air pollution exposures and highlight the importance of considering composition.

In a panel study of 29 elderly subjects with coronary artery disease, Delfino et al. (2008) found a 7,337 particles.cm^{-3}increase in outdoor PN was significantly associated with 0.50 pg/ml increase in IL-6 and 153.24 pg/ml increase in sTNFrII. PN and $PM_{0.25}$ (PM mass in the quasi-ultrafine size fraction, <0.25 μm) were also more strongly associated with IL-6 and sTNFrII than $PM_{0.25–2.5}$ mass (Delfino et al. 2009). A 0.56 ng/m^3 increase in outdoor total PAHs was associated with 135 (45 – 225) pg/ml increase in sTNFrII and 0.27 (0.10 – 0.44) pg/ml increase in IL-6 (Delfino et al. 2010). However, PN in this study was mainly traffic-related (0.5 correlation with elemental carbon) and more closely resembled our 'Traffic' source with loadings of PN, BC and PB-PAHs. When taking particle composition into account, Delfino et al (2010) found that $PM_{0.25}$ associations with IL-6 and sTNFrII were completely confounded by PAHs. The high correlation (0.85) between BC and PB-PAHs in our study meant that we could not include them in the same model; however, the 'Traffic' source captured their combined effect on sTNFrII. In general, higher effects were seen in the

Delfino et al. studies for IL-6 and sTNFrII compared to our study, and this could be due to the differences in the composition and oxidative potential of the exposure mixtures (Delfino et al. 2011), or differences in susceptibility of asthmatics compared to elderly participants with a history of coronary artery disease.

In the McCreanor et al. (2007) study, walking for 2 hours in a diesel vehicular traffic zone with elevated $PM_{2.5}$, UFP, EC and NO_2 levels on Oxford Street, London, resulted in up to 6.1% and 5.4% decrease in FEV_1 and FVC compared to baseline, respectively, in asthmatics. Similarly, we found a 1.6% and 1.52% drop in % predicted FEV_1 two hours post BC and 'Traffic' exposure, respectively. In addition, we found that measured $PM_{2.5}$ was more strongly associated with reduced FEV_1 and MMEF than the modeled 'PM Mass' source, and that the PM_{10} size fraction had the largest effect on these lung function outcomes, suggesting that the actual PM mass or amount inhaled plays a role in worsening lung function, potentially related to increased burden on the lungs to clear particles from the airways.

$FeNO_{50}$ and airway NO source parameters were not associated with PN in our study, although associations have been previously reported in the literature (Buonanno et al. 2013; Strak et al. 2012). We also did not find any fibrinogen or vWF associations as previously reported in patients with chronic obstructive pulmonary disease (Hildebrandt et al. 2009).

Strengths of our study include: a randomized cross-over within-person, semi-experimental design; a susceptible study population (adults with asthma); participants who performed moderate-light activity to increase ventilation rates; randomized assignments to control and exposure scenarios with a 1+ week washout period in-between; exposures to real-life airport emissions; and the high exposure contrasts achieved at the two exposure locations. Using multi-pollutant measurements and source apportionment modeling, we distinguished the contribution of aviation activities at LAX from traffic, another major source of UFPs in this urban area. In addition, the use of personal monitoring accurately captured exposures in the breathing zone, while the DiscMini diffusion charger provided more detailed particle size and lung deposited surface area. Limitations of our study include a short follow up time, with only one health assessment ~2 hours immediately after the walking exposure period, and the limited sample size in this pilot study that reduced statistical power. We were also unable to adjust for the variable inhalation rates across subjects due to varying levels of fitness, age, etc.. but ensured an almost identical walking pace on all study days.

One of the biggest sources of uncertainty in estimating acute and chronic health effects of UFPs in epidemiological studies lies in the exposure assessment as noted by a European expert panel (Hoek et al. 2010). Specifically, for future airport-related UFP health investigations, it is important to consider the entire source to receptor pathway to accurately assess exposures and estimate health effects, starting from emissions, composition, fate and transport, exposures and confounding factors in the population of interest.

At low power conditions (thrust <30%), commercial aircraft gas turbine engine emissions are dominated by organics –a variety of unburned hydrocarbons (ethylene, formaldehyde, acetaldehyde, and benzene) and lubrication oils. Whereas, higher power conditions are

dominated (~80%) by soot or elemental carbon particles referred to as the non-volatile PM fraction (nvPM, the regulated fraction), which directly correlates with the fuel sulfur content (Onasch et al. 2009). As the plume cools downstream of the exhaust, volatile PM forms by two main processes: nucleation of exhaust gases such as SO_x creating new particles (<20nm, high PN and low mass) or condensation of gases onto existing soot particles (see Whitefield et al. (2011; 2008) for a detailed overview). Nucleation typically outnumbers condensation by a factor of 10 to 100 and is also dependent on fuel sulfur content (Lobo et al. 2007; Timko et al. 2010; Timko et al. 2013; Wong et al. 2015). Secondary organic aerosol formation in the aging plume likely exceeds primary organic aerosol emissions (Herndon et al. 2008; Presto et al. 2011). This is why measurements taken at the point of exit from the engine typically underestimate particle mass downwind by a factor of 5 to 10 (Timko et al. 2013).

As for composition, emitted nucleation mode particles are rich in carbon, oxygen, sulfur and chlorine (Mazaheri et al. 2013), and the oxidative reactivity of emitted soot particles is inversely proportional to thrust (Liati et al. 2014). Lubrication oil and incomplete combustion products are the primary sources of organics in emitted particles (Timko et al. 2010). Cross et al. (2013) resolved aliphatic, aromatic and oxygenated organics in aircraft emissions, mainly from unburned fuel at idling and from pyrolysis products at higher power. Timko et al. (2014) identified two lubrication oil factors, two aliphatic factors - one related to soot emissions and another to mixing with ambient organic aerosol – and a fifth factor related to benzene emissions at low thrust using the Positive Matrix Factorization (PMF) model.

Several modeling approaches have been used to predict the fine spatial and temporal variability in PN and separate the contribution of aircraft flight activity from other outdoor important UFP sources - namely traffic, fuel combustion, and secondary formation - ranging from statistical regression approaches (Diez et al. 2012; Hsu et al. 2012) to source-oriented and receptor-oriented source apportionment models. Source-oriented models include simple dispersion models such as a AERMOD that might perform well near the source but do not handle the complicated UFP particle dynamics and chemical transformations that are crucial determinants of the volatile PM fraction (Levy et al. 2015). More sophisticated source-oriented models include chemical transport models such as the Community Multiscale Air Quality (CMAQ) model that generally have lower spatial resolution but account for all sources and emissions in an urban area and fully model fate and transport with proper treatment of chemistry and particle dynamics and typically larger spatial domains that can capture communities further downwind (Arunachalam et al. 2011; Kukkonen et al. 2016; Levy et al. 2008; Levy et al. 2015; Levy et al. 2012). Receptor-oriented source apportionment models such as PMF or PCA used in our study have proven valuable for determining source impacts at affected communities and disentangling the airport signal from other potentially correlated UFP sources in the air pollution mixture (Masiol et al. 2016).

For all modeling efforts, detailed meteorological data and multiple pollutant measurements, including gases, semi-volatiles and particulate matter characteristics (composition, size distribution, particle number concentration, etc.) are recommended to characterize the

mixture and obtain the best performance, especially in receptor models. While particle size and PN ratios relative to BC have been used to separate aircraft from traffic signals (Riley et al. 2016), an inert and unique chemical tracer of aircraft emissions would be ideal to facilitate source separation and minimize factor smearing in receptor models - possibly from the jet fuel formulation, lubrication oil additives or other compounds uniquely emitted by aircraft engines. The property of non-reactivity or known chemical reactivity where the species is conserved would facilitate the separation of aircraft impacts in fresh emissions as well as in more aged plumes downwind of airports.

Outdoor exposure estimates should be combined with information on individuals' time-activity patterns and UFP infiltration efficiency indoors to disentangle indoor- from outdoor-generated UFPs and isolate aviation/airport contributions to total personal UFP exposure. Cooking, smoking, burning wood, candles or incense, and cleaning are some of the indoor UFP sources (Habre et al. 2014; Vu et al. 2017; Wallace 2006; Wallace et al.). UFPs are generally less efficient at penetrating indoors compared to $PM_{2.5}$, with infiltration factors (F_{inf}) ranging from around 0 (particles < 10nm) to 0.3 (particles between 80 and 100 nm) with windows closed and from 0 to 0.6 with one window open in a test house (Rim et al. 2010). Kearney et al. (2014) found large variability in UFP F_{inf} both within and between homes in Edmonton, with the majority of indoor UFPs being of indoor origin (contrary to indoor $PM_{2.5}$). Confounding from co-occurring exposures such as noise or socioeconomic factors related to health disparities should also be adjusted for in epidemiological studies of aviation-related UFP exposures. Finally, recent advances in miniaturization of personal UFP monitors combined with detailed time-activity and geolocation tracking to capture individuals' behaviors and time spent in various microenvironments can prove crucial in estimating the contribution of aviation-related sources to total personal UFP exposure, especially in heavily exposed occupational subgroups such as baggage handlers (Moller et al. 2014; Moller et al. 2017).

In conclusion, and up to our knowledge, our study is the first to demonstrate increased acute systemic inflammation following exposure to airport-related UFPs. These effects were distinct from traffic-related exposures. Further research is needed to replicate these findings in different susceptible populations and at longer time lags to determine downstream health effects, especially in communities heavily impacted by multiple environmental exposures. This study also emphasizes the importance of multi-pollutant measurements and modeling techniques to disentangle sources of UFPs contributing to the complex urban air pollution mixture and to evaluate population health risks.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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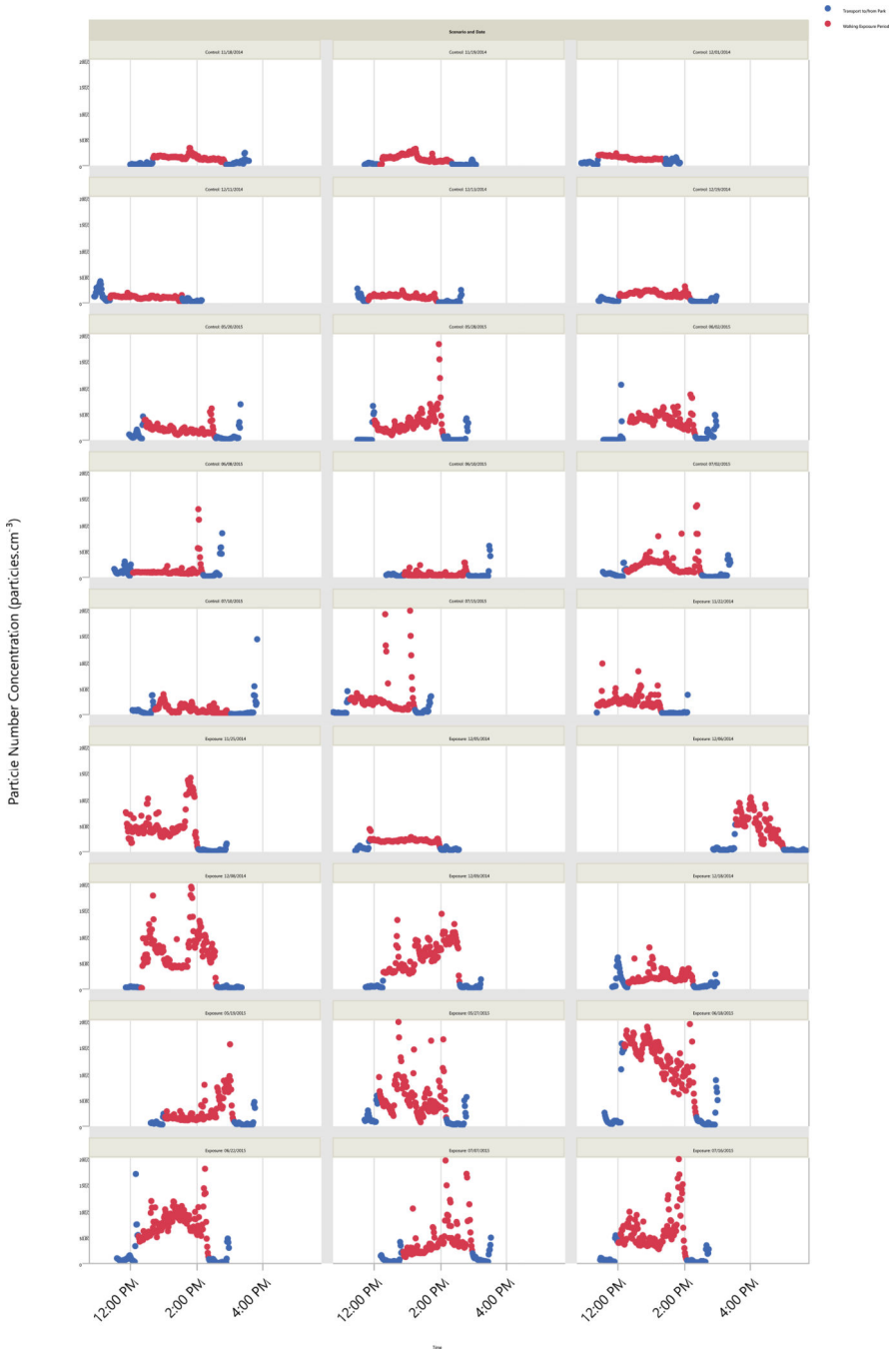

Figure 1.

Ultrafine particle number concentrations (PN, particles.cm^{-3}) on study days grouped by exposure scenario and colored by transport (blue) and walking exposure (red) period.

Table 1.

Participant characteristics (N=22)

		N (%)			
Gender	Female	16 (73%)			
Race	White	11 (50%)			
	African-American	3 (14%)			
	Asian	3 (14%)			
	American Indian	1 (5%)			
	Other	4 (18%)			
Ethnicity	Hispanic	9 (43%)			
		Mean	**Std Dev**	**Min**	**Max**
Age		27	9.5	18	60
Age at asthma diagnosis		13	12.7	3	58
ACT* Score (At recruitment)		18.7	3.2	11	22
ACT* Score (On day of visit)		20.6	3.8	11	25
Body Mass Index (kg/m^2)		24.8	6.1	17.4	46.7

*ACT = Asthma Control Test

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Table 2.

Distribution of health outcomes at baseline (morning assessment on first visit) and change (post-pre) in outcomes following walking exposure period at the two study sites.

	Baseline Level						Change (Post-Pre)					
							Control			Exposure		
Outcome	**N**	**Mean**	**Std Dev**	**Min**	**Median**	**Max**	**N**	**Mean**	**Std Dev**	**N**	**Mean**	**Std Dev**
Cytokines (pg/ml)												
IL-6	18	1.7	2.8	0.4	0.8	12.3	20	0.3	1.7	18	0.4	0.4
sTNFrII	18	1,083.1	922.9	146.2	940.6	2,384.0	20	−79.0	131.7	18	−85.6	87.8
vWF	17	0.5	0.2	0.3	0.5	0.8	18	0.0	0.2	18	0.0	0.1
Fibrinogen	17	78.4	29.6	45.4	67.4	127.6	18	0.6	19.7	18	−0.5	19.9
% Predicted Spirometry												
FEV_1	22	105.0	14.5	72.3	105.7	132.8	21	0.0	4.2	22	−1.2	3.4
FVC	22	108.9	11.3	80.5	108.4	129.0	20	−0.8	2.8	22	−0.7	3.1
MMEF	22	99.9	30.4	34.2	96.9	153.5	20	−0.3	9.5	22	−0.7	9.2
PEFR	22	107.4	24.1	59.6	105.6	152.6	21	3.0	8.4	22	2.1	10.3
Exhaled Nitric Oxide[*]												
$\log(FeNO_{50,pred})$	22	3.30	0.8	2.2	3.0	4.6	21	0.0	0.1	22	−0.1	0.1
C_ANO	22	1.1	0.9	−0.7	1.2	2.5	21	0.0	0.2	22	−0.2	0.3
$\log(C_{AW}NO)$	22	4.0	0.9	2.7	3.8	5.6	21	0.0	0.2	22	−0.1	0.3
$\log(D_{AW}NO)$	22	3.6	0.6	2.4	3.5	4.8	21	0.0	0.2	22	0.1	0.3

[*] Exhaled nitric oxide units as follows: $\log(FeNO_{50})$ in log(ppb); CANO and $\log(C_{AW}NO)$ in log(ppb); $\log(D_{AW}NO)$ in $\log(pl(s{\cdot}ppb)^{-1})$

Table 3.

Distribution of air pollution exposure and meteorology parameters during the walking periods.

	Overall (n=43)		Control (n=21)		Exposure (n=22)		Pearson t-test
Pollutants (units)	**Mean**	**Std Dev**	**Mean**	**Std Dev**	**Mean**	**Std Dev**	**p-value**
PN (particles.cm^{-3}, personal DiscMini)	36,842.2	26,016.4	19,556.6	11,131.0	53,342.1	25,528.5	**3.97E-06**
Particle Size (nm)	30.9	10.6	33.2	11.5	28.7	9.5	1.67E-01
LDSA (cm^2)	47.2	27.1	28.8	13.0	64.8	25.4	**1.59E-06**
PN (particles.cm^{-3}, stationary CPC)	23,013.6	14,062.5	13,036.0	4,491.7	32,537.6	13,480.1	**8.66E-07**
PN (particles.cm^{-3}, personal CPC)	31,705.0	18,589.5	19,066.1	6,879.7	43,769.4	18,271.3	**2.60E-06**
PM_1 (μg/m^3)	4.7	3.6	3.9	2.7	5.5	4.2	1.56E-01
$PM_{2.5}$ (μg/m^3)	12.0	7.6	10.1	5.8	13.7	8.8	1.17E-01
PM_4 (μg/m^3)	14.8	8.8	12.7	6.7	16.9	10.2	1.24E-01
PM_{10} (μg/m^3)	30.1	22.1	27.4	12.3	32.6	28.7	4.42E-01
BC (ng/m^3)	523.5	291.9	410.0	207.3	631.9	322.9	**1.09E-02**
CO_2 (ppb)	407.8	13.3	401.4	9.3	413.9	13.8	**1.28E-03**
PB-PAH (μg/m^3)	3.2	1.5	2.6	0.6	3.8	1.9	**8.07E-03**
O_3 (ppb)	45.9	14.4	44.9	12.0	46.7	16.7	6.89E-01
Source Factors							
Airport UFPs	0.06	0.74	−0.32	0.49	0.42	0.77	**5.91E-04**
PM Mass	−0.05	0.46	−0.14	0.33	0.04	0.55	1.85E-01
Traffic	−0.14	0.86	−0.53	0.58	0.23	0.92	**2.45E-03**
Secondary Photochemistry	−0.04	0.80	−0.31	0.62	0.21	0.88	**3.06E-02**
Meteorology							
Temperature (°C)	27.05	2.74	26.3	2.5	27.7	2.8	9.58E-02
Relative Humidity (%)	45.02	9.32	46.5	8.1	43.6	10.3	3.21E-01

PN=Ultrafine Particle Number, LDSA=Lung-deposited surface area, PM_1, $PM_{2.5}$, PM_4, PM_{10}=Particle Mass in the 1, 2.5, 4 and 10 μm size fraction, BC=Black Carbon, CO_2=Carbon Dioxide, PB-PAH=Particle-bound Polyaromatic Hydrocarbons, O_3=Ozone.

The overall standard deviation is used to scale reported health effect estimates.

Table 4.

Loading profiles (eigenvalues) of air pollution source factors resolved by principal components analysis.

	SOURCE FACTORS			
Pollutant	**Airport UFPs**	**PM Mass**	**Traffic**	**Secondary Photochemistry**
PN (personal DiscMini)	**0.72**	0.00	0.16	0.20
PN (stationary CPC)	**0.71**	−0.02	0.35	0.19
Particle Size	**−0.81**	0.01	0.23	0.15
PM_1	−0.04	**0.93**	0.07	0.06
$PM_{2.5}$	−0.10	**0.63**	0.09	**0.47**
PM_{10}	0.07	**0.98**	−0.07	−0.08
BC	0.05	0.17	**0.76**	−0.14
CO_2	−0.03	−0.10	**0.83**	−0.10
PB-PAH	0.19	0.07	**0.59**	−0.21
O_3	0.19	0.06	**−0.63**	**0.68**

Table 5.

Single-pollutant model associations of measured concentrations and modeled source factor contributions with cytokines, exhaled nitric oxide and spirometry outcomes.

		POLLUTANTS														
		PN			LDSA			BC			PB-PAH			O_3		
Outcome	**N**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**
Cytokines																
IL-6	36	0.13	−0.03, 0.29	0.100	0.07	−0.11, 0.25	0.407	−0.09	−0.31, 0.12	0.373	0.05	−0.11, 0.20	0.523	0.03	−0.20, 0.27	0.751
Fibrinogen	35	−0.01	−9.83, 9.82	0.999	−0.98	−11.21, 9.25	0.841	−3.07	−14.23, 8.09	0.565	−2.99	−11.76, 5.77	0.476	4.64	−7.36, 16.64	0.421
sTNFrII	36	10.57	−24.06, 45.19	0.525	21.03	−14.18, 56.24	0.222	**49.38**	**10.18, 88.59**	**0.017**	**30.23**	**1.55, 58.92**	**0.040**	**−52.30**	**−91.09, −13.51**	**0.012**
vWF	34	−0.01	−0.06, 0.04	0.612	−0.01	−0.07, 0.05	0.703	−0.00	−0.06, 0.05	0.940	−0.00	−0.05, 0.05	0.873	0.00	−0.07, 0.07	0.975
% Predicted Spirometry																
FEV_1	40	−0.52	−1.54, 0.50	0.293	−0.99	−1.98, −0.00	0.050	**−1.60**	**−2.68, −0.51**	**0.006**	−0.85	−1.76, 0.06	0.064	1.34	−0.05, 2.73	0.058
FVC	39	0.14	−0.74, 1.02	0.746	0.24	−0.71, 1.19	0.604	0.23	−0.92, 1.38	0.679	0.03	−0.84, 0.89	0.952	0.28	−1.09, 1.66	0.667
MMEF	39	0.27	−2.72, 3.25	0.851	−0.25	−3.47, 2.97	0.871	−1.41	−5.25, 2.42	0.444	1.03	−1.84, 3.89	0.457	0.48	−3.97, 4.92	0.822
PEFR	42	0.49	−3.33, 4.31	0.791	0.61	−3.39, 4.61	0.752	0.03	−5.09, 5.16	0.989	−1.62	−5.52, 2.29	0.396	2.75	−2.64, 8.13	0.298
Exhaled Nitric Oxide																
$\log(FeNO_{50,pred})$	41	−0.02	−0.06, 0.02	0.299	−0.02	−0.06, 0.02	0.377	0.00	−0.05, 0.05	0.974	0.00	−0.04, 0.04	0.945	−0.02	−0.07, 0.03	0.483
C_ANO	41	−0.07	−0.14, 0.01	0.082	−0.07	−0.15, 0.00	0.062	−0.05	−0.15, 0.05	0.336	−0.02	−0.10, 0.07	0.684	−0.05	−0.16, 0.06	0.357
$\log(C_{AW}NO)$	41	**−0.07**	**−0.13, −0.00**	**0.044**	−0.06	−0.13, 0.01	0.103	0.01	−0.08, 0.10	0.775	0.01	−0.06, 0.08	0.868	−0.06	−0.15, 0.02	0.144
$\log(D_{AW}NO)$	41	0.09	−0.02, 0.19	0.090	0.06	−0.05, 0.18	0.250	−0.05	−0.19, 0.08	0.418	−0.02	−0.12, 0.08	0.702	0.09	−0.04, 0.21	0.175
		PM_1			PM_{25}			PM_4			PM_{10}					
Outcome	**N**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**			
Cytokines																
IL-6	36	−0.14	−0.29, 0.02	0.075	**−0.19**	**−0.35, −0.04**	**0.015**	**−0.22**	**−0.37, −0.06**	**0.008**	**−0.31**	**−0.53, −0.08**	**0.010**			
Fibrinogen	35	−2.94	−11.71, 5.84	0.485	−4.45	−13.74, 4.84	0.322	−4.58	−14.21, 5.05	0.325	−9.54	−23.64, 4.55	0.169			
sTNFrII	36	14.57	−19.19, 48.33	0.372	23.89	−11.45, 59.23	0.170	26.67	−9.73, 63.08	0.139	25.22	−31.18, 81.63	0.356			
vWF	34	−0.00	−0.04, 0.04	0.956	−0.00	−0.05, 0.04	0.876	−0.01	−0.06, 0.04	0.766	−0.02	−0.10, 0.05	0.504			
% Predicted Spirometry																
FEV_1	40	**−1.28**	**−2.04, −0.51**	**0.003**	**−1.45**	**−2.26, −0.64**	**0.002**	**−1.51**	**−2.35, −0.67**	**0.002**	**−2.02**	**−3.43, −0.61**	**0.008**			
FVC	39	0.50	−0.41, 1.40	0.260	0.43	−0.54, 1.40	0.358	0.42	−0.58, 1.43	0.386	0.46	−1.06, 1.99	0.527			

		POLLUTANTS														
		PN			LDSA			BC			PB-PAH			O_3		
Outcome	**N**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**
MMEF	39	**−2.90**	**−5.38, −0.41**	**0.025**	**−2.98**	**−5.76, −0.21**	**0.037**	**−3.08**	**−5.98, −0.19**	**0.038**	**−5.56**	**−9.83, −1.29**	**0.014**			
PEFR	42	2.49	−1.10, 6.08	0.163	2.22	−1.82, 6.27	0.263	2.17	−2.07, 6.42	0.296	3.30	−3.08, 9.68	0.292			
Exhaled Nitric Oxide																
log($FeNO_{50,pred}$)	41	0.01	−0.03, 0.04	0.723	−0.00	−0.04, 0.04	0.910	−0.01	−0.05, 0.04	0.764	−0.02	−0.08, 0.04	0.481			
C_ANO	41	−0.02	−0.10, 0.05	0.497	−0.05	−0.13, 0.03	0.229	−0.06	−0.14, 0.03	0.173	−0.10	−0.22, 0.02	0.107			
log($C_{AW}NO$)	41	0.00	−0.06, 0.07	0.913	0.01	−0.06, 0.08	0.767	0.01	−0.07, 0.08	0.799	0.02	−0.10, 0.13	0.755			
log($D_{AW}NO$)	41	−0.03	−0.13, 0.07	0.541	−0.06	−0.17, 0.05	0.289	−0.06	−0.18, 0.05	0.282	−0.12	−0.29, 0.05	0.150			
		SOURCE FACTORS														
		PM Mass			Traffic			Airport UFPs			Secondary Photochemistry					
Outcome	**N**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**			
Cytokines																
IL-6	36	−0.15	−0.31, 0.01	0.071	−0.06	−0.24, 0.11	0.457	**0.21**	**0.08, 0.34**	**0.003**	**−0.20**	**−0.39, −0.01**	**0.044**			
Fibrinogen	35	−3.28	−12.52, 5.96	0.459	−2.60	−11.95, 6.74	0.560	1.74	−7.73, 11.21	0.699	−5.28	−16.36, 5.81	0.325			
sTNFrII	36	13.77	−22.13, 49.68	0.426	**36.47**	**6.03, 66.91**	**0.022**	−5.21	−40.30, 29.89	0.756	27.83	−14.21, 69.87	0.179			
vWF	34	−0.00	−0.05, 0.04	0.888	−0.00	−0.05, 0.05	0.933	−0.01	−0.05, 0.04	0.768	−0.01	−0.06, 0.05	0.777			
% Predicted Spirometry																
FEV_1	40	**−1.31**	**−2.14, −0.49**	**0.004**	**−1.52**	**−2.28, −0.77**	**0.001**	0.37	−0.62, 1.36	0.438	**−1.55**	**−2.55, −0.54**	**0.005**			
FVC	39	0.52	−0.44, 1.48	0.270	0.25	−0.68, 1.19	0.574	−0.04	−0.91, 0.83	0.920	0.45	−0.68, 1.58	0.413			
MMEF	39	**−3.12**	**−5.75, −0.48**	**0.024**	−1.48	−4.50, 1.53	0.311	1.49	−1.18, 4.17	0.252	−2.95	−6.43, 0.52	0.090			
PEFR	42	2.70	−1.08, 6.47	0.151	0.39	−3.77, 4.56	0.845	−0.19	−4.08, 3.70	0.920	2.36	−2.26, 6.97	0.298			
Exhaled Nitric Oxide																
log($FeNO_{50,pred}$)	41	0.01	−0.03, 0.04	0.772	−0.00	−0.05, 0.04	0.873	−0.01	−0.05, 0.02	0.514	−0.01	−0.06, 0.03	0.568			
C_ANO	41	−0.03	−0.11, 0.05	0.446	−0.05	−0.13, 0.04	0.244	−0.03	−0.10, 0.05	0.454	−0.08	−0.16, 0.01	0.073			
log($C_{AW}NO$)	41	0.00	−0.07, 0.07	0.934	−0.00	−0.08, 0.07	0.947	−0.05	−0.11, 0.01	0.090	−0.01	−0.09, 0.08	0.884			
log($D_{AW}NO$)	41	−0.03	−0.14, 0.07	0.518	−0.03	−0.14, 0.09	0.615	0.09	−0.00, 0.18	0.062	−0.05	−0.18, 0.08	0.464			

Exposures: PN=Ultrafine Particle Number; LDSA=Lung-deposited surface area; PM_1 $PM_{2,5}$, PM_4, PM_{10}=Particle Mass in the 1, 2.5, 4 and 10 μm size fraction; BC=Black Carbon; PB-PAH=Particle-bound Polyaromatic Hydrocarbons; O3=Ozone

Outcomes: Cytokines: IL6 = High-sensitivity Interleukin-6; sTNFrII = Soluble TNF receptor II; vWF = Von Willebrand Factor. Exhaled Nitric Oxide: FeNO50 = Predictedexhaled nitric oxide at 50ml/s flow rate; $C_{A}NO$ = Distal Alveolar Nitric Oxide; $C_{aw}NO$ = Airway Wall Nitric Oxide; $D_{aw}NO$ = Diffusivity. Lung Function (% predicted): FEV_1 = Forced Expiratory Volume in 1 second; FVC = Forced Vital Capacity; MMEF = Maximum Mid-expiratory Flow; PEFR = Peak Expiratory Flow Rate.

All reported effect estimates are scaled to one standard deviation change in the exposure of interest.

Table 6

Multi-pollutant model associations of measured concentrations and modeled source factor contributions with cytokines, exhaled nitric oxide and spirometry outcomes.

POLLUTANTS													
		PN			PM_{25}			BC			O_3		
Outcome	**N**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**
Cytokines													
IL-6	36	0.13	−0.02, 0.27	0.087	**−0.28**	**−0.52, −0.05**	**0.023**	0.13	−0.23, 0.50	0.438	0.05	−0.18, 0.28	0.659
Fibrinogen	35	−2.18	−15.17, 10.81	0.719	−9.56	−28.69, 9.56	0.294	10.07	−17.98, 38.13	0.446	7.31	−9.83, 24.44	0.368
sTNFrII	36	−3.11	−38.21, 31.99	0.850	−9.14	−69.37, 51.08	0.746	44.07	−48.54, 136.69	0.320	−33.28	−84.40, 17.83	0.181
vWF	34	−0.02	−0.10, 0.05	0.529	−0.02	−0.13, 0.09	0.659	0.03	−0.13, 0.20	0.646	0.02	−0.10, 0.14	0.702
% Predicted Spirometry													
FEV_1	40	−0.75	−1.55, 0.05	0.065	**−1.92**	**−3.13, −0.70**	**0.005**	1.12	−0.71, 2.94	0.209	**1.51**	**0.27, 2.75**	**0.021**
FVC	39	0.24	−0.94, 1.43	0.661	0.75	−1.21,2.72	0.418	−0.40	−3.25, 2.46	0.767	0.38	−1.56, 2.31	0.679
MMEF	39	−0.87	−4.19, 2.46	0.581	**−5.31**	**−10.37, −0.25**	**0.041**	4.25	−3.27, 11.77	0.242	1.42	−3.86, 6.71	0.569
PEFR	42	1.32	−3.92, 6.57	0.599	5.48	−2.14, 13.10	0.146	−5.47	−17.54, 6.61	0.350	1.00	−6.59, 8.60	0.782
Exhaled Nitric Oxide													
$\log(FeNO_{50,pred})$	41	−0.03	−0.08, 0.03	0.347	−0.02	−0.10, 0.06	0.617	0.03	−0.09, 0.15	0.596	0.00	−0.07, 0.07	0.995
C_ANO	41	−0.07	−0.18, 0.03	0.168	−0.08	−0.22, 0.07	0.295	0.05	−0.17, 0.28	0.610	−0.01	−0.15, 0.13	0.856
$\log(C_{AW}NO)$	41	−0.08	−0.16, 0.01	0.085	−0.02	−0.15, 0.10	0.697	0.06	−0.12, 0.24	0.501	−0.02	−0.13, 0.09	0.649
$\log(D_{AW}NO)$	41	0.10	−0.03, 0.23	0.129	−0.02	−0.21, 0.17	0.816	−0.06	−0.34, 0.23	0.678	0.05	−0.11, 0.21	0.506

SOURCE FACTORS													
		PM Mass			Traffic			Airport UFPS			secondary photochemistry		
Outcome	**N**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**
Cytokines													
IL-6	36	0.05	−0.20, 0.31	0.652	0.09	−0.14, 0.31	0.423	**0.18**	**0.04, 0.32**	**0.017**	−0.29	−0.64, 0.07	0.102
Fibrinogen	35	1.24	−20.42, 22.90	0.902	2.63	−17.06, 22.31	0.775	0.26	−12.07, 12.58	0.964	−9.09	−38.13, 19.96	0.505
sTNFrII	36	−33.72	−97.38, 29.93	0.271	**64.38**	**6.30, 122.46**	**0.033**	−16.80	−51.64, 18.05	0.314	−6.45	−95.94, 83.04	0.878
vWF	34	0.00	−0.11, 0.11	0.981	0.01	−0.10, 0.12	0.785	−0.01	−0.07, 0.05	0.707	−0.03	−0.17, 0.12	0.709
% Predicted Spirometry													
FEV_1	40	−0.63	−2.04, 0.78	0.353	−1.35	−2.80, 0.10	0.066	0.14	−0.76, 1.03	0.746	0.37	−1.58, 2.32	0.686

		POLLUTANTS										
		PN			PM_{25}			BC			O_3	
Outcome	**N**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**	**Est**	**95% CI**	**p-value**
FVC	39	0.83	−1.13, 2.79	0.376	−0.46	−2.48, 1.55	0.626	0.33	−0.87, 1.52	0.564	0.27	−2.30, 2.84	0.821
MMEF	39	−3.48	−8.81, 1.84	0.180	1.80	−3.70, 7.31	0.489	−0.42	−3.89, 3.05	0.795	−1.66	−8.95, 5.62	0.628
PEFR	42	5.00	−1.87, 11.87	0.142	−5.57	−12.95, 1.80	0.128	2.02	−2.36, 6.41	0.341	3.32	−5.70, 12.34	0.445
Exhaled Nitric Oxide													
$\log(FeNO_{50,pred})$	41	0.02	−0.05, 0.10	0.539	0.01	−0.07, 0.10	0.756	−0.01	−0.06, 0.04	0.686	−0.05	−0.14, 0.04	0.298
C_ANO	41	0.01	−0.13, 0.15	0.878	0.04	−0.11, 0.19	0.595	−0.04	−0.13, 0.05	0.315	−0.13	−0.31, 0.04	0.120
$\log(C_{AW}NO)$	41	−0.04	−0.17, 0.09	0.494	0.04	−0.10, 0.17	0.546	−0.07	−0.15, 0.01	0.075	−0.02	−0.18, 0.13	0.758
$\log(D_{AW}NO)$	41	0.08	−0.13, 0.28	0.440	−0.05	−0.25, 0.15	0.580	0.11	−0.01, 0.23	0.077	−0.03	−0.28, 0.21	0.768

Exposures: PN=Ultrafine Particle Number; LDSA=Lung-deposited surface area; PM2 5=Particle Mass in the 2.5 pm size fraction; BC=Black Carbon; O3=Ozone

Outcomes: Cytokines: IL6 = High-sensitivity Interleukin-6; sTNFrII = Soluble TNF receptor II; vWF = Von Willebrand Factor. Exhaled Nitric Oxide: FeNO50 = Predicted exhaled nitric oxide at 50ml/s flow rate; CANO = Distal Alveolar Nitric Oxide;CawNO = Airway Wall Nitric Oxide; DawNO = Diffusivity. Lung Function (% predicted): FEV1 = Forced Expiratory Volume in 1 second; FVC = Forced Vital Capacity; MMEF = Maximum Mid-expiratory Flow; PEFR = Peak Expiratory Flow Rate

All reported effect estimates are scaled to one standard deviation change in the exposure of interest.

Government Office for Science

Foresight

Understanding the UK Freight Transport System

Future of Mobility: Evidence Review

Foresight, Government Office for Science

Understanding the UK Freight Transport System

MDS Transmodal

February 2019

This review has been commissioned as part of the UK government's Foresight Future of Mobility project. The views expressed are those of the author and do not represent those of any government or organisation.

This document is not a statement of government policy.

This report has an information cut-off date June 2018.

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GLOSSARY OF TERMS

Bulk freight	Large volumes of homogeneous freight carried in specialised transport equipment between specialised terminals.
Bulk rail freight	Where freight is carried in railway wagons designed specifically for carrying particular types of bulk freight (e.g. coal and chemicals) and requires special facilities to transfer the freight between rail and storage.
Coastal shipping	The domestic movement of freight by sea between two UK ports.
Deep-sea shipping	The international movement of freight by sea between a UK port and a port situated outside Europe and the Mediterranean.
Distribution centre	Industrial buildings where freight is stored; there are essentially two types of distribution centre – national distribution centres and regional distribution centres.
Domestic freight transport	The carriage of goods with a first origin and final destination within Great Britain.
Freight transport	Carriage of goods between an origin and a destination.
Heavy goods vehicle (HGV)	Goods vehicles over 3.5 tonnes gross laden weight (i.e. weight of vehicle plus load).
Intermodal rail freight	Freight carried in units (e.g. a container) on special flat rail wagons for the 'trunk' haul between two intermodal terminals; collection and delivery is by road to provide a door-to-door service.
Intermodal terminal	Facility designed to transfer units between rail and road and consists of sidings to accommodate trains, special cranes for loading and unloading the units and space for storage of units.
International freight transport	The carriage of goods with a first origin or final destination outside the United Kingdom. However, for the purposes of this report it has been defined as including movements between Great Britain and Northern Ireland.
Loading gauge	The cross-section of a railway line through which an intermodal rail freight service – with units transported on intermodal rail wagons – can safely pass. More generous loading gauges can allow more cost-effective combinations of standard intermodal wagons and larger units to be transported.
Load-on/load off (LoLo)	Unitised cargo in containers that is loaded on and off a ship by a crane.
Logistics	Designing and managing 'supply chains' for organisations, including purchasing, manufacturing and storage as well as transport.

Logistics providers	Organisations that undertake the movement and handling of goods on behalf of their customers; there are two main types of logistics providers – road hauliers and 3PLs (third party logistics providers).
National distribution centre (NDC)	Inventory holding points for imported and nationally sourced goods before re-distribution to other stages in the supply chain; serve the whole of the UK from one location.
Network Rail	Organisation responsible for the maintenance and renewal of the GB rail network.
Non-bulk freight	Freight carried in standard 'box' units, mainly road trailers and containers.
Non-bulk rail freight	Freight carried in units (usually a container) on an intermodal rail freight service or in railway 'box cars' or 'vans' between specialist terminal facilities.
Rail-connected distribution park	Large distribution site, with an intermodal terminal serving on-site distribution centres and the wider region; also called a Strategic Rail Freight Interchange.
Regional distribution centre (RDC)	Re-distribution of inward supplies of goods to other stages in the supply chain, normally a retail outlet; they have a regional hinterland and are normally associated with retailers. Their primary role is to consolidate and re-distribute goods in short periods of time rather than to hold goods for long periods.
Road hauliers	Provide road transport services from one location to another at the direction of their customers.
Roll-on/roll-off (RoRo)	Unitised cargo in trailers which is rolled on and off a ship without the use of a crane.
Short-sea shipping	The international movement of freight by sea between a UK port and a port situated in geographical Europe.
Strategic Rail Freight Interchange (Strategic RFI)	Large distribution sites (over 60 hectares), with an intermodal terminal serving on-site distribution centres and the wider region; also called rail-connected distribution parks.
Third party logistics company (3PL)	Companies that sell comprehensive packages of supply chain management services in addition to road transport operations.
Tonne-kilometres (tkm)	Tonnes lifted x length of haul.
Tonnes lifted	Weight of freight
Tonnes moved	The sum of tonnes moved and the distance it is moved; usually expressed in tonne kilometres.

Vehicle-kilometres (vkm)	Tonne-kilometres divided by average load per vehicle.
West Coast Main Line (WCML)	Key route for GB rail freight services; the line links London with the West Midlands, North West England and the Central Belt of Scotland (Glasgow).

1 INTRODUCTION

1.1 Study objectives

The objective of this study is to provide an evidence-based review of the current 'landscape' of the 'freight transport system' in the UK, while also providing some observations on how the future freight transport system might develop over the next 10 years. The Government Office for Science (GO-Science) has also commissioned a number of parallel pieces of work which seek to provide more detailed views on the future of freight transport up to 2040.

The 'freight transport system' in the UK has been defined for the purposes of this study as the network of users of freight transport (principally shippers and receivers of cargo), freight transport and logistics service providers and the infrastructure which these services use.

1.2 Foresight Future of Mobility Project

This research was commissioned by GO-Science, which has the remit of ensuring that government policies and decisions are informed by the best scientific evidence and strategic long-term thinking. This piece of work forms part of the GO-Science Foresight Future of Mobility project, which is considering what benefits and opportunities the transport system of the future could provide and what the implications are for Government and society.

1.3 The political economy of freight transport

Freight transport is needed because goods available at one geographical location are required at another location for processing, sorting or consumption. Freight transport is therefore an example of what economists call a derived demand as the transport is not required in itself, but only as a means to satisfy another demand.

As a derived demand, the demand for freight transport does not come directly from consumer needs or wants but from private sector companies such as retailers, manufacturers and processors. However such organisations are ultimately responding to consumer demand for goods and dealing with return flows such as unwanted or faulty goods and waste materials such as packaging for recycling or disposal; the level of demand for goods will be influenced by various factors, including the performance of the wider economy and changes in tastes and fashions over time. Freight transport and logistics services are delivered almost exclusively by private sector companies which invest heavily in fixed infrastructure, such as port facilities, rail terminals, distribution centres, and mobile equipment such as trucks, vans, forklift trucks, ships and railway locomotives and wagons.

The private sector needs, however, to use publicly owned road and rail infrastructure and is subject to the taxation and regulatory regimes that the public sector puts in place. Changes in taxation and regulation may lead to more efficient outcomes for the wider economy and society as a whole, but will also affect the value of private sector investments that have been predicated on the existing fiscal and regulatory position. It follows that Government needs to understand the current landscape for freight transport as future interventions are likely to require a combination of public investment in road and rail network infrastructure, changes in the regulatory framework and the taxation regime and the application of appropriate planning policies. These changes should be designed, wherever possible, to increase the efficiency of the freight and logistics sector by reducing its costs; this is particularly important as freight

transport should be seen as a cost of production and as having an impact on the productivity of firms and the UK economy as a whole.

Freight transport movements also have impacts on the environment and on the quality of life and health of citizens and so an appropriate balance needs to be found in the future between, on the one hand, economic objectives and, on the other hand, quality of life and environmental objectives.

As the freight transport industry is highly competitive – facilitated by relative ease of entry into the market – any interventions by the public sector will lead to a response from the private sector operators and any resulting changes in costs will be passed on, in the medium to long term, to the industry's customers and, ultimately, to the wider economy.

Technological changes and innovation in freight transport have facilitated the development of mass and then lean production techniques, which have led to transformational changes in the UK economy since the 18th century (CILT, 2015):

- Canals allowed raw materials and manufactured products to be distributed nationwide and to and from ports at a reasonable cost in the 18th and early 19th centuries, while the railways provided high-capacity freight transport with faster transit times from the latter half of the 19th century;

- The development and mass production of vehicles using the internal combustion engine in the early 20th century and the development of the motorway network after the Second World War allowed road freight to increase its market share on longer-distance hauls at the expense of the railways, without radically transforming the structure of the UK economy;

- Containerisation of a wide range of cargoes since the 1960s, allied to the process of globalisation and investment in very large container ships, has made it easier for goods to be manufactured anywhere in the world and then distributed cost-effectively to the UK;

- Greater use of integrated information and communications technology (ICT) in supply chains since the 1980s has allowed companies to reduce their inventory and operate increasingly lean manufacturing processes, which has led to lower production costs and greater productivity for the UK economy.

As the history of transport since the industrial revolution in the 18th century has shown, technological change in the freight transport sector has had a transformational effect on the economy and on society. This is likely to continue up to 2040 as the freight industry adapts to changing consumer demands, stronger environmental regulation and the challenges of an increasingly integrated global economy.

This provides the context for this study, which has an objective of ensuring that Government has a clear view of the freight transport landscape in the UK. This is important because the public sector can have such a significant impact on the sector, which is in turn a key facilitator for the wider economy.

1.4 UK freight transport policy

Government transport policy in relation to freight transport is designed to be relatively light touch and is set out at a UK level in *The Logistics Growth Review* (Department for Transport, 2011 and 2014). The main aim of the original document, which was produced in 2011 in collaboration with the freight and logistics industry, was to identify the barriers to economic growth within the industry and present a series of measures to address the barriers that were identified.

The document outlined five core areas where the Government can assist and facilitate growth and competitiveness in the logistics industry, namely:

- Giving industry greater confidence to invest in the short term by removing planning barriers to sustainable logistics development, with a particular focus on strategic rail freight interchanges (SRFIs[1]) that can facilitate modal shift from road to rail over the longer distances;
- Improving the longer-term capacity, performance and resilience of our congested road and rail networks and improving connectivity to ports;
- Promoting the image of the sector at a local level;
- Reducing unnecessary regulation;
- Attracting and retaining high-calibre recruits.

The 2014 update presented the measures the Government had taken in relation to these five core areas. These included producing a National Networks National Policy Statement to endorse policy on SRFIs, increasing investment to upgrade the strategic road network and providing funding to improve training and skills in the logistics sector.

1.5 Scope and methodology

The scope of this research project is on the UK freight transport system as defined above, but given the open nature of the UK's economy, it also considers transport links to the European continental mainland, Ireland and the rest of the world. It encompasses all modes of freight transport, but focuses on road and rail, shipping, inland waterways and aviation.

As it is only possible to understand the existing landscape through an appreciation of historic trends, we have presented as much data as possible from 2002 to the most recent year for which published data is available. The time horizon for the Foresight Future of Mobility project is 2040, but our observations on future trends are limited to the next ten years.

[1] Strategic Rail Freight Interchanges are large distribution sites (over 60 hectares), with an intermodal terminal serving on-site distribution centres and the wider region; they are also called rail-connected distribution parks.

The methodology adopted to complete this study has involved:

- Desk research to analyse existing public policy and research;
- Data analysis to develop a statistical 'picture' of the current position based on official data and outputs from the GB Freight Model, which forms the freight module of the DfT's current National Transport Model and other databases developed by MDS Transmodal;
- Providing observations on how the freight transport system might develop up to about 2028.

As this report demonstrates, there is a significant amount of data available in the public domain, much of which is collected by the public sector in order to inform the development of policy. Data are collected to fulfil different needs. Hence the datasets report on different aspects of the transport system, using different methods. Consequently there can be differences in the picture shown by the data. For example there is sometimes inconsistency between the HGV distance in the Continuing Survey of Road Goods Traffic and the Road and the National Road Traffic Survey. The reasons for this difference are given on the DfT methodology page (2016). Policy makers and users of this (and any) data need to comprehend any uncertainties in the picture being presented, or there are risks of misunderstanding.

As the freight transport sector is essentially operated by the private sector, this official data is aggregated and anonymised to avoid raising issues of commercial confidentiality and generally seeks to record movements of freight by individual mode. This makes it difficult to follow the movements of different commodities through the transport chain and examine the (often international) supply chains of individual companies or industries from a statistical point of view. Advances in ICT can allow individual consignments to be tracked automatically from production to consumption, improving company's situational awareness. However, whilst government and local authorities could benefit from this information, in terms of planning, it is likely challenging to obtain and use, given its commercial nature.

Where possible the report includes references to data sources and research produced by others; where references are not provided, the views expressed are those of the authors.

1.6 Structure of report

Section 2 Freight transport & stakeholders provides definitions of freight transport and how it is measured. It then considers the key stakeholders in freight transport that have a particular interest in how it develops up to 2040. It then describes the main modes of freight transport and provides a short introduction to freight transport economics.

Section 3 Freight transport demand provides data and analysis of the demand for freight transport by mode of freight transport, with the main focus on road, rail, port-based and air freight.

Section 4 Freight transport services provides information on the service providers that operate in the freight transport industry by mode of transport.

Section 5 The strategic freight transport infrastructure network seeks to describe the infrastructure that the services use – both publicly owned and privately owned infrastructure.

Section 6 The Future of Freight provides some observations on the potential impact of, inter alia, changes in regulation, technology, changing trade relationships, and alternative fuels on the future UK freight system.

2 FREIGHT TRANSPORT & STAKEHOLDERS

2.1 Introduction

This section provides definitions of freight transport and how it is measured, as well as the wider concepts of logistics and supply chains. It then considers the key stakeholders in freight transport that have a particular interest in how it develops in the future. It concludes by describing the main modes of freight transport and provides a short introduction to freight transport economics.

2.2 Definition of freight transport

Freight transport is the carriage of goods between an origin and a destination for commercial reasons because goods available at one geographical location are required at another location for processing, sorting or consumption. This definition excludes the majority of light goods vehicle (or 'white van') traffic, which is for the provision of services or for personal use rather than for the transport of goods (Braithwaite, 2017).

Logistics is a broader concept that involves designing and managing supply chains for individual organisations. It seeks to efficiently manage the purchasing, manufacturing and storage functions and the transport as an integrated system. Minimising stockholding (inventory) and the associated costs is a key principle of logistics. The **supply chain** of an individual organisation is the sequence of processes involved in the production and distribution of a commodity. The freight transport industry is therefore involved in both transport and logistics – particularly as many transport service providers also provide 'added value' services such as packaging, labelling and sorting of goods – and is essential for the distribution of goods within the supply chain of an individual organisation.

This report mainly discusses freight transport rather than logistics, but attention is also paid to distribution centres because of their importance as nodes in the wider freight network, in adding value to the goods stored and in creating employment.

Freight transport can generally be categorised by its:

- Origin or destination, with a particularly important distinction made between domestic transport (i.e. within the UK) and international freight between the UK and other countries, whether within the existing customs union that includes the rest of the European Union or with non-EU countries;
- Mode of appearance (principally bulk or non-bulk for land-based transport);
- Mode of transport (road, rail, air, etc.).

Domestic freight transport is defined as the carriage of goods with both the first origin and final destination within the United Kingdom, while **international freight transport** is the carriage of goods with either an origin or destination outside the United Kingdom. As Great Britain is an island, all international freight has to be handled through a port, airport or

through the Channel Tunnel, while for Northern Ireland international freight transport can also involve movements across the land border with the Republic of Ireland.

Bulk freight transport is where large volumes of a homogeneous cargo are carried in specialised transport equipment between specialised terminals. Examples include the transport of aggregates from a quarry to a rail-served terminal and the transport of petroleum products by sea in oil tankers from an oil refinery based on an estuary to a coastal tank farm.

Non-bulk freight transport is made up of two main categories of cargo:

- Unitload transport: where cargoes are carried in standard 'box' units, mainly road trailers and containers. Examples are where a truck makes a delivery of food and beverages from a distribution centre to a supermarket or where a container containing consumer goods from China is transported on a rail service from a container port to an intermodal rail freight terminal, where it is then loaded onto the back of a truck for delivery to a distribution centre.

- Semi-bulk transport: where high-volume industrial products are 'packaged' to ease handling without being in pure bulk form or being transported in a unit. Examples include steel coils, paper rolls or packaged timber.

2.3 Measuring freight transport

Freight transport is usually measured in terms of **freight tonnes lifted** or **freight tonnes moved**. Freight tonnes moved can be expressed in tonne-kilometres (tkm) or, for road freight, vehicle-kilometres (vkm). Tonne-kilometres is generally regarded as the most relevant measure for defining modal share and a combination of tonne-kilometres and tonnes lifted allows the average length of haul to be derived.

tonne kilometres (tkm) = tonnes lifted x length of haul in kilometres

vehicle kilometres (vkm) = tonne kilometres / average load in tonnes

tonne kilometres / tonnes lifted = average length of haul in kilometres

2.4 Key freight transport stakeholders

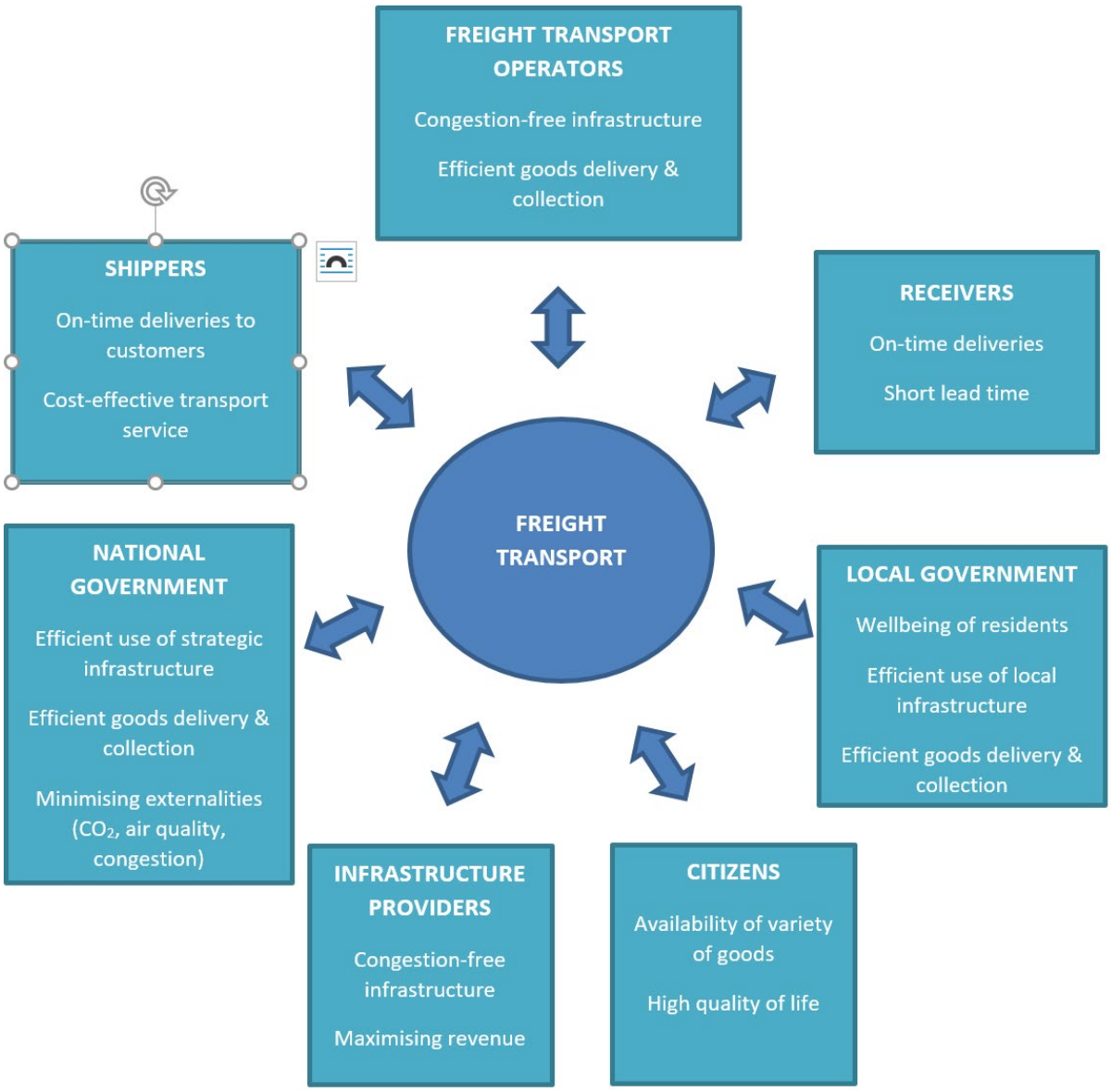
Freight transport movements are a source of environmental emissions, and they contribute to congestion and generate noise. These issues cause concern for a wide range of stakeholders and can justify intervention by the public sector to protect the wider public interest. At the same time the functioning of the UK economy is facilitated by the availability of efficient freight transport services, ensuring the availability of goods, supporting manufacturing activity and supporting employment.

The different expectations of the various stakeholders in relation to freight transport can be described through stakeholder analysis, which categorises the different groups of people and organisations with an interest in the subject and highlights their different expectations.

Figure 1 shows the key stakeholder groups that are affected by freight transport, with their main expectations. In general terms, citizens are seeking a high quality of life, while transport operators and their customers (shippers and receivers of goods) have a strong interest in achieving low-cost on-time delivery and collection of goods to improve their competitiveness.

These different expectations can result in conflicts that need to be resolved through trade-offs between the private needs of the freight industry and its customers and public needs (such as improved air quality, lower levels of congestion, etc.) through intervention in the market by the public sector. In economic terms, where the costs of private activities are not fully reflected in the user costs of the freight industry and their customers, there is market failure; the public sector therefore has a role in seeking to balance the needs of the private operators with the wider needs of society.

Figure 1: Freight transport stakeholders and expectations (source: MDS Transmodal)



2.5 Modes of freight transport & modal economics

Freight transport is often defined in terms of the mode of freight transport because this determines the relative economics of the freight transport movement and its environmental impacts.

Road freight transport is the dominant mode because of a number of factors:

- The mode's inherent flexibility and cost-effectiveness, particularly over shorter distances and for smaller consignments.
- The ease of entry into the road haulage sector due to lower start-up costs and a lower level of institutional and regulatory complexity compared to, for example, the railway industry.
- The extent of the high-capacity strategic highways network that was developed after the Second World War, notwithstanding the current congestion and bottlenecks in some locations, particularly at peak times.
- The fact that most distribution centre sites are no longer directly connected to other modal networks.

The vast majority of road freight lifted and moved is carried in heavy goods vehicles (HGVs), which are defined as vehicles over 3.5 tonnes gross laden weight (i.e. the weight of the vehicle plus its load). The average length of haul for an HGV is about 100km (Department for Transport, 2018c). Although there are a variety of types and sizes of HGV, the main type of HGV used for long-distance road haulage is the combination of a tractor and 13.6-metre trailer unit. There has been an increase in light goods vehicles (LGVs or so-called 'white vans') traffic. The majority of LGV movements on the road network are not associated with e-commerce deliveries (Braithwaite, 2017). They are mainly used for food distribution, construction and business services (such as plumbers, electricians, fitters, etc.). Therefore, while the growth in LGV traffic on the roads is often assumed to be related to the growth in e-commerce, this is a contributory factor, it is also likely related to the growth in service-related activity. However there remains considerable uncertainty in exactly what LGVs are used for.

Rail freight transport can be cost-effective, even over short distances (i.e. less than 100km), for full trainload consignments moving between two rail-connected sites (such as shipments of coal from ports to inland power stations). It can also provide economic and flexible transport chains for higher-value goods when transported in containers within intermodal transport chains. However, rail freight tends to be competitive with road over longer distances and the average length of haul is about 150km (Office of Rail & Road, 2018d). Other benefits of rail freight include:

- The ability to receive large volumes of cargo in 'one move';
- The ability to deliver/receive cargo at specific times and in a timely manner which avoids road congestion; rail operates to working timetables with recent performance for the sector indicating that around 94% of freight trains arrive 'on-time';
- Lower greenhouse gas and other emissions per unit moved so that, where organisations are required to report them, the use of rail can either off-set emissions

elsewhere or contribute to a reduction of overall emissions, as well as help in meeting corporate social responsibility objectives; and

- Greater levels of security – the railway operates in a closed/secured environment so that, for example, spent nuclear fuel is transported by rail freight despite road haulage potentially being able to offer a more cost effective solution.

Maritime freight transport via seaports is essential to trade with the European continental mainland, Ireland and the rest of the world. A wide variety of modes are used to transport goods by sea, from container ships and roll-on/roll-off ferries carrying high-value consumer goods to bulk carriers transporting petroleum products, crude oil, liquid natural gas, grain, biomass, bulk steel and a wide variety of other goods.

Waterborne freight transport includes the transport of domestic freight within the UK on inland waterways, along the coasts and between Great Britain and Northern Ireland and 'one-port traffic' between a single UK port and an offshore installation. While large volumes of bulk goods and some containers are transported coastwise between UK ports and along major inland waterways such as the Manchester Ship Canal, a few other wide inland navigations and on the major river estuaries, there is no cargo transported by barge on narrow-gauge canals.

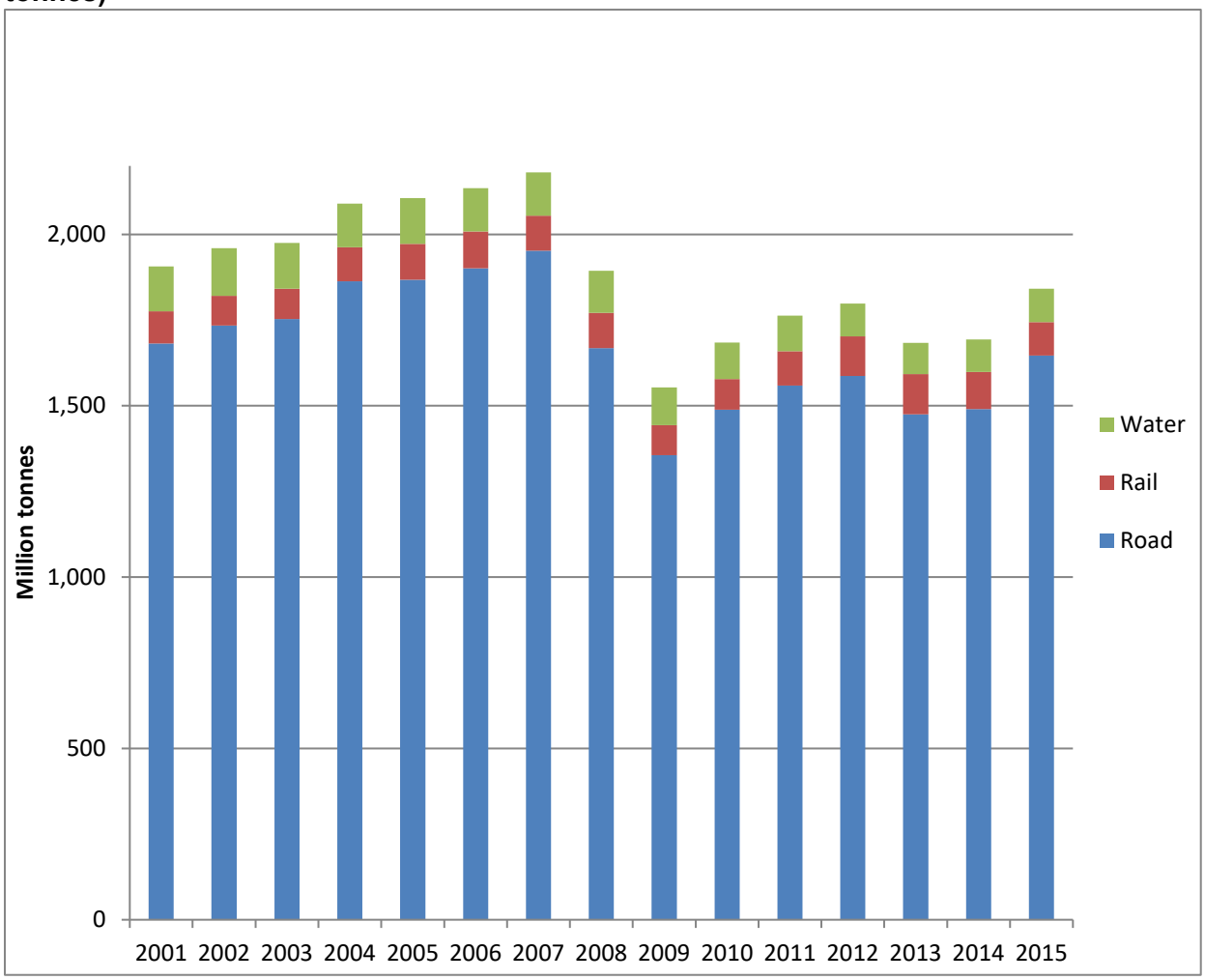
Pipelines provide a specialist mode of transport for the cost-effective transport of large volumes of bulk liquids and gases between ports and manufacturing sites, refineries and power stations.

Air freight is a specialist mode of freight transport, mainly for the inter-continental transport of relatively low volumes of very high-value or urgent goods and documents.

2.6 Overall freight transport volumes

Figure 2 shows how GB domestic freight transport by mode in terms of tonnes of freight lifted has fluctuated during the period 2001–15, with road freight responsible for transporting between 87% and 90% of total freight by volume over the period.

Figure 2: Domestic freight transport lifted by mode in Great Britain 2001–15 (million tonnes)



Source: Department for Transport Statistics Great Britain

In addition, road and rail freight data analysed by the authors suggests that total freight lifted in the UK by road (including overseas hauliers) and rail in 2016 amounted to 2.1 billion tonnes of goods (Table 1). Of the total goods lifted, 83.6% had an origin in England, 2.6% had an origin in Northern Ireland, 4.8% had an origin i77n Wales and 9.0% had an origin in Scotland.

Inland freight moved in the UK by road and rail in 2016 amounted to an estimated 209 billion tonne-kilometres, with each tonne being moved on average 100km (Table 2). The rail modal share in terms of freight moved was an estimated 9% in 2016 (Table 3), with the highest share for rail being 15% in Yorkshire and the Humber where there are significant bulk rail movements to and from the port of Immingham.

Table 1: Total estimated UK freight lifted in tonnes by origin-destination region, 2016 (million tonnes)

	Origin tonnes	Destination tonnes
North East	81	78
North West	220	228
Yorkshire and the Humber	216	205
East Midlands	230	213
West Midlands	188	199
East Of England	252	242
London	132	151
South East	258	270
South West	171	163
Wales	100	94
Scotland	188	191
Northern Ireland	53	54
Total	2,088	2,088

Source: MDS Transmodal analysis of data from DfT's Continuing Survey of Road Goods Transport (GB & Northern Ireland), International Road Haulage Survey & Network Rail data

Table 2: Total estimated UK freight moved in tonne km by origin-destination region, 2016

	ORIGIN		DESTINATION	
	Origin billion tonne-km	Av. distance moved (km)	Destination billion tonne-km	Av. distance moved (km)
North East	7.8	97	7.3	94
North West	23.4	107	24.6	108
Yorkshire and the Humber	24.0	111	21.1	103
East Midlands	24.2	105	21.9	103
West Midlands	18.6	99	20.2	102
East of England	25.6	102	24.5	101
London	7.7	58	10.6	70
South East	27.0	104	29.5	109
South West	17.7	104	16.7	102
Wales	11.1	112	9.8	103
Scotland	18.8	100	19.7	103
Northern Ireland	3.4	63	3.4	63
Total	209.4	100	209.4	100

Source: MDS Transmodal analysis of data from DfT's Continuing Survey of Road Goods Transport (GB & Northern Ireland), International Road Haulage Survey & Network Rail data

Table 3: Total UK freight by road & rail by origin region, 2016 (billion tonne-km)

	Road tonne-km	Road modal split %	Rail tonne-km	Rail modal split %	Total tonne-km
North East	7.0	90%	0.8	10%	7.8
North West	21.6	92%	1.8	8%	23.4
Yorkshire and the Humber	20.5	85%	3.6	15%	24.0
East Midlands	21.5	89%	2.7	11%	24.2
West Midlands	17.8	95%	0.9	5%	18.6
East Of England	23.3	91%	2.4	9%	25.6
London	7.2	94%	0.4	6%	7.7
South East	25.7	95%	1.3	5%	27.0
South West	15.9	90%	1.8	10%	17.7
Wales	9.6	87%	1.5	13%	11.1
Scotland	17.2	91%	1.7	9%	18.8
Northern Ireland	3.4	100%	0.0	0%	3.4
Total	190.6	91%	18.8	9%	209.4

Source: MDS Transmodal analysis of data from DfT's Continuing Survey of Road Goods Transport (GB & Northern Ireland), International Road Haulage Survey & Network Rail data

2.7 Summary

Freight transport is an essentially private sector activity which has wider economic, social and environmental impacts. These wider impacts can justify appropriate intervention by the public sector to address market failure.

The modes of transport have different strengths and weaknesses but for domestic freight road is competing with rail and, to a lesser extent, coastal shipping. For international freight transport, maritime transport has the highest market share in terms of tonnage, but air freight is used for the transport of very urgent and high-value inter-continental cargo and the Channel Tunnel fixed link competes with cross-Channel ferry services for traffic to and from the European continental mainland.

3 FREIGHT TRANSPORT DEMAND

3.1 Introduction

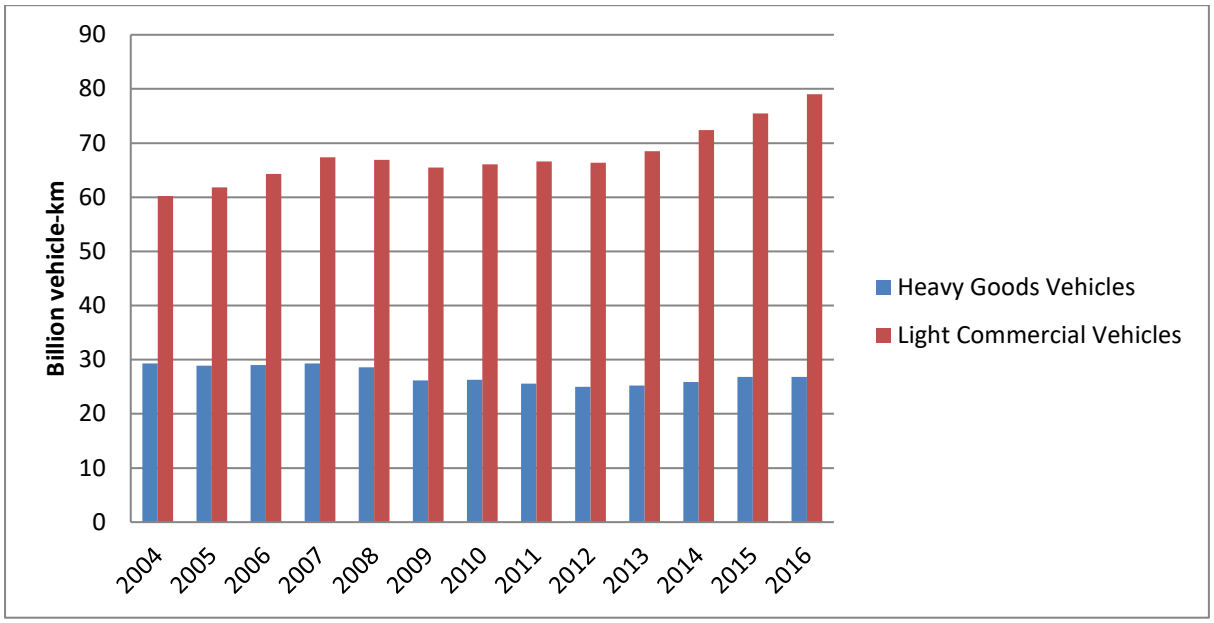
This section provides data and analysis of the demand for freight transport by mode of freight transport, with the main focus on road, rail, ports and air freight. Where a consistent time series is available it sets out the data from 2001 to 2016 (or the 2016–17 financial year) to show historic tends.

3.2 Road freight: traffic volumes & goods transported

Traffic volumes

Total HGV and LGV freight traffic is recorded by the DfT's National Traffic Survey, which is based on continuous traffic counts. This data suggests that HGV traffic has been gradually increasing since 2012 and in 2016 reached 27.1 billion vehicle kilometres. However, it has still not reached its pre-recession peak of 29.3 billion vehicle kilometres achieved in 2007.

Figure 3: Road traffic (billion vehicle-km) by vehicle type, 2004–16



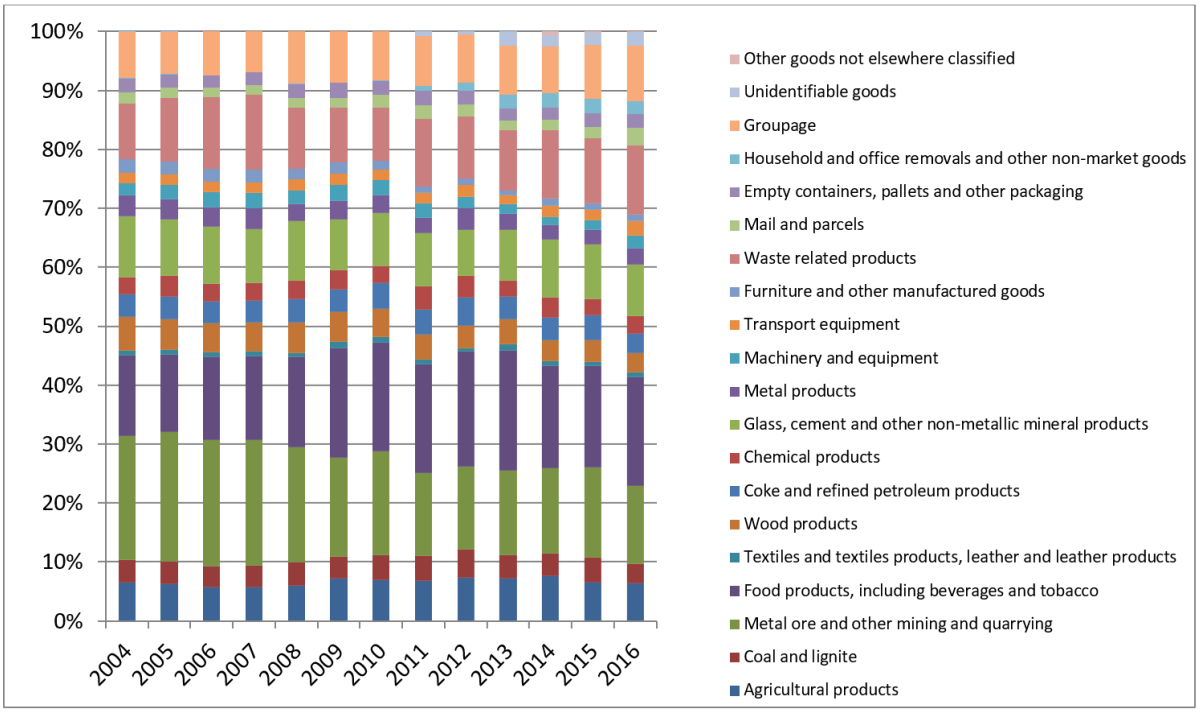
Source: Department for Transport, 2018, TRA0201

By comparison, LGV traffic has increased steadily from 60 billion vehicle-kilometres in 2004 to 79 billion vehicle kilometres in 2016, an increase of 31%. Although less is known about LGV movements, much of this increase is likely to be related to the growth in in the service economy and, probably to a more limited extent, growth in e-commerce (Braithwaite, 2017).

Commodities transported

Figure 4 provides analysis of freight tonnes lifted by broad commodity by UK-registered HGVs over the period 2004–16 and as recorded in the DfT's Continuing Survey of Road Goods Transport (Department for Transport, 2018, RFS0104). While the trends in different broad commodity groups can be difficult to establish from this data source, there appears to be a gradual reduction in the proportion of goods transported that relate to agriculture,

extractive industries, raw materials and intermediate goods for manufacturing, while there has been an increase in the volume of mail and parcels and waste products transported and food and beverages volumes have remained roughly stable. This is likely to reflect an ongoing gradual shift in the structure of the British economy away from manufacturing and towards a service-based economy that imports an increasing proportion of its final consumer goods.



Source: Department for Transport, 2018, RFS0104

Figure 4: Goods lifted by UK-registered HGVs by broad commodity, 2004–16

The cost of road freight transport

The cost of road freight transport is usually relatively low compared to the value of the goods being transported. The one-way cost for a 13.6 metre trailer carrying up to 26 pallets between a distribution centre in the Midlands and the North West might be in the region of £260, which could equate to as little as £0.01 per kilogramme of goods transported.[2] This relatively low cost of transport compared to the value of the goods allows them to be manufactured in one location and consumed in another and often pass through two or three storage facilities between manufacture and final consumption.

[2] MDS Transmodal's estimate is based on its in-house road haulage cost model. This is based on a fixed operating cost per hour of £27, a variable cost per kilometre of £0.38 and includes re-positioning of the vehicle to pick up a backload. The cost per kilogramme of goods is based on a full load of 26 pallets, each pallet transporting a tonne of goods.

Load factors an empty running

Table 4 shows the road haulage sector's performance in terms of empty running and load factors since 2006.

Table 4: Empty running and load factors in the road haulage sector, 2006–16

Year	Empty running	Load factor*
2006	26.8%	0.56
2007	27.4%	0.57
2008	28.9%	0.58
2009	28.3%	0.57
2010	28.7%	0.59
2011	30.2%	0.62
2012	28.5%	0.63
2013	28.6%	0.63
2014	28.8%	0.62
2015	28.6%	0.64
2016	30.2%	0.68

Source: Department for Transport, 2018, RFS0125

*The volume of goods moved as a proportion of the total volume of goods that could have been carried.

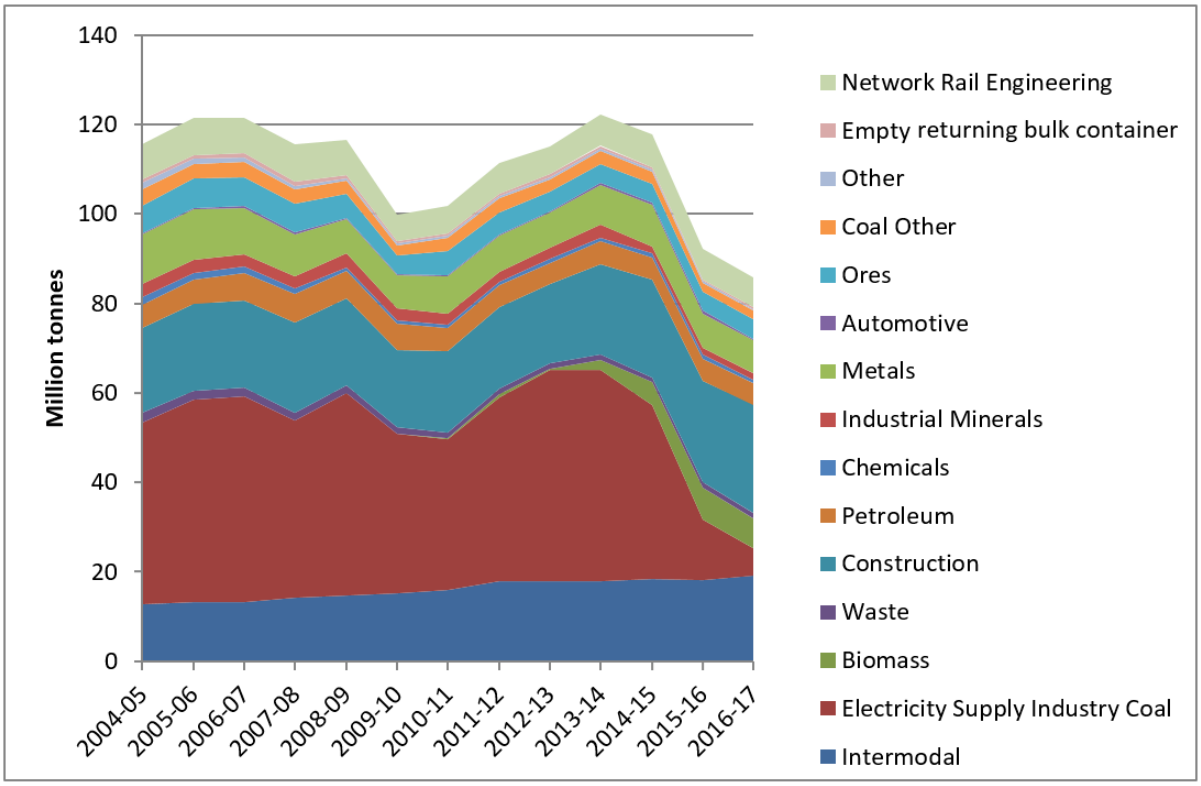
According to DfT statistics, empty running in the road haulage sector has fluctuated around a mean of 28.5% over the past decade (Department for Transport, 2018, RFS0125). The inherent nature of some road haulage operations is that vehicles are unable to collect a backload and have to return empty after making a delivery; examples would include HGVs delivering fuel to a filling station or aggregates to a construction site. Given that empty running has remained fairly stable over the past decade, this suggests that operators are generally able to secure return loads (thereby running loaded in both directions) where this is possible. Based on official DfT statistics there also appears to have been a gradual improvement in load factor over the past decade as road hauliers seek to increase their efficiency and remain competitive (Department for Transport, 2018, RFS0125).

3.3 Rail freight: volume & goods transported

Total freight lifted by rail reached a post-crisis peak of 122 million tonnes in 2013–14, before declining by 30% to 86 million tonnes in 2016–17 (Figure 5). The significant fall in rail freight tonnage since 2013–14 was due to a dramatic reduction in coal volumes, principally coal supplied to the Electricity Supply Industry (ESI), which fell from a high of 47 million tonnes in 2013–14 to 6 million tonnes in 2016–17. This is explained by European emissions legislation and Government policy to phase out electricity generated from coal, which resulted in many coal-fired power stations closing over that period and a consequent reduction in the use of steam coal for electricity generation. While total rail freight volumes in 2016–17 were at their

lowest point in the time series of data, the fall in ESI coal volumes essentially masks growth in other sectors, particularly domestic intermodal and construction materials.

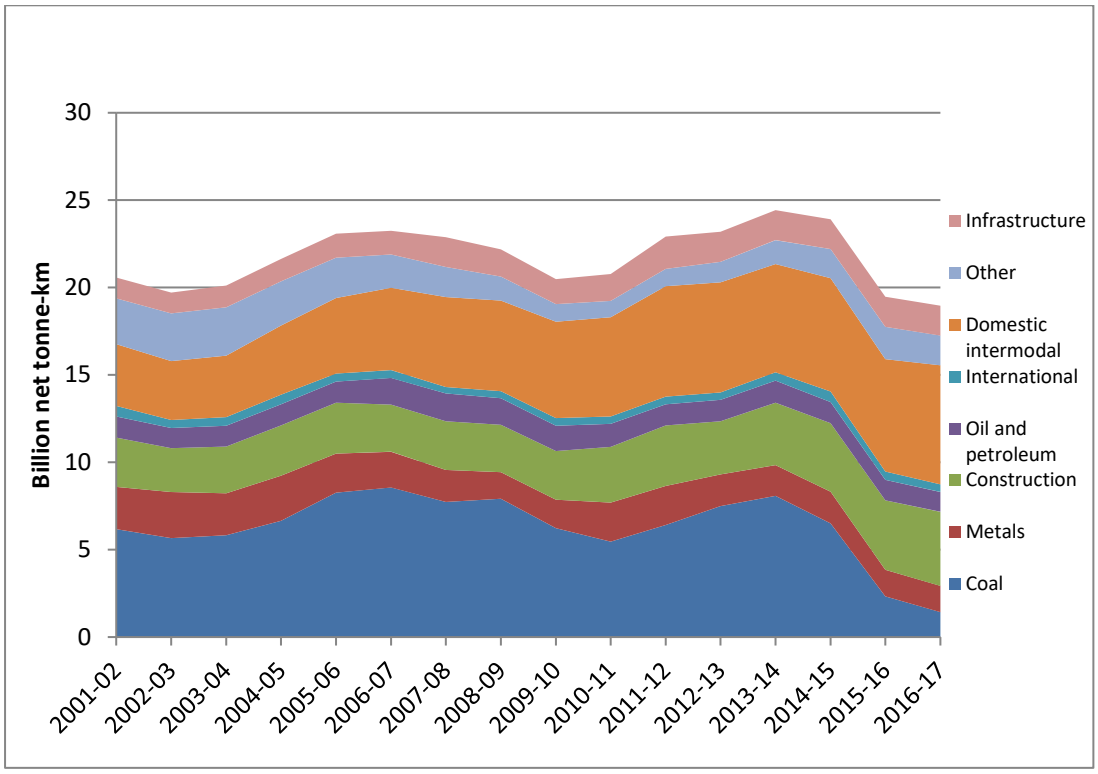
Figure 5: Rail freight lifted by broad commodity by financial year, 2004–17 (million tonnes)



Source: MDS Transmodal based on Network Rail, 2013

Total freight moved by rail (Figure 6) reached a peak of 24 billion tkm in before declining to 19 billion tkm in 2016-17 due to the decline in the volumes of ESI coal being transported by rail (Office of Rail & Road, 2017) . The average length of haul has increased, reflecting a change in the mix of traffic away from relatively short distance movements of ESI coal between import ports and inland power stations to longer distance movements of higher value cargo in containers between deep sea container ports and regional intermodal rail terminal terminals or Strategic Rail Freight Interchanges.

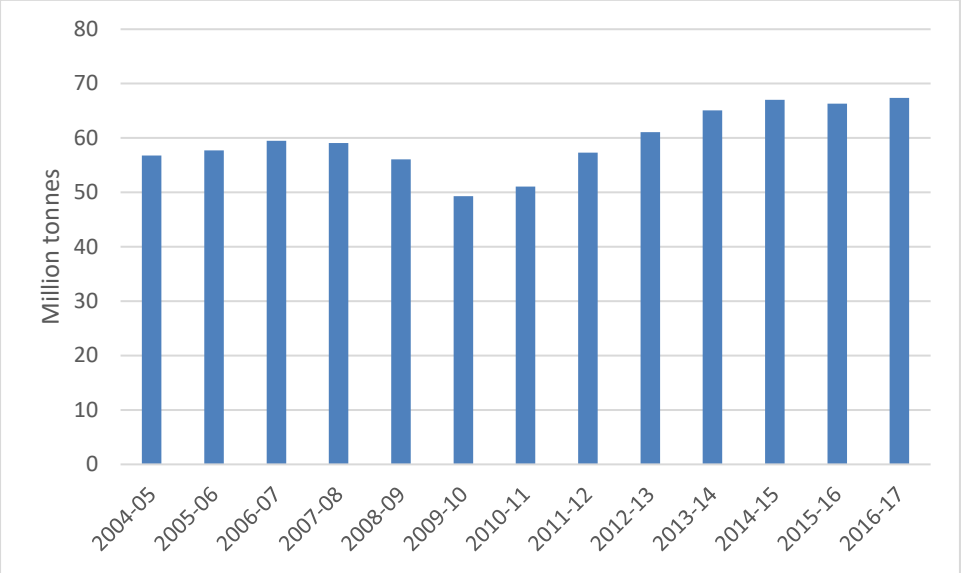
Figure 6: Rail freight moved by broad commodity, 2001–17 by financial year (billion net tonne-km)



Source: Office of Rail & Road, 2018c

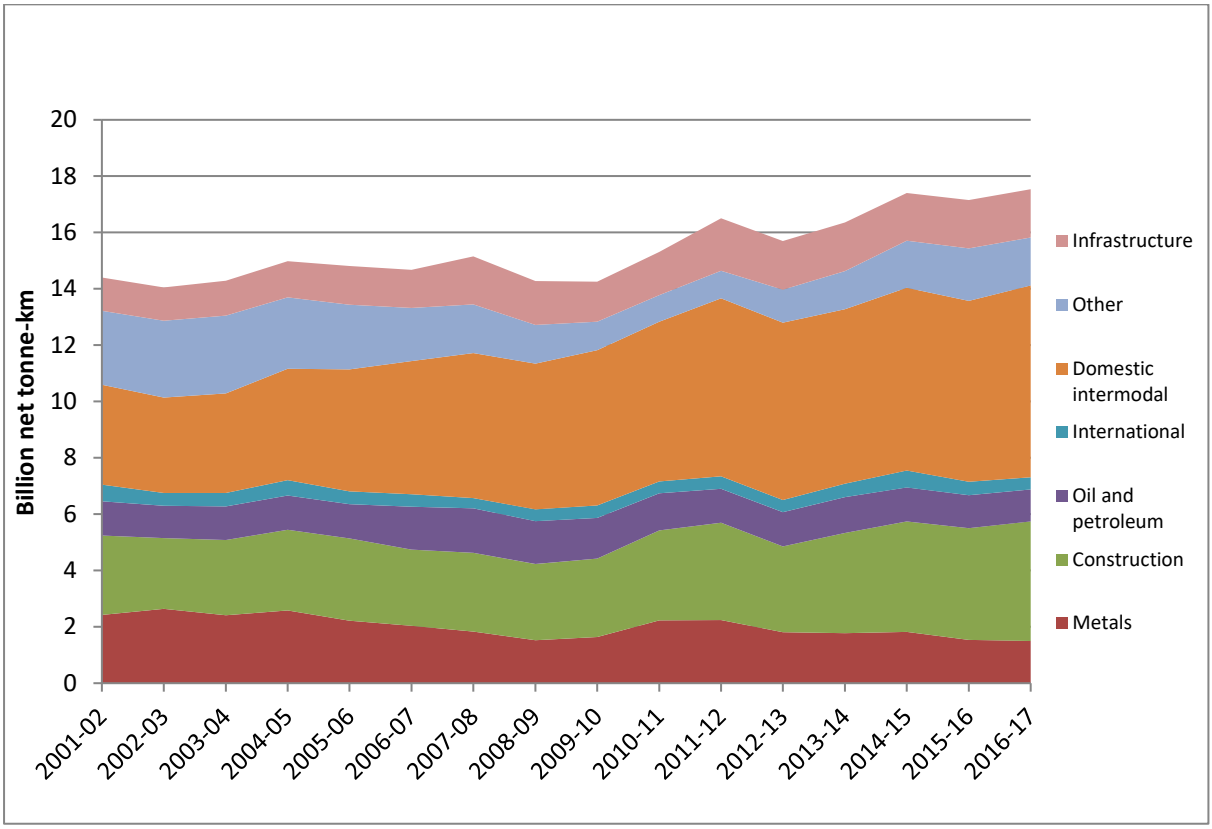
By excluding coal from the data (Figures 7 and 8) the underlying trends within the rail freight sector become more apparent. Since the end of the financial recession in 2009, the fall in coal volumes has masked overall growth in the sector, principally driven by increasing volumes of domestic intermodal and construction materials.

Figure 7: Total rail freight lifted 2004–5 to 2016–17 excluding coal (million tonnes)



Source: Department for Transport, 2018, RAI0402

Figure 8: Rail freight moved by broad commodity (excluding coal) 2001–17 by financial year (billion net tonne-km)

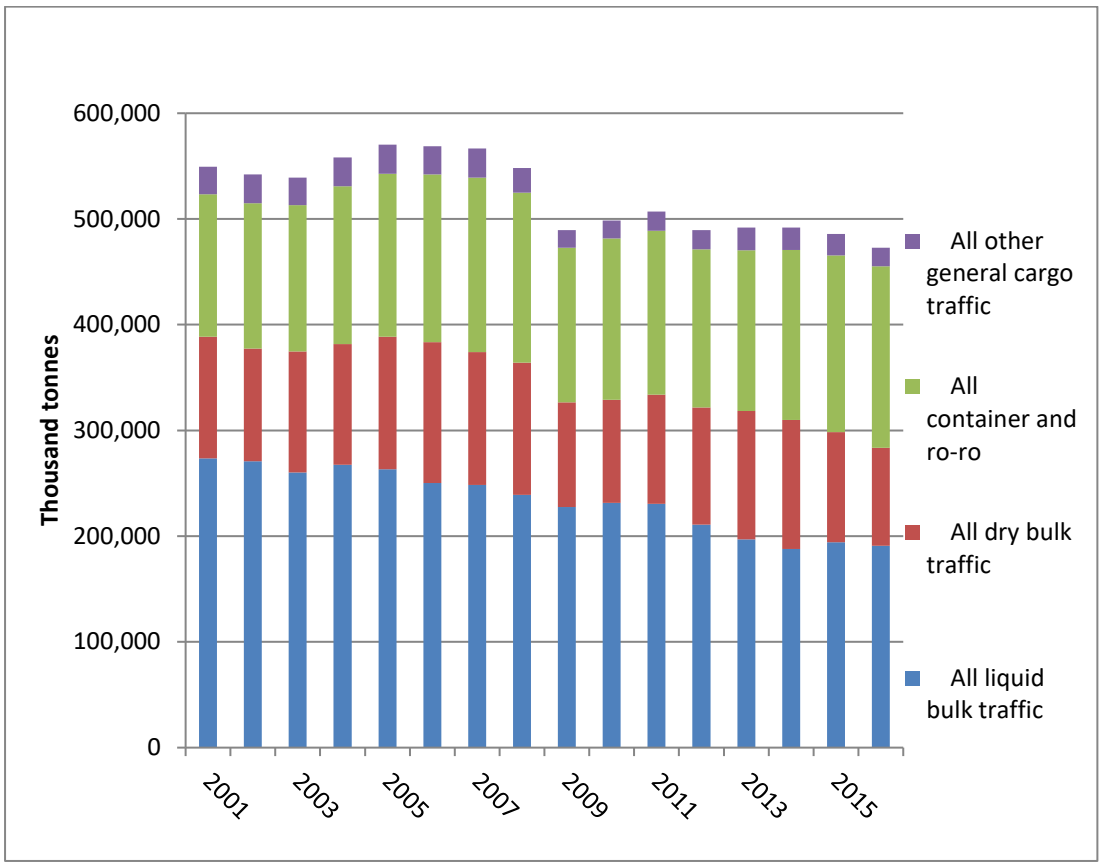


Source: Department for Transport, 2018, RAI0401

3.4 Port freight: volume & goods transported

Total freight handled at ports (Figure 9) has gradually declined from a peak of 570 million tonnes in 2005 to 473 million in 2016 (Department for Transport, 2017a), a decline of 17% over 11 years. This decline is related essentially to the reduction in the volumes of crude oil and gas from the North Sea fields that is then exported either as crude or as refined petroleum products and the reduction in imports of steam coal as feedstock for inland power stations; between 2001 and 2016 total bulk traffic volumes have declined by 27% from 389 million tonnes to 284 million tonnes. Steam coal is being replaced as a feedstock for electricity generation to some extent by increased imports of liquefied natural gas (LNG) via Milford Haven in West Wales and a terminal on the Isle of Grain in the Thames Estuary and by biomass imported via ports such as Liverpool and Immingham, but also by a switch to renewables such as wind power that generate little tonnage through ports.

Figure 9: UK major port traffic by commodity group 2001–16 (thousand tonnes)



Source: Department for Transport, 2018, PORT0201

Other non-unitised traffics, such as forest products and steel, have generally fluctuated in line with the relative health of the construction industry. Most non-unitised traffic, with the exception of steam coal, forest products and steel, has little impact on strategic inland networks because it is either transported inland by pipeline or is only transported relatively short distances by either road or rail.

Table 5 shows the liquid bulk, dry bulk and general cargo commodity groupings divided into their individual commodities for the period 2006–16 (Department for Transport, 2017a). This shows that crude oil traffic declined by 39% over the period 2006–16, while liquefied gas traffic increased by 41% over the same period. Coal volumes handled by ports declined by 79% over the 10-year period.

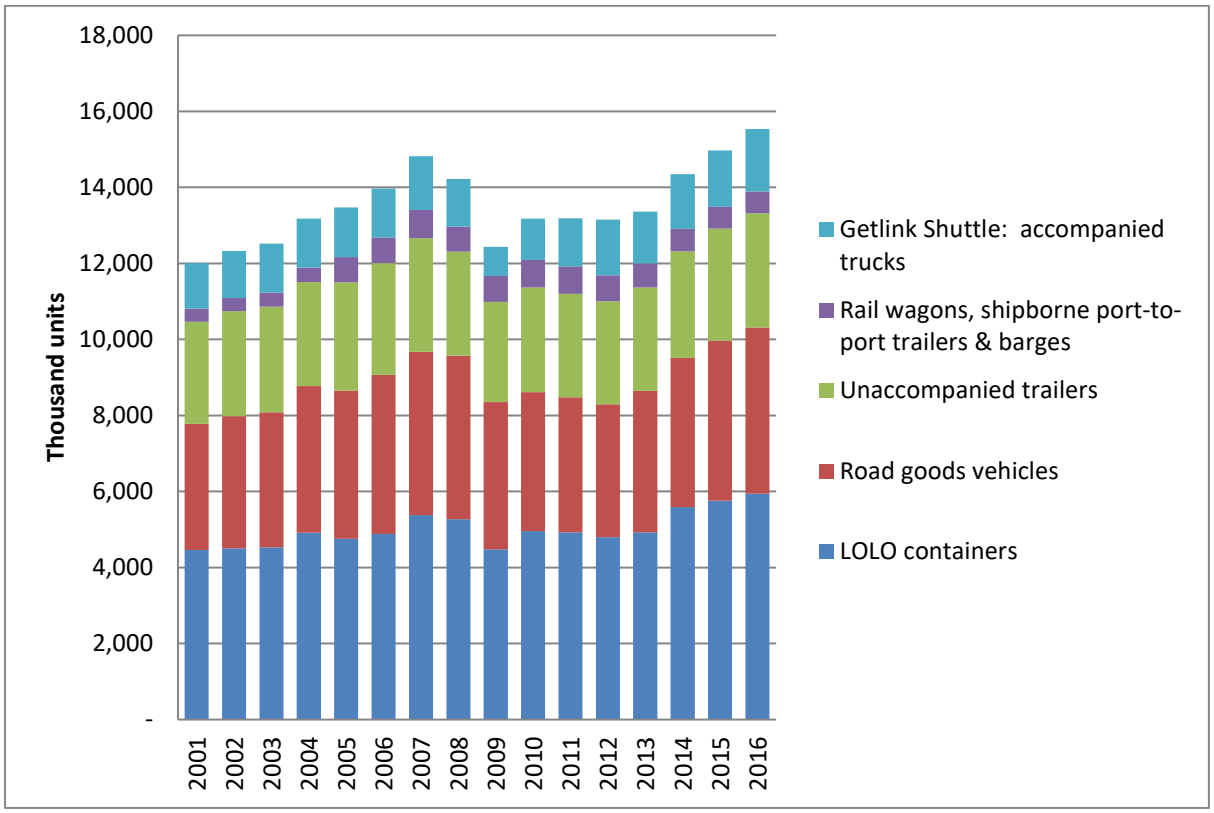
Table 5: UK major port liquid bulk, dry bulk and general cargo traffic, in thousand tonnes, 2006–16 (source DfT Port Freight Statistics, 2017)

Liquid bulk	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Liquefied gas	9,471	7,902	7,444	13,051	21,240	24,088	15,869	12,437	12,795	15,218	13,401
Crude oil	142,200	140,132	132,146	122,924	118,189	113,045	105,028	93,042	89,461	90,718	87,090
Oil products	85,120	85,960	86,814	79,094	79,415	81,414	78,794	81,868	74,455	77,953	78,450
Other liquid bulk	13,598	14,599	12,770	12,475	12,765	12,011	11,167	9,633	11,086	10,461	12,053
sub-total	*250,388*	*248,592*	*239,174*	*227,544*	*231,609*	*230,558*	*210,858*	*196,980*	*187,797*	*194,351*	*190,994*
Dry bulk											
Ores	18,301	19,144	18,091	14,822	18,235	16,702	16,320	20,754	20,783	17,720	15,714
Coal	57,282	47,427	50,515	39,612	29,852	36,910	47,040	52,186	44,658	25,342	12,011
Agricultural products	13,095	12,746	13,978	13,966	15,024	13,448	13,540	13,099	14,127	13,242	14,007
Other dry bulk	44,403	46,067	42,272	30,643	34,296	36,349	33,981	35,378	42,417	47,761	50,885
sub-total	*133,080*	*125,383*	*124,856*	*99,045*	*97,407*	*103,408*	*110,881*	*121,417*	*121,985*	*104,064*	*92,617*
General Cargo											
Forestry products	8,894	8,987	6,525	5,243	5,588	5,713	4,679	7,022	5,704	5,861	5,310
Iron and steel products	10,637	12,236	10,317	6,182	6,128	6,936	7,789	8,991	9,975	8,848	6,965
Other General cargo	7,141	6,215	6,243	5,451	5,068	5,368	5,846	5,387	5,526	5,615	5,112
sub-total	*26,672*	*27,438*	*23,085*	*16,876*	*16,784*	*18,017*	*18,313*	*21,400*	*21,204*	*20,325*	*17,387*

The main growth sectors for international freight have related to unitised traffic, both short-sea traffic between Great Britain and the Continental mainland and Ireland and deep-sea container traffic between the UK and non-European locations, as shown in Figure 10 (Department for Transport, 2017a; Getlink, 2018). Unitised traffic overall grew from 12.0 million units in 2001 to 14.8 million units in 2007 before falling back to 12.4 million units in 2009 and then reached a new record high of 15.5 million units in 2016. A 'unit' in this context is, in general terms, the equivalent of a 13.6 metre-long semi-trailer which is transported by sea as either:

- an accompanied truck, which is transported on a ferry or on the Getlink Shuttle as an HGV accompanied by a driver;
- an unaccompanied trailer, which is transported on a ferry without a tractor unit and driver; or
- a container that is transported on a container ship or on a ferry.

Figure 10: UK ports unitised freight traffic by type of unit in both directions, 2001–16 (thousand units)



Source: DfT Port Freight Statistics and Getlink

Freight growth is due to a complex set of factors such as trade relations, international supply chains, UK's propensity to import, liberalisation and population growth. This growth has had the following impacts on freight transport:

- The development of new deep-sea container port capacity at Felixstowe, London Gateway, Liverpool and Southampton over the last decade;

- Overall growth in intermodal rail freight services to link deep-sea container ports such as Felixstowe and Southampton to inland terminals in the Midlands, the North of England, Scotland and Wales (AECOM, 2016);

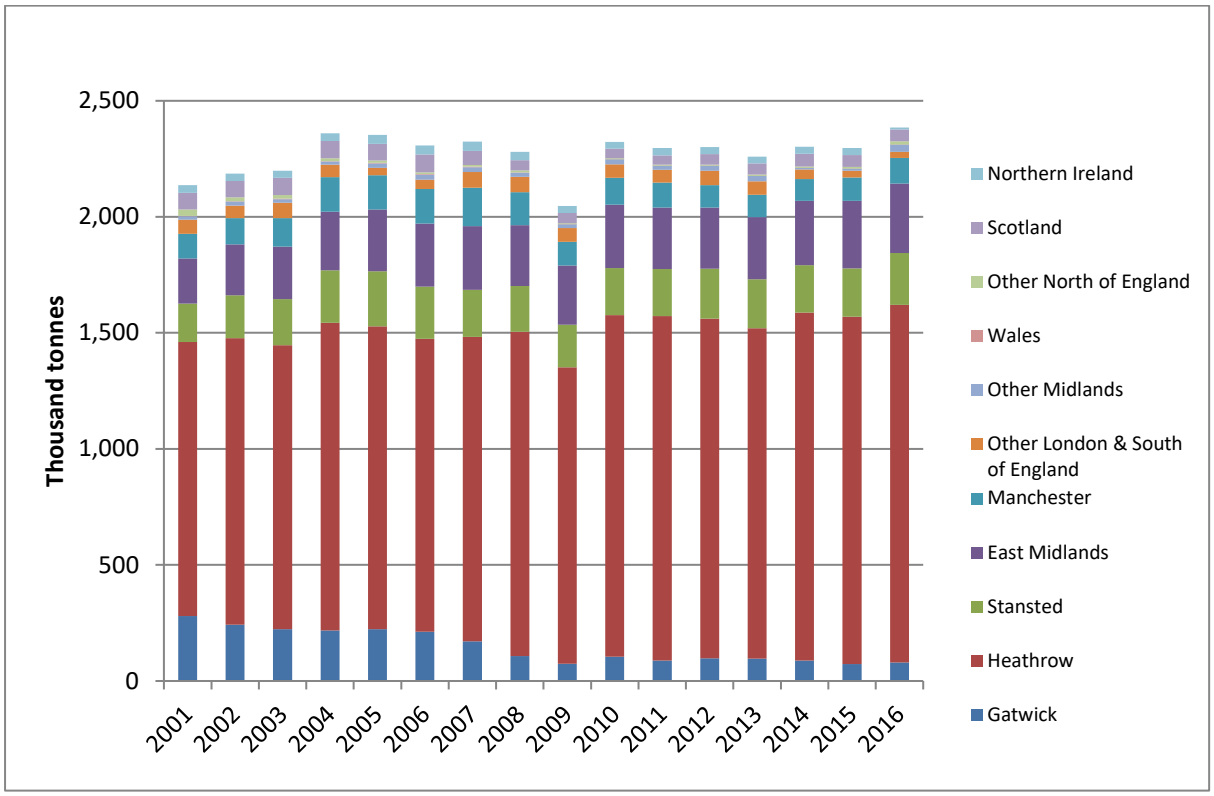
- Growth in traffic through Dover and on the Getlink freight shuttle services (Freightlink, 2016).

3.5 Air freight: volume & goods transported

Air freight is a highly specialised sector of the freight industry, which handles relatively low volumes of high value freight; in 2016 total air freight volume passing through UK airports was less than 2.4 million tonnes as shown in Figure 11 (Civil Aviation Authority Airport Statistics, 2017), while the total volumes of traffic handled through UK seaports was 473 million tonnes in the same year (Figure 11).

Figure 11 shows how the air freight sector was affected by the economic downturn, with a significant decline in traffic in 2008–9 and then a gradual increase up to 2016 to exceed the pre-crisis peak level. Most air freight handled at UK airports is carried in specialised containers in the belly holds of international passenger jets, principally wide-bodied aircraft operating on inter-continental routes. For this reason, Heathrow is by far the most important UK airport for freight in terms of tonnage handled, with a market share that has increased from 55% in 2001 to 64% in 2016. East Midlands and Stansted have specialised in handling dedicated air freighters operated by the main international express couriers (e.g. TNT, UPS), transporting less than container-load consignments on 24–48 hour lead times, generally feeding European hubs (such as Brussels and Leipzig) for services to the Far East. While air freight forms a very small percentage of the overall freight market when measured as tonnes-lifted, it forms a much larger proportion when measured by the value of the cargo lifted.

Figure 11: Air freight by airport group, 2001–16 (thousand tonnes)



Source: Civil Aviation Authority Airport Statistics, 2017

Operations at airports that handle large volumes of freight, such as Heathrow, require support from specialised distribution facilities located close to the airports where air freight logistics operators receive and despatch air freight and provide storage. As the volumes of freight are quite low, only road freight transport is used for collection and delivery.

3.6 Waterborne freight: volume & goods transported

Freight moved by waterborne freight consists of:

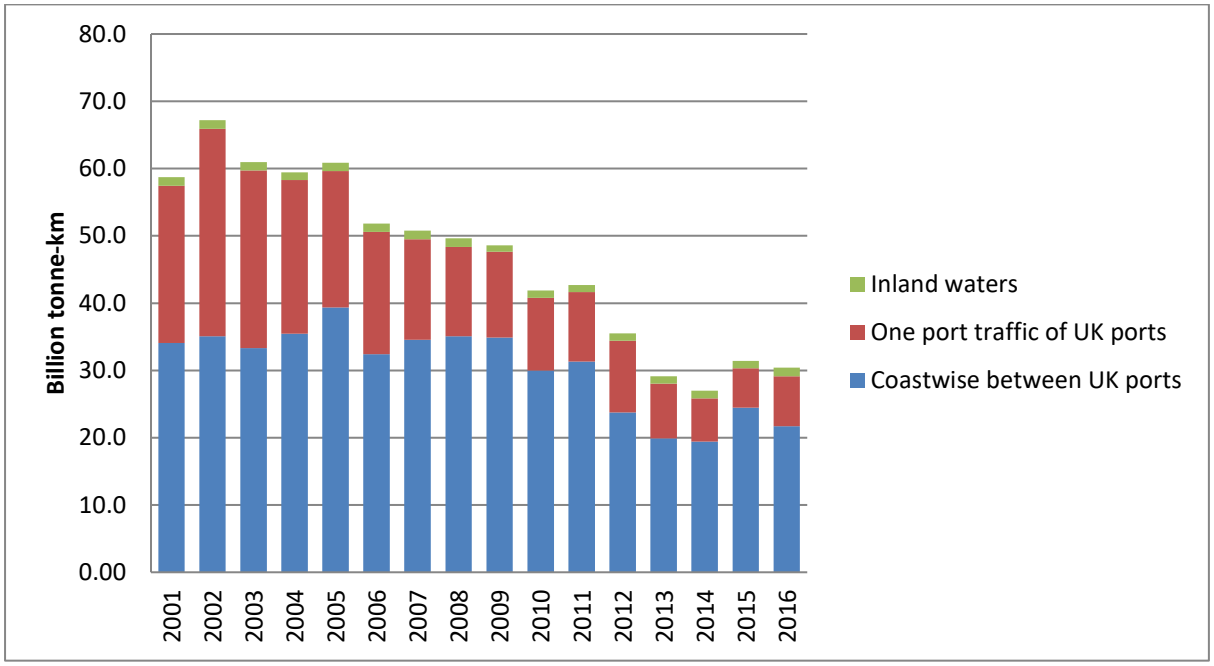
- Coastwise traffic: freight moved around the coast of the UK;
- One-port traffic: freight moved between a UK port and offshore installations, such as offshore wind farms and oil and gas installations;
- Inland waters traffic: freight traffic carried by both barges and seagoing vessels along inland waters, both non-seagoing traffic and seagoing traffic which crosses into inland waters from the sea (Department for Transport, 2017b).

96% of waterborne freight relates to movements by seagoing ships, either coastwise or one-port movements or to and from inland waters by seagoing vessels. The only movements on inland waterways are on the main river estuaries such as the Thames, Humber and Forth and on the Manchester Ship Canal, while the use of broad-gauge canals and other rivers for freight is limited due to the lack of economies of scale that are available and the limited

connectivity provided by the network. There are no freight movements on narrow-gauge canals (Department for Transport, 2017c).

Total freight moved by waterborne freight has roughly halved since 2005 (Figure 12), particularly due to a fall in one-port traffic between UK ports and offshore oil and gas installations as activity in the North Sea has declined.

Figure 12: Waterborne freight moved by type 2001–16 (billion tonne-km)



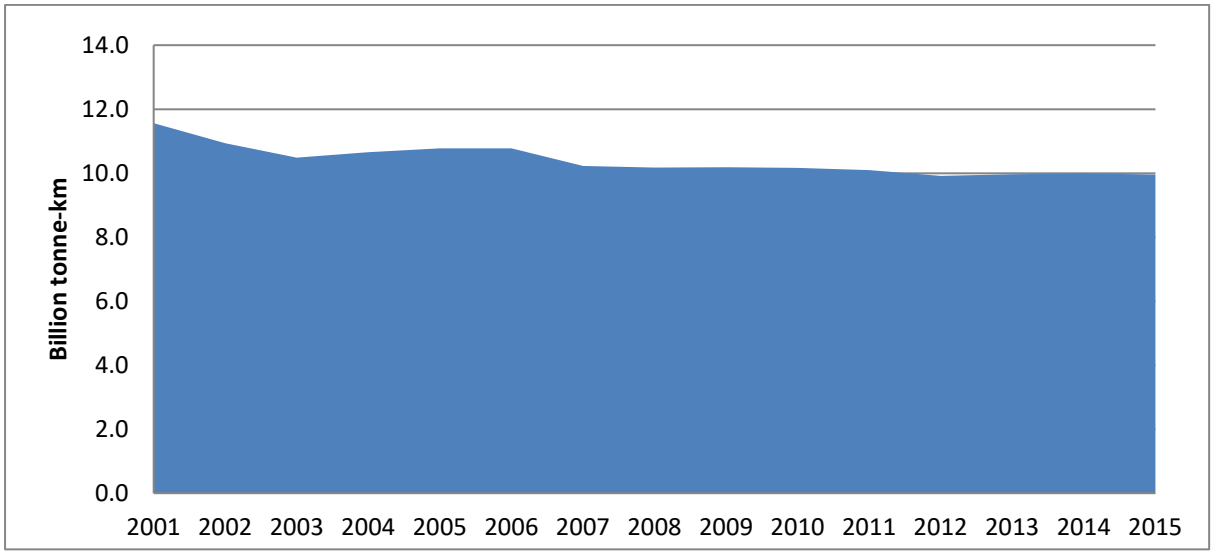
Source: DfT Domestic Waterborne Freight Statistics

Seventy-six percent of goods transported on inland waters are bulk commodities such as aggregates and petroleum products, but there are unitload services that operate on sections of rivers that are classified as inland waters and there is also a container service that operates to a facility on the Manchester Ship Canal.

3.7 Pipeline: volume & goods transported

Pipelines provide a specialist mode of transport for the cost-effective transport of large volumes of bulk liquids and gases between ports and manufacturing sites, refineries and power stations. They have very high initial investment costs and so are only developed between locations where there are expected to be very high levels of demand over a long period; however, the operating costs are low.

Figure 13: Freight moved by pipeline in the UK 2001–15



Source: European Commission, 2017

Note: data for 2013–15 is estimated using European Commission data

Figure 13 shows the trend for freight moved by pipeline during the period 2001–15, including freight transported from the North Sea oil and gas fields. There has been a general downward trend due to the reduction in the output of oil and gas from the North Sea.

3.8 Active modes in freight: cycling & walking

There are no official statistics available on trends in the use of the active modes of transport, for freight namely cycling and walking. There has been longstanding use of these modes of transport by Royal Mail for the delivery of letters and packets in towns and cities. Looking forward it is likely that courier companies will make increasing use of cycling and walking to make final deliveries and collections of parcels in urban areas due to increasing road congestion and the need to operate within pedestrianised zones.

Deliveries of parcels by bicycle are therefore already possible in a number of urban areas for the delivery of lightweight and smaller parcels, particularly as separate infrastructure is developed for cyclists. With the increased importance of e-commerce, which involves the delivery of smaller parcels rather than larger consignments to retail outlets, the international parcels delivery companies that work for e-commerce retailers are more prepared to hand over parcels for ‘last mile’ deliveries to local courier companies for deliveries into the centre of urban areas. Bicycles can be used for a wide variety of deliveries and collections, with Hereford Pedicabs & Cargo delivering parcels and also collecting retail waste material (Hereford Pedicabs, 2016); while Zedify has tricycles that can transport up to 250kg (Zedify, 2018).

As urban centres have become pedestrianised with time windows that only allow road freight vehicles access at the beginning and the end of the day, final deliveries and collections are also carried out on foot by delivery staff.

4 FREIGHT TRANSPORT SERVICES

4.1 Introduction

This section sets out the service providers that operate in the freight transport industry by mode of transport. While road and rail freight and bulk freight services can only be described in generic terms, data on unitload shipping services has been provided based on proprietary databases.

4.2 Road haulage services and 3PLs

Types of road freight enterprise

There were about 51,000 road freight enterprises, employing 284,000 people, operating in the UK in 2016. These road haulage enterprises operated a total of 499,400 HGVs (Department for Transport, 2018c).

Some 45% of road freight lifted is transported by vehicles operated by the owners of the goods. Operator licence restrictions prevent these 'own account' operators from conveying goods for other organisations, thereby limiting opportunities for backloads. 55% of freight lifted is contracted out to specialist road hauliers and third party logistics operators (public or third party haulage) on a 'hire and reward' basis. Reasons for shippers adopting an outsourcing strategy for their road haulage requirements include:

- Economies of scale: Larger third party operators can operate more efficiently due to, among other factors, managing large distribution centres shared between multiple shippers, more efficient HGV deployment (including greater opportunities to obtain return loads, to operate trucks full in both directions), shared back office costs and the use of sophisticated IT inventory systems;

- Quality: they are perceived as offering a higher quality of service than in-house transport operations as a result of competition to win and retain business;

- Innovation: they can introduce new ideas and working practices, overcoming in-house management inertia, and remove restrictive working practices.

While many smaller operators may struggle to generate the economies of scale enjoyed by the larger players, they can focus on offering services in specialist sectors such as bulk chemicals and temperature-controlled foods, and they can potentially develop closer relationships with customers and offer higher quality and more flexible services. The degree and level of outsourcing to logistics companies can vary, but typically it involves outsourcing day-to-day operations (distribution centres, inventory management and transport operations), while shippers maintain overall control of the supply chain (the structure of the supply chain, the number and location of distribution centres and modal choice), controlling inventory levels and purchasing policies.

Third party providers of road freight transport services can also be divided into two main types of organisation: road hauliers and third party logistics operators (3PLs).

Road hauliers generally provide road transport services from one location to another at the direction of their customers. They are normally small to medium-sized concerns operating up to 1,000 vehicles and drivers, and range from publicly quoted companies through to family-owned businesses and owner drivers. Their key commercial operating strategy is to secure long-term contracted work directly from shippers and receivers, along with sub-contracted work for larger logistics providers and spot hire loads (occasional loads for shippers with irregular shipments), thereby ensuring that HGVs are nearly always 'busy'. This can include offering 'groupage' services, where part vehicle loads from a number of shippers are combined to form a full vehicle load. Many hauliers provide some multi-user warehousing. Secure long-term revenue flows can then be used to invest in new HGV equipment.

More recently, many road hauliers have combined some of their operations to establish pallet load networks such as Palletline and Pallex to target shippers seeking to move less than full-load consignments on a next day basis. This is where hauliers belonging to the network will transport full loads from each of their home areas (comprising pallets from multiple customers) into a central hub which is normally located in the Midlands. The pallets are then cross-docked onto other vehicles for onward delivery (usually by another haulier in the network from the destination region). For example, pallets from Cardiff to Newcastle will initially move to the Midlands hub on an HGV from South Wales, before being re-loaded onto an HGV originating from (and returning to) the North East. By sharing loads in this manner, operators are able to fill vehicles in both directions, and can offer low-cost express 'next day' deliveries on a nationwide basis.

Third party logistics providers (3PLs) have usually grown out of road haulage businesses and are large publicly quoted companies that sell major shippers and receivers comprehensive packages of supply chain management services integrated with road transport operations. These services include non-transport activities (called 'added value' activities) including the provision and operation of distribution centres together with other services such as packaging, labelling and bar-coding and there is a strong focus on the application of ICT to the management of the supply chains and the transport movements within them. Their key commercial strategy is to secure long-term contracts with customers; again this allows investments in new HGVs and other equipment, secured against a long-term revenue flow.

More recently, so called **4PLs (or Lead Logistics Provider)** have emerged. This is where the one company, contracted to the shipper, is then tasked with managing, coordinating and integrating the services of multiple 3PLs and road hauliers in order to deliver total supply chain benefit to the client.

Table 6 shows the top 20 British road hauliers/3PLs as defined by turnover in 2016–17.

Table 6: Top 20 British road hauliers and 3PLs by turnover

Rank	Company	Financial Year Ending	Turnover (£)	Pre-Tax Profit (£)	Return on Turnover
1	Royal Mail	26/03/2017	7,658,000	411,000	5.4%
2	DHL	31/12/2016	4,035,769	116,559	2.9%
3	XPO Logistics	31/12/2016	1,257,210	34,903	2.8%
4	Wincanton	31/03/2016	1,118,100	45,000	4.0%
5	DPD Group UK	03/01/2017	1,089,382	169,860	15.6%
6	UPS	31/12/2016	944,927	62,321	6.6%
7	Kuehne + Nagel	31/12/2016	809,640	31,386	3.9%
8	TNT UK	31/12/2015	717,699	-22,104	-3.1%
9	Eddie Stobart Logistics	30/11/2016	570,200	48,200	8.5%
10	Whistl UK	31/12/2016	528,449	8,391	1.6%
11	Hermes Parcelnet	29/02/2016	510,369	33,727	6.6%
12	Yodel Distribution	30/06/2016	505,713	-58,249	-11.5%
13	Culina Group	31/12/2016	420,700	19,500	4.6%
14	Gist	31/12/2016	416,678	17,707	4.2%
15	Ceva Logistics	31/12/2016	394,484	16,147	4.1%
16	UK Mail Group	31/12/2016	366,087	7,605	2.1%
17	Clipper Logistics Group	30/04/2017	340,100	16,100	4.7%
18	Turners (Soham)	31/12/2016	313,608	27,346	8.7%
19	DX Group	30/06/2017	291,900	-82,300	-28.2%
20	FedEx UK	31/05/2016	253,035	32,939	13.0%

Source: Motor Transport Top 100, 2017

Market structure

The road freight transport market provides an example of near-perfect competition as there are a large number of buyers and sellers operating in the market, road haulage costs are well understood and there are few barriers to entry, particularly in terms of capital investment and regulation. The average fleet is relatively small, with an average of 5 vehicles in 2017 (Department for Transport, 2018c).

In this environment, road haulage operators have to be highly efficient and cost-effective in order to remain profitable. Analysis of the Top 100 UK hauliers by the publication *Motor Transport* suggests the average return on sales in 2016–2017 was just under 3%, down from 4% the previous year; turnover increased by 1% over the same time period (Motor Transport Top 100, 2017).

Types of heavy goods vehicle

The vast majority of road freight lifted and moved is carried in heavy goods vehicles (HGVs), which are defined by the Department of Transport as vehicles over 3.5 tonnes gross laden weight (i.e. weight of vehicle plus its load).

Table 7 shows the numbers of HGVs by taxation group and axle configuration operating in Great Britain in 2016.

Table 7: Number of registered HGVs in Great Britain by type and axle configuration, 2016 (thousand vehicles)

Year	HGV	Trailer HGV	Total
Rigid Vehicles			
2 Axle	191.9	3.0	195.1
3 Axle	42.7	6.4	49.2
4 Axle	34.3	1.4	35.8
All Rigid	268.8	10.8	280.1
Articulated Vehicles			
2 Axle Tractor & 2 axle trailer	7.1	0.0	7.1
2 Axle Tractor & 3 axle trailer	11.4	0.0	11.4
2 Axle Tractor & 4 or more axle trailer	2.8	0.0	2.8
All 2 Axle Tractor	21.4	0.0	21.4
3 Axle Tractor & 2 axle trailer	0.7	0.0	0.7
3 Axle Tractor & 3 axle trailer	101.3	0.0	101.3
3 Axle Tractor & 4 or more axle trailer	1.3	0.0	1.4
All 3 Axle Tractor	103.3	0.0	103.4
All Articulated Vehicles	124.6	0.0	124.7
All Goods Vehicles	393.5	10.8	404.8

Source: DfT Vehicle Licensing Statistics

The main type of HGV used for long-distance road haulage is the combination of a tractor and 13.6-metre trailer unit. However, smaller rigid HGVs represent 69% of the national fleet and are generally used for more local deliveries and collections.

'Light goods vehicles' or 'LGVs' (defined as a commercial vehicle with a maximum gross laden weight of 3.5 tonnes or less) are also an integral part of many logistics supply chains. This is particularly the case in the e-commerce and urban delivery markets, where LGVs are the obvious vehicle of choice given physical access limitations. They can also be driven using a standard 'car' driving licence, meaning a wider labour pool is available when compared with HGV-qualified drivers. The latest vehicle registration statistics from the DfT

indicate that there are currently 3.8 million LGVs licensed in Great Britain compared with just under 0.5 million HGVs (DfT, 2018a).

There has been significant growth in the numbers of LGVs operating on British roads. The DfT's figures indicate that LGVs are the fastest-growing segment of the road user market, with 70% growth over the past 20 years when measured in distance moved compared with 12% growth for cars and 5.5% growth for HGVs. This suggests that LGV traffic is growing, but not necessarily at the expense of HGV traffic. This LGV growth appears to have more or less mirrored recent trends in the retail sector, whereby e-commerce has shown significant growth rates and gained market share from traditional 'bricks and mortar' retailing. This appears to suggest the two trends are directly linked, given that online deliveries to homes or places of employment are predominantly undertaken by LGVs.

However, research by Professor Alan Braithwaite for the RAC Foundation (2017) suggests that the use of LGVs is diverse and extends beyond what is typically regarded as freight transport (i.e. the carriage of goods from one location to another). His research concluded that:

- The national LGV fleet is growing at around 5% annually; however, this is not at the expense of smaller HGVs, which also continue to grow, albeit at slower rates;

- E-commerce continues to grow between 10 and 12% each year, while e-commerce parcel volumes are growing at around 9% annually (the difference is accounted for by so called 'click and collect' orders);

- LGVs in use by parcel and grocery e-commerce operators comprise around 4% of the national LGV fleet and around 10% of LGV traffic, i.e. only one in 10 LGVs on the road is associated with e-commerce deliveries; and

- The implication to be drawn from this analysis is that, while LGVs are an important part of many supply chains, the majority of LGV movements on the road network are associated with economic activities other than, in particular, e-commerce. These include food distribution, construction and business services (such as plumbers, electricians, fitters, etc.).

Further research undertaken by Professor Braithwaite in the London Borough of Barking and Dagenham found that 37% of LGVs were unmarked, meaning it was difficult to determine their use based on the business type. Around 32% of LGVs were identified as undertaking 'servicing' activities rather than carrying freight, while it was also recognised that LGVs in this sector will convey parts and materials associated with that service. Likewise, LGV movements associated with food service (2%) and construction (8%) are also likely to be conveying materials. The research also suggested that 3% of vans in the Borough were being used directly for freight and another 3–4% were conveying parcels (though this share would rise if unmarked vans were to be correctly attributed).

Therefore, while the growth in LGV traffic on the roads is often assumed to be related to the growth in e-commerce, it is also likely to be related to the growth in service-related activity. However, both pieces of research also conclude that the use of LGVs in general, and in the freight/logistics sectors specifically, is poorly understood and that further work is required.

4.3 Rail freight services

Market structure

The rail freight sector in Great Britain is effectively the only fully privatised part of the railway industry[3], in that private sector freight operating companies (FOCs) compete for business in an open competitive market and, essentially, at their own commercial risk. Rail freight services are therefore a response to demand, rather than operating regardless of the number of passengers carried. Intermodal rail freight services, particularly those serving the deep-sea container ports, tend to operate as daily scheduled trains in much the same manner as passenger trains (services will always operate in their timetabled paths regardless of loadings). Likewise, conventional (bulk) rail freight trains have reserved paths in the working timetable, even if services may only actually operate when there is sufficient customer demand. For example, a bulk aggregates train may have a timetabled path on Mondays, Wednesdays and Fridays each week, but the train may only operate on Monday and Friday when demand is low.

There are currently five competing FOCs, namely:

- DB Cargo – a subsidiary of Deutsche Bahn (German railways);
- Freightliner – a subsidiary of Genesee and Wyoming (a US railroad holding company that has interests in rail freight operators in North America, Europe and Australia);
- GB Rail Freight – owned by Swedish private equity group EQT Partners;
- Direct Rail Services (DRS) – owned by the Nuclear Decommissioning Authority; while the 'shareholder' is a public sector body, the company is registered as a 'Private Limited Company'. Aside from its in-house spent nuclear fuel operations, it operates in the same manner as the other privately owned FOCs by competing for traffics on commercial terms; and
- Colas Rail – a subsidiary of French industrial conglomerate Bouygues.

In simple terms, the five FOCs compete for traffic with each other, as well as with road haulage and coastal shipping in some market sectors. The rail infrastructure providers (principally Network Rail – see following section) supply freight paths to the FOCs on non-discriminatory terms but on the basis of the operators having 'grandfather rights', in return for payment of track access charges. The Office of Rail and Road, the independent regulator, provides impartial oversight in terms of charges and network access, thereby ensuring open competition.

Types of rail freight service

Rail freight services can be categorised by mode of appearance – which refers to the way cargoes are presented for handling at rail terminals – into bulk and non-bulk rail freight.

Bulk rail freight is where a large volume of a relatively low value, heavy or voluminous and homogeneous commodity such as coal, aggregates or biomass is transported in specialist

[3] Although, note the caveat around Direct Rail Services

railway wagons, normally between privately owned railway sidings (e.g. between a quarry and aggregates terminal located near a major urban area or between a port-located biomass terminal and a power station). Commercially and contractually, many bulk rail movements are undertaken on what is known as a 'hook and haul' basis. This is where the shipper will own/lease the actual wagons, with a contracted FOC (generally following a tender) hauling them between cargo origins and destinations at the direction of the shipper. Contracts between FOCs and shippers can be 3–5 years in length. Bulk rail freight therefore relies on significant long-term investments from the private sector in the loading/discharge equipment at private sidings, traction and specialist wagons. These wagons are often leased on long-term deals from specialist leasing companies. The inherent nature of bulk rail freight is that wagons have to be re-positioned empty back to the cargo origin once delivery has been undertaken and this means that the shipper has to pay for a round trip.

In many bulk markets, rail effectively has a monopoly, particularly where planning conditions have been placed on some facilities (such as some quarries) requiring the operators to use rail rather than road for freight movements. More generally, road haulage may not be able to provide a cost-effective solution for the movement of bulk products because of the volume of product that needs to be transported, and the shipper/receiver will have invested in private rail sidings with the loading/discharge equipment at both cargo origin and destination.

The bulk rail freight market is relatively mature, with existing rail freight operators seeking to secure contracts from each other rather than developing major new markets. The principle exception to this is biomass for electricity generation, a relatively new commodity which the rail freight sector has used its inherent advantages to exploit. However, since 2013 there has been a dramatic decline in the volume of coal transport which has led to over-capacity in the market.

Many large-scale infrastructure construction projects are supported by bulk rail freight services. Heathrow T5 and the Olympic Park, for example, both relied heavily on rail freight for the import of aggregates, steel and other materials. Hinckley C power station, currently under construction, is receiving materials in bulk by rail. Large-scale projects such as the Heathrow third runway and HS2 projects would provide new opportunities for rail in the bulk market.

Non-bulk rail freight is where freight is mainly carried in some form of unit load. It includes intermodal rail freight, where cargo in some type of container unit is conveyed on flat-deck platform wagons between specialist intermodal terminals. It is termed 'intermodal' in that the container unit is designed to be moved by rail and other modes of transport, such as HGVs, ships or barges as well as by road, with transfer between modes taking place at an intermodal terminal. More unusually in Great Britain, non-bulk rail freight also includes palletised cargo conveyed in railway 'box wagons' or 'vans' between directly rail-linked warehousing so that the goods can be discharged directly from the box wagons into storage.

Intermodal rail freight services

Commercially, there are two types of intermodal rail freight service, namely:

- **Liner or scheduled services:** This is where a FOC will operate a regular scheduled service (normally Monday to Friday) between two terminals, with shippers subsequently purchasing slots (capacity) on the train service. The train will operate to a fixed timetable regardless of whether it attracts any traffic. The commercial risk therefore rests with the FOC or in some cases with a shipping line, port or road haulier, who will require a minimum load factor in order to cover costs and render the service profitable; hence the

commercial strategy of the risk-taker is to sell capacity for the highest value possible, taking into account competing services and modes. Liner services are therefore attractive to shippers moving less than trainload quantities on a daily basis as a trainload is constructed from multiple shippers.

- **Contract (dedicated) trains:** This is similar to 'hook and haul' bulk trains in that one train will be dedicated to a particular shipper or other commercial risk-taker such as a road haulier between two terminals, generally on a daily basis. A contracted FOC will haul intermodal wagons between cargo origins and destinations at the direction of the shipper. The commercial risk therefore lies with the shipper, in that the FOC will charge a fixed rate per trip regardless of how much traffic is conveyed. Contract trains are therefore only attractive to those shippers able to convey trainload volumes between terminals on a daily basis.

Intermodal rail freight services are usually carrying higher-value consumer (palletised) cargo and more lightweight general freight, rather than large volumes of a single commodity, and are more likely to be competing with long-distance road. The market for the inland distribution of deep-sea containers from ports such as Felixstowe and Southampton is well established and has been expanding. Most intermodal services are operated as liner/scheduled services, while a number of the largest deep-sea container lines have sufficient volumes moving on a daily basis to justify contracting dedicated trains.

Rail has a presence in only a few sectors of the domestic general freight market, principally between major national distribution centres in the Midlands and Scotland. Most of these are operated on a contract basis, either directly by large supermarket chains or by a handful of Scottish logistics operators with sufficient Anglo-Scottish traffic to fill a daily train. The domestic intermodal rail freight sector is generally therefore under-developed and there is substantial scope for growth in services at the expense of road haulage for domestic movements of high-value commodities on trunk routes where there are large volumes of regular flows.

Shippers or their logistics providers may decide to use rail where the freight flow is large enough to justify a regular trainload and where the mode can meet the required service levels (e.g. transit time, frequency). If the freight flow is suitable for rail freight and an adequate level of service can be provided by rail, then the key decision-making factor is then cost. Rail is likely to have to be cheaper than road where the shipper is accepting service levels that are lower than could be provided by road.

CASE STUDY: FREIGHTLINER

Freightliner is the leading intermodal rail freight service provider in Great Britain, focusing on the transport of deep-sea containers between three deep-sea container ports (Felixstowe, Southampton and London Gateway) and 12 terminals in all the major British conurbations. It markets itself as providing 100 services each day and handles about 770,000 containers per annum.

The company's operations started in the 1960s as part of British Rail but became a private company in 1995 just after privatisation of the rail freight industry in 1993–94. As a result of the privatisation process Freightliner inherited a network of intermodal terminals and it now serves its own terminals in Liverpool, Manchester, Leeds, Doncaster, Coatbridge, Birmingham, Bristol and Cardiff, as well as a number of third party terminals, including rail-connected distribution parks such as DIRFT at Daventry in the Midlands and 3MG at Ditton near Liverpool.

Freightliner has its own fleet of 250 trucks so it can offer a quay-to-door service for its customers, i.e. from the quay at the port to the regional intermodal by rail and then final delivery by truck to a distribution centre or manufacturing facility in the relevant region.

In 1999 the company established its Heavy Haul division and started to secure bulk rail freight contracts in competition with the incumbent bulk operator (English Welsh and Scottish Railway, now acquired by Deutsche Bahn) and has secured contracts in the bulk rail freight market. It has subsequently established rail freight operating subsidiaries in Poland and Australia. In 2013 the company purchased European Rail Shuttle (from global shipping line Maersk) which mainly operates rail freight services to and from the Port of Rotterdam.

Freightliner is owned by Gennesee and Wyoming, which is a US railroad holding company. The holding company has also purchased Pentalver, one of the largest container road hauliers in the UK.

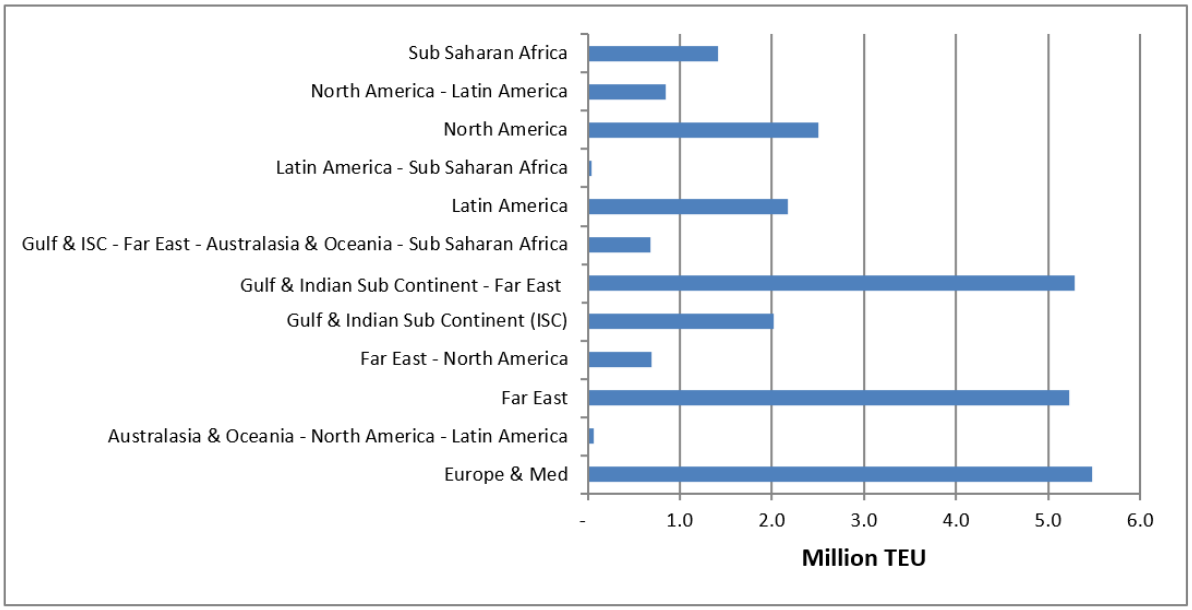
4.4 Container shipping services

Container shipping services provide cost-effective transport between the UK and the rest of the world and can be categorised as follows:

- Coastal services between two or more UK ports;
- Short-sea services between the UK and the rest of North West Europe, Ireland, Scandinavia, the Baltic, the Atlantic coast of Europe and the Mediterranean basin; and
- Deep-sea services between the UK and the rest of the world.

At the end of 2017 there were a total of 131 short-sea and deep-sea services linking UK ports with the rest of the world, provided by a total of 572 different vessels making calls at UK ports (MDS Transmodal, 2017). Figure 14 shows how the total annual capacity deployed by the shipping lines of 26.4 million TEU (20-foot equivalent units) is divided between the different routes by world region; the main routes are short-sea services, linking the UK to the rest of Europe (5.5 MTEU) and deep-sea services through the Suez Canal to the Gulf, Indian Subcontinent and the Far East (a total of 12.5 MTEU) and transatlantic to North America (3.3 MTEU).

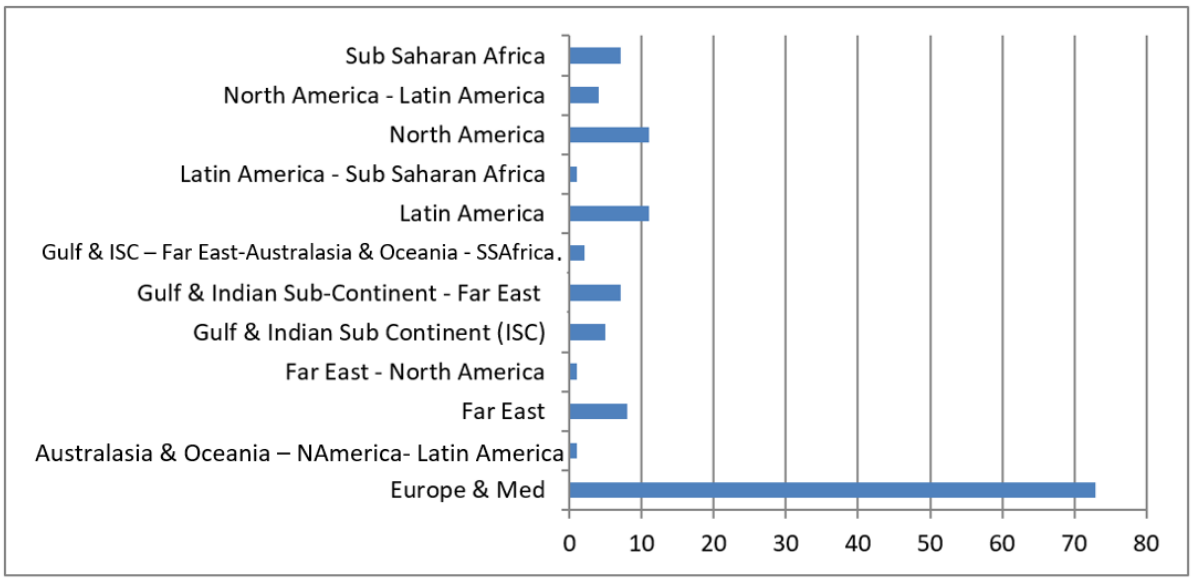
Figure 14: Annual deployed short-sea and deep-sea container service capacity calling at UK ports by world region, 2017(million TEU)



Source: MDS Transmodal Container ship Databank

The vast majority of the individual services are short-sea, providing links between the UK and European markets and between North West European deep-sea container port hubs such as Rotterdam and Antwerp and UK regional ports. As shown in Figure 15, some 56% of the services that call at UK ports are short-sea rather than deep-sea services. The average size of the ships deployed on short-sea routes is 1,400 TEU, while the average size of ships on services to and from the Gulf and the Far East is 14,500 TEU.

Figure 15: Number of short-sea and deep-sea container services calling at UK ports by world region, 2017



Source: MDS Transmodal Container ship Databank

On the deep-sea routes there are two key trends that are having a significant impact on the global container shipping market following the 2008–9 global economic crisis and as a result of the end of shipping line cartels in 2008:

- Ship sizes have increased as the major shipping lines have sought to secure economies of scale and reduce unit costs per container transported once their privilege to operate cartels was ended by the EU;

- Shipping lines have sought to consolidate both through mergers and acquisitions and also by forming three global alliances – called the 2M Alliance, THE Alliance and the Ocean Alliance – in order to have greater control over capacity on the major trade lanes such as between Europe and the Far East.

This has an impact on UK container ports in that they are faced with fewer customers and also have to cater for larger ships, which leads to a need to invest in enhanced facilities such as deeper dredged channels and quays; the larger ships also lead to a greater number of containers being loaded and unloaded at any one time, which places greater pressure on cranes, storage yards and on inland logistics.

There are almost no ‘pure’ coastal container services that only transport containers between two UK ports, but there are some 17 services that provide direct links between two UK ports while also serving ports in NW Europe or the Republic of Ireland. These services are included within the short-sea Europe and Mediterranean services in the analysis in Figures 14 and 15 above.

4.5 RoRo shipping services

RoRo services, which are unitised cargo in trailers that are rolled on and off a ship without the use of a crane, provide frequent maritime transport links between Great Britain and the European continental mainland and Ireland. The overall market is usually split between:

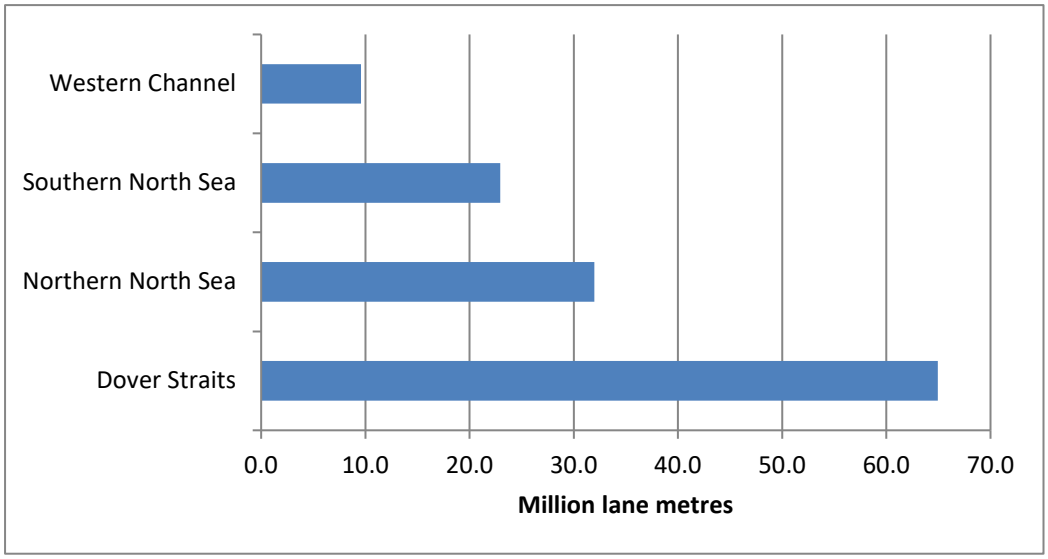
- The GB–Continent market, which is then split further into the Dover Straits (between Dover and the Region Hauts-de-France[4]), the North Sea corridor (between GB ports in the Thames to Forth range to the Near Continent, Scandinavia and the Baltic) and the Western Channel (between GB ports in the Newhaven to Plymouth range to France and Spain).

- The GB–Ireland market, which is then split further between the Northern Corridor (GB ports to Northern Ireland), the Central Corridor (Lancashire and North Wales ports to Dublin) and the Southern Corridor (South West Wales ports to southern Ireland).

At the end of 2017 there were a total of 56 RoRo services carrying freight at GB ports, provided by a total of 112 different vessels (MDS Transmodal, 2017).

Figure 16 shows how the total capacity deployed by the ferry operators in the GB–Continent market in late 2017 of 130 million lane metres is divided between the different corridors; the dominant corridor is the Dover Straits with 65 million lane metres of capacity provided by the high-frequency 'turn-up and go' ferry services that operate on this corridor for driver accompanied trucks. However, for slower-moving unitload traffic, the North Sea corridor both on the southern North Sea (to and from the Thames and Harwich Haven) and the Northern North Sea (to and from the Humber, Tees, Tyne and Forth) provide a combined deployed capacity of 55 million lane metres.

Figure 16: Annual deployed capacity in the GB–Continent market in million lane metres, 2017

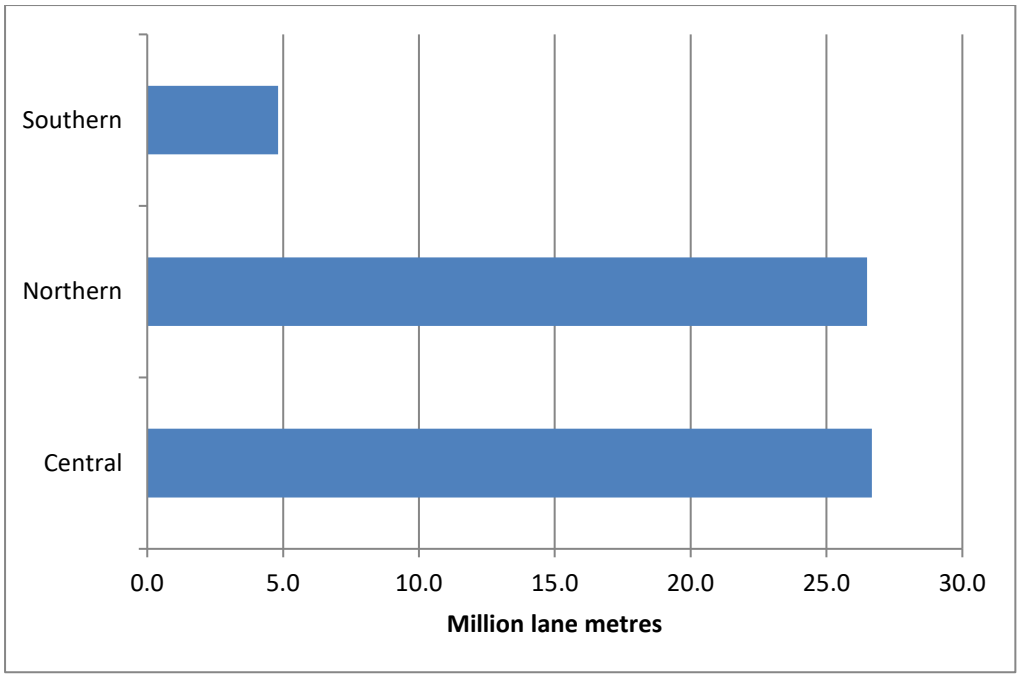


Source: MDS Transmodal Ferry Databank

[4] Formed from a merger of the former regions of Nord Pas de Calais and Picardie, with the new region coming into existence on 1 January 2016.

Figure 17 shows how the total capacity deployed by the ferry operators in the GB–Ireland market of 58 million lane metres is divided between the different corridors; the two most important corridors are the Northern and Central Corridors which link Great Britain with the major Irish population centres of Belfast and Dublin respectively.

Figure 17: Annual deployed capacity in the GB–Ireland market in million lane metres, 2016



Source: MDS Transmodal Ferry Databank

Commercially, most RoRo services on GB–Continent and GB–Ireland routes are operated on a scheduled/liner basis. Services therefore operate to scheduled timetables, with the shipping lines selling capacity (deck space) to road hauliers and logistics operators in an open competitive market. Road hauliers therefore have a choice of routes and shipping lines and the commercial risk rests with the shipping line, with sales revenue needing to cover operating costs in order to generate a financial return. The key players in the RoRo market are:

- Dover Straits – P&O Ferries, DFDS and Eurotunnel;
- Western Channel – Brittany Ferries and LD Transmanche;
- North Sea – Stena Line, P&O Ferries, Cobelfret and DFDS; and
- Irish Sea – Stena Line, Irish Ferries, Sea Truck and P&O Ferries.

In most cases, space is sold to hauliers and logistics operators on a third party basis, so that the shipping line has no financial interest in the hauliers. However, Cobelfret, P&O and DFDS also own subsidiaries that are pan-European logistics companies.

Small island communities located off the mainland of Great Britain rely on lifeline services to receive supplies and to facilitate trade with the mainland and the rest of the world. The relevant island groups are:

- The Western Isles of Scotland, served by services operated by Caledonian Macbrayne that operate between the mainland and 23 island communities, as well as providing some inter-island services;
- The Northern Isles of Scotland (Shetland and Orkney), served by Northlink Ferries which provides links to and from the mainland (both Aberdeen and Scrabster) and between the two island groups;
- The Channel Islands, which has freight services to and from Portsmouth operated by Condor Ferries;
- The Isle of Man, which has a freight service mainly to and from Heysham operated by the isle of Man Steam Packet Company;
- The Isle of Wight, which has freight services provided by Red Funnel (to and from Southampton) and Wightlink (to and from Portsmouth and Lymington).

4.6 Bulk shipping

Bulk shipping provides port-to-port shipping services transporting unpackaged dry bulk cargoes (such as coal, iron, ore, cement and grains) and liquid bulk cargo (such as crude oil, chemicals, liquid natural gas and refined petroleum products). The ships are usually specialised and so transport large volumes of a homogeneous cargo between specialised port handling and storage facilities.

In 2016 some 47,000 ship arrivals at UK ports were either by liquid bulk tankers or dry cargo vessels out of a total of 138,000 arrivals, so that bulk shipping accounted for about one third of all ship calls (Department for Transport, 2017a).

Typical flows in the UK might be the transport of refined petroleum products by a petroleum products tanker from a coastal oil refinery to a coastal tank farm (a storage facility for bulk liquid products) or the shipping of cement in a bulk carrier from a port close to a cement production facility to a port for storage and then use in development projects in the surrounding region.

These bulk shipping services are usually provided by the shipping company to a shipper on a single contract (or voyage charter) rather than on a regular scheduled basis, with the contract stipulating the movement of the cargo between two ports for a given contract value.

5 THE STRATEGIC FREIGHT INFRASTRUCTURE NETWORK

5.1 Introduction

This section describes the infrastructure that freight transport services use, whether it is publicly or privately owned.

The road and rail networks are predominantly publicly owned and managed and freight transport operators generally share use of the infrastructure with passengers. The most important types of privately owned infrastructure in relation to freight transport are distribution centres, ports and airports. Distribution centres are commercial developments and, although some smaller ports are owned by local authorities and there are a number of 'trust ports' such as Dover, Port of Tyne and Milford Haven (which are required to re-invest any financial surpluses), the major UK ports are privately owned following a programme of privatisation in the 1980s and 1990s.

5.2 The strategic road network

The highway network in Great Britain is mainly owned and operated by an arm of the state, with Highways England, Transport Scotland and the Welsh Government owning and operating the strategic highway network in each country and local authorities owning and operating other roads.

The highways network is principally funded from general taxation rather than from vehicle excise duty or fuel excise duty. The exceptions to this are the direct charges levied to use a number of major estuary crossings such as the Dartford Crossings and the M6 Toll and which are funded either by borrowing or a PFI scheme. There are some private highways in and around ports, airports and logistics parks; these were originally funded and are maintained by the facilities owner, even if the general public can in some circumstances drive on them. Highways England, as a DfT-owned company, is subject to economic monitoring by the Office of Rail and Road (ORR).

The Strategic Road Network in England (defined as that owned and managed by Highways England) consists of about 3,000 km of motorways and 4,100 km of trunk A roads. While it represents only 2% of the total road network, it accommodates 66% of HGV tonne-km (Department for Transport, 2015) because a high proportion of freight traffic is strategic in nature and is moving over long distances.

Figure 18 shows the estimated flows of HGVs on the GB road network (MDS Transmodal, 2017), highlighting how the major flows are concentrated on the motorway and trunk road network.

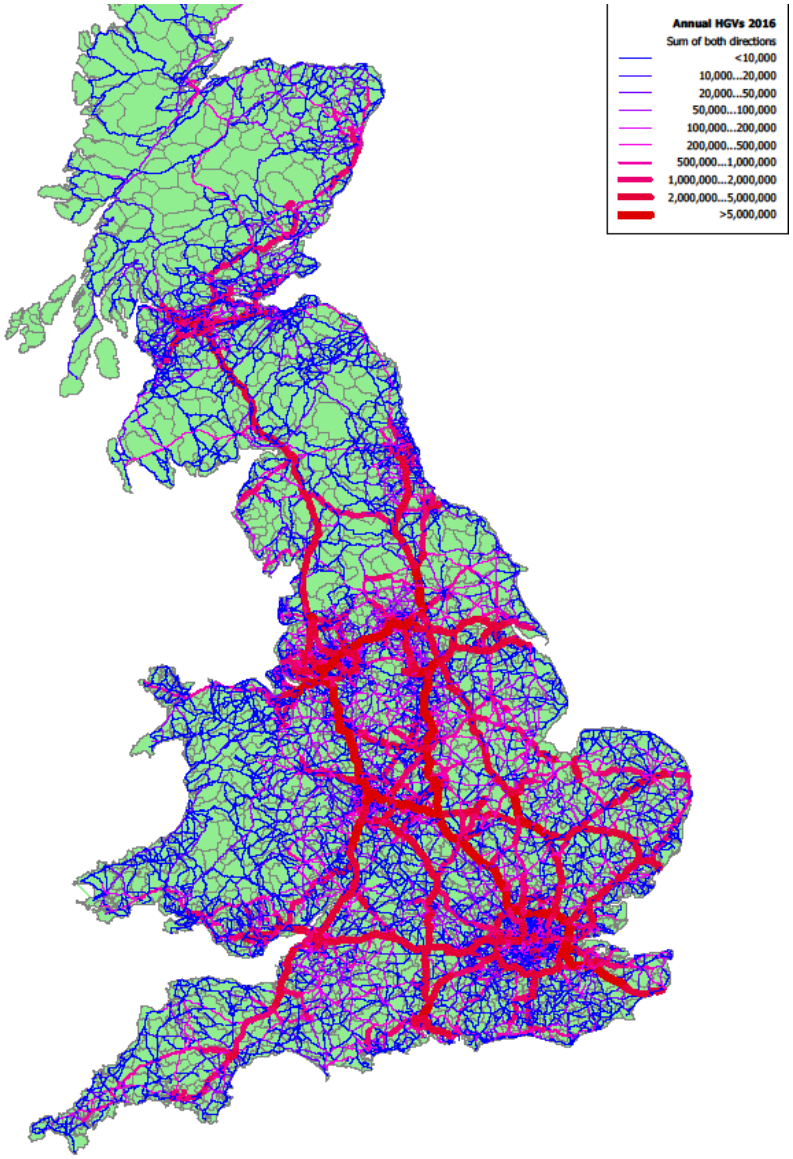


Figure 18: Annual HGV flows on the GB road network, 2016

Source: MDS Transmodal GB Freight Model

5.3 Distribution centres & other storage

Within the general cargo and consumer goods sectors, the 'hub' of most logistics operations is the distribution centre and these have tended to be located on greenfield sites close to, or with easy access to, the strategic road network to increase the efficiency of road-based distribution operations and avoid conflicts with local residents. There are basically two types of distribution centre (DC):

- **National distribution centres (NDCs):** these act as inventory holding points for imported and nationally sourced goods, before re-distribution to subsequent stages in the supply chain. Average dwell time varies considerably but may average 4–6 weeks. They are termed 'national' because they serve the whole of Great Britain (and often Ireland) from the one site and are normally associated with manufacturers, with suppliers

to retailers such as importers of electrical goods, beers/wines/spirits or clothing and major retailers. NDCs have traditionally been located in the Midlands, as they are centrally located to serve domestic suppliers, ports and regional distribution centres, thereby minimising overall road transport costs. Outbound flows were typically to regional distribution centres or retail outlets, although direct deliveries to homes are becoming increasingly important due to the increasing levels of e-commerce.

- **Regional distribution centres (RDCs):** these receive goods from NDCs or direct from suppliers, before re-distributing the goods to retail outlets and, increasingly, direct to homes. They have a regional hinterland and are normally associated with retailers which receive inbound goods from suppliers and their own NDCs before consolidation into loads for individual retail outlets throughout the region. Dwell times are much shorter; perishable and time-sensitive goods will be redistributed within 24 hours without passing through pallet racking systems and with a simple transfer between vehicles (a process called ‘cross docking’).

Goods with short lead times and time-sensitive cargoes would generally pass direct to an RDC from a domestic supplier or port. Some DCs act as both national and regional distribution centres, depending on the precise distribution requirements of the business.

Distribution centres for the large retailers therefore form part of complex international supply chains and a typical distribution centre can be expected to receive goods from domestic, EU and deep-sea sources. Goods with short lead times (essentially domestic and EU sourced goods) and those which are time-sensitive usually pass through distribution centres fairly quickly. Cargo with a longer lead time, principally that from deep-sea sources, tends to be stored for longer periods ahead of demand.

In addition to the traditional storage and re-distribution functions at pallet level quantities, distribution centres are increasingly the location of other ‘added value’ operations. With respect to e-commerce, they are often the location of product ‘fulfilment’; this is where an individual order will be received, ‘picked’ from storage, prepared and appropriately packed and then dispatched to the customer’s delivery address. Associated returns processing and other back office functions may also be co-located at the same distribution centre.

UK distribution centres are still fairly labour intensive, despite some automation driven by e-commerce and fulfilment. Employment densities are in the range 70–95 square metres per FTE (full-time equivalent), with NDCs generally recording higher levels of employment per square metre (Homes and Communities Agency, 2015).

Figure 20 shows the location of ‘large’ distribution centres in England, defined as more than 8,000 square metres of storage space. The map shows that there is a concentration of distribution centres (mainly NDCs) in the so-called logistics ‘Golden Triangle’ (bounded by the M42, M1 and M6), but there are also significant concentrations located within or close to the major British conurbations.

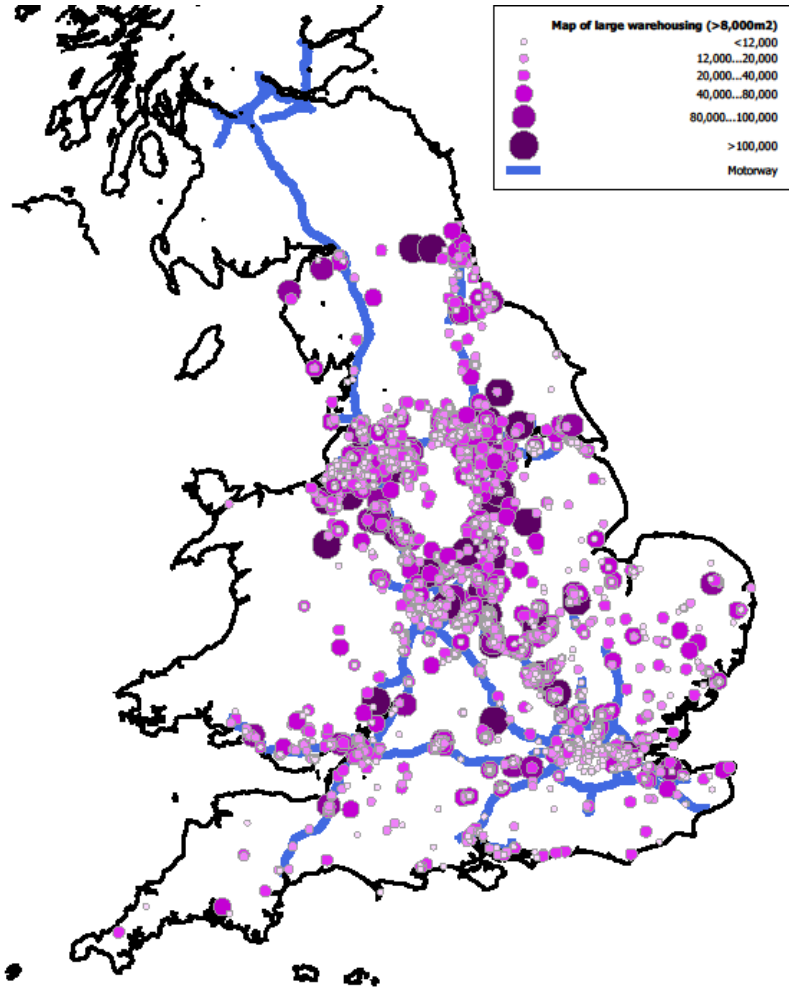


Figure 20: The location of distribution space over 8,000 square metres in England and Wales in 2017

Source: MDS Transmodal, based on Valuation Office Agency data

The concentrations of distribution centres in different regions reflects their competitiveness in terms of total transport costs for inbound and outbound cargo, land values and the cost of labour. The Midlands and parts of the North of England tend to be the most favoured areas for NDCs because these areas minimise the overall costs when goods have to be received from both overseas and around Britain and then distributed to all other British regions. This is shown in Table 8, which compares the proportion of distribution centre space (medium and large-scale distribution centres over 5,000m^2) in England and Wales by region compared to the proportion of the population (MDS Transmodal, 2017). Whereas London – with 15% of the total population of England and Wales and only 6% of the warehousing space – is relatively under-represented, the East Midlands – with only 8% of the population but 17% of the warehousing space – has a relative specialisation in providing distribution space.

Table 8: Comparison of warehousing space with population for English regions & Wales in 2016–17

Region	Proportion of warehousing space (more than 5,000m^2) in 2017	Proportion of population in mid-2016
East of England	10%	11%
East Midlands	17%	8%
London	6%	15%
North East	3%	5%
North West	15%	12%
South East	10%	15%
South West	6%	9%
Wales	3%	5%
West Midlands	16%	10%
Yorkshire and the Humber	12%	9%
Total	63.8 million m^2	58.4 million

Source: MDS Transmodal Distribution Centre Database & Office for National Statistics

The provision of warehousing is a purely commercial function undertaken by commercial property developers, often in association with pension/investment funds, although some commercial property developers such as Goodman and Pro Logis are also investment funds in their own right. Developers identify and acquire sites, design and build the distribution centre units, which are then let to long-term occupiers. The consequent annual rental payments represent the developer's investment return, or alternatively the completed and occupied unit may then be sold to a pension/investment fund (sale proceeds minus development costs representing the developer's return). Warehousing is therefore the key fixed infrastructure required by (and used by) the general cargo/consumer freight sector, even if it is delivered and funded by long-term private sector investment. The warehouses are therefore commercial investments intended to make a financial return for the investor. As with all commercial investments, the decision on whether to proceed will take into account the capital costs alongside future revenue streams, the likely payback time and overall financial return.

However, delivery of distribution space is ultimately reliant on the planning system; land needs to be allocated through local plans and consents granted at commercially attractive locations. These are generally close to strategic transport routes, to the markets to be served and to a labour supply. Conflicts often emerge, with many sites that could be competitive geographically being located in the greenbelt or in competition with proposed residential developments.

The key to achieving sustainable distribution for medium- to long-distance flows is the development of Strategic Rail Freight Interchanges (SRFIs) and port-centric distribution. SRFIs are large developments of modern large-scale distribution centres co-located on the

same site as an intermodal terminal. This renders rail freight services to and from the SRFIs more cost-effective because the origin and/or destination of the door-to-door freight transport movement (a distribution centre) is next to the rail terminal so that no road delivery or collection is required between the rail freight terminal and the distribution centre. This is considered further in section 5.4.

Port-centric distribution provides similar advantages to SRFIs, but the distribution centres are located in or close to a port estate or a wharf on a major inland waterway such as the Manchester Ship Canal. This renders maritime or waterborne freight services to and from the port or wharf more cost-effective because the port or wharf is the origin and/or destination of the door-to-door freight transport movement with no need for an inland movement by road.

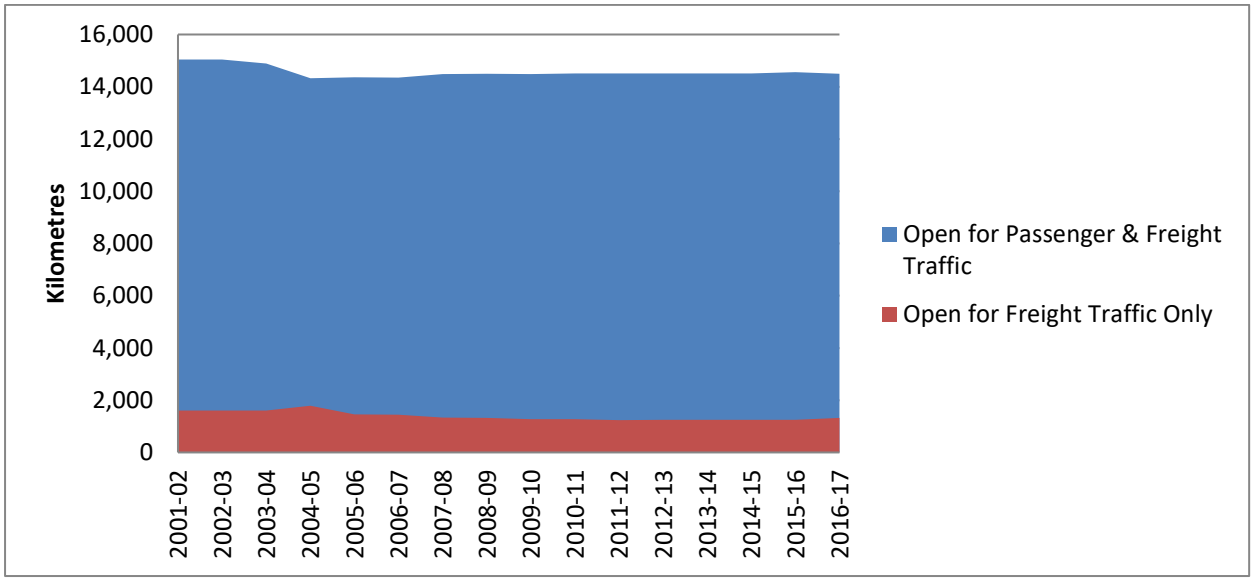
5.4 Rail freight network

The GB rail network

The vast majority of Britain's rail network is owned and operated by Network Rail. Network Rail is an arm's length public sector body of the Department for Transport. However, it is subject to independent economic and safety regulation by the Office of Rail and Road (ORR). Its revenue comes from three main sources, namely track access charges paid by the passenger and freight operators for using the network, a direct grant from the DfT and property/rental income. Section 5.6 describes how it is funded with respect to day-day operations and investments in enhancements. The two principal track networks not owned by Network Rail are HS1 and the Channel Tunnel, which are both operated under private sector concessions.

Data on the length of the rail network in Great Britain in 2016–17 shows that the total network available for freight movements is some 15,800 km, of which 1,300km is only available for freight (Office of Rail & Road, 2018a). Since 2004–5 the total length of the network has remained essentially stable (Figure 21).

Figure 21: Rail infrastructure length 2001–2 to 2016–17



Source: Office of Rail and Road, 2018

Some 92% of the network is shared by freight and passenger trains and where there is congestion on the network this can lead to a lack of capacity for new rail freight services; FOCs are unable to acquire new paths (over and above existing utilised paths) as the network is effectively 'full'. As rail freight services are provided in response to demand, rather than being timetabled in advance of demand, the timetabling of additional passenger services could therefore lead to a lack of capacity for additional freight services on the network. Proposals for additional train services should consider both existing passenger and freight services, and their growth potential. For many routes, or times, there may not be additional spare capacity, so decisionmakers will have to balance competing priorities.

Just over 10 years ago, the Government and Network Rail announced their intention to develop a Strategic Freight Network (SFN) on the railways (Department for Transport, 2007). The SFN was intended to be a core network of trunk freight routes capable of accommodating more and longer freight trains, and being able to handle wagons with a greater loading gauge, integrated with and complementing the existing mixed traffic network. The Government recognised that investment will be required to deliver the SFN, and subsequent funding settlements for Network Rail have included targeted investment in this network.

Figure 22 shows the estimated flows of rail freight services on the GB rail network in terms of average weekday trains in 2016–17, highlighting how the major flows are concentrated on the major north–south link of the West Coast Main Line, between the two major deep-sea container ports of Felixstowe and Southampton and to/from the port of Immingham.

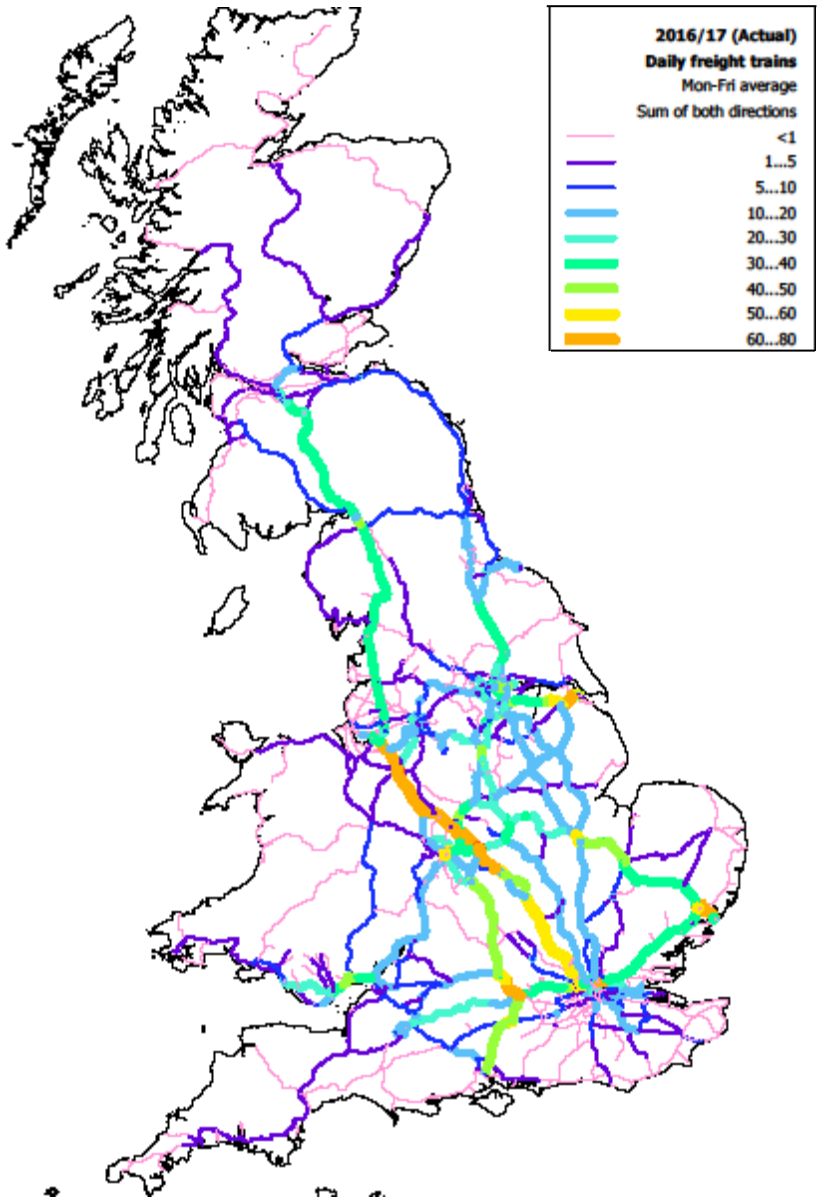


Figure 22: Average daily freight trains on the GB rail network 2016–17

Source: MDS Transmodal GB Freight Model

Rail freight terminals

Rail freight terminals are needed to allow the transfer of cargo between rail and, in particular, road transport. As for rail freight services there are two types of rail freight terminal, namely:

- bulk terminals; and
- intermodal rail freight terminals and SRFIs.

Bulk rail terminals are normally located on private sidings that are either owned or leased on a long-term basis, by the shippers and receivers of the cargo. The terminals are needed for the transfer of bulk commodities to and from rail where rail is most likely to be the most cost-effective mode of transport for long-distance transport (e.g. for the transport of stone

between quarries and major cities for construction projects or for the transport of iron ore from a port to a steelworks). The loading and discharge equipment will have been funded by the cargo shipper and/or receiver. Such facilities therefore rely on significant long-term investments from the private sector in the loading/discharge equipment at the private sidings.

Intermodal rail freight terminals are designed to transfer units between rail and road, and they generally consist of sidings to accommodate trains, special cranes for loading and unloading the units and space for storage. There are existing terminals at the main deep sea container ports as well as some short-sea container ports (principally investments by the ports themselves) and in the British regions with major population centres (i.e. Greater Manchester, West Yorkshire, Liverpool, the West Midlands, Bristol, London, South Yorkshire and the Central Belt of Scotland). Most of these terminals, which were originally developed by British Rail in the 1960s and 1970s, have no distribution centres located on the same site.

Rail freight can offer very competitive transport solutions, when compared with road transport, even over short distances of 100km or less. However, two conditions are required to render such flows competitive:

- The ability to move the product directly between two rail-served facilities i.e. without the requirement to use road transport for part of the end-end journey; and

- The ability to move large quantities in one move on a frequent and regular basis to provide the sufficient volume of traffic to fill a full-length train and provide efficient use of assets.

This explains why for bulk products, shippers and receivers have invested in bulk rail terminals at both cargo origin and destination. Examples include the former merry-go-round coal trains which operated over short distances between collieries (and latterly ports) and coal-fired power stations, and aggregates trains moving product from rail-served quarries to rail-served urban distribution depots; these flows can provide sufficient volumes of traffic for economic trains to operate on a frequent and regular basis.

Where one end of the supply chain is not rail-served, there is a consequent need to use road transport to complete the trip (i.e. to move the cargo from shipper to a rail-head or from a rail terminal to the final customer) and this introduces additional costs compared with one where both ends are rail-served (handling costs and road haulage). Under this operating scenario, the break-even distance (with road transport) increases to around 250km. Where neither end of the transport chain is rail-served and road transport is required at both ends, this distance rises to around 400km. This explains why intermodal container trains from Southampton or Felixstowe will serve destinations from the Midlands northwards (final trip to the end-user generally being by road), with inland destinations in the South East being served by road transport.

In the intermodal sector, therefore, the key factor in attracting traffic away from road transport, particularly over distances less than 250km, is the development of large scale distribution centre capacity at sites with intermodal rail terminals. This is necessary as intermodal services higher value cargo that passes through large scale distribution centres. In planning terms, these are called Strategic Rail Freight Interchanges (SRFIs). When large distribution centres are located on rail-served sites, rail is able to offer significant cost advantages over road transport and the concentration of large scale distribution centres on a single site also generates the requisite volumes of cargo to fill a full-length train.

SRFIs are large developments (over 60 hectares) of modern large-scale distribution centres co-located on the same site as an intermodal terminal, serving the on-site distribution centres and the wider region. They need to be located on main lines with a loading gauge that can accommodate cost-effective intermodal trains and located close to the strategic highway network and close to major urban conurbations; the latter provides both consumers for the cargo passing through them and a local source of labour. Suitable sites for SRFIs are very limited and are often located in the greenbelt. Their development also relies on train paths being available on the network and terminals being available at SRFIs; however, freight services struggle to secure capacity on the network in some locations in competition with passenger services and the planning system has also found it difficult to provide SRFI capacity in key locations such as the South East. Given the above, the Government has attempted to promote their development by classifying them as Nationally Significant Infrastructure Projects (NSIP) and including them in the National Planning Statement for National Networks policy statement.

Figure 23 shows the location of existing Strategic Rail Freight Interchanges (SRFIs) in Great Britain. Note that 'Future SRFIs' are those which have been granted consent and are currently under development. Consent for SRFIs at Radlett (Hertfordshire) and Howbury Park (Dartford) have previously been granted, albeit work has yet to commence on construction; in the case of Howbury Park, the consent time limit has passed and a fresh application is being progressed (Greater London Authority, 2016).

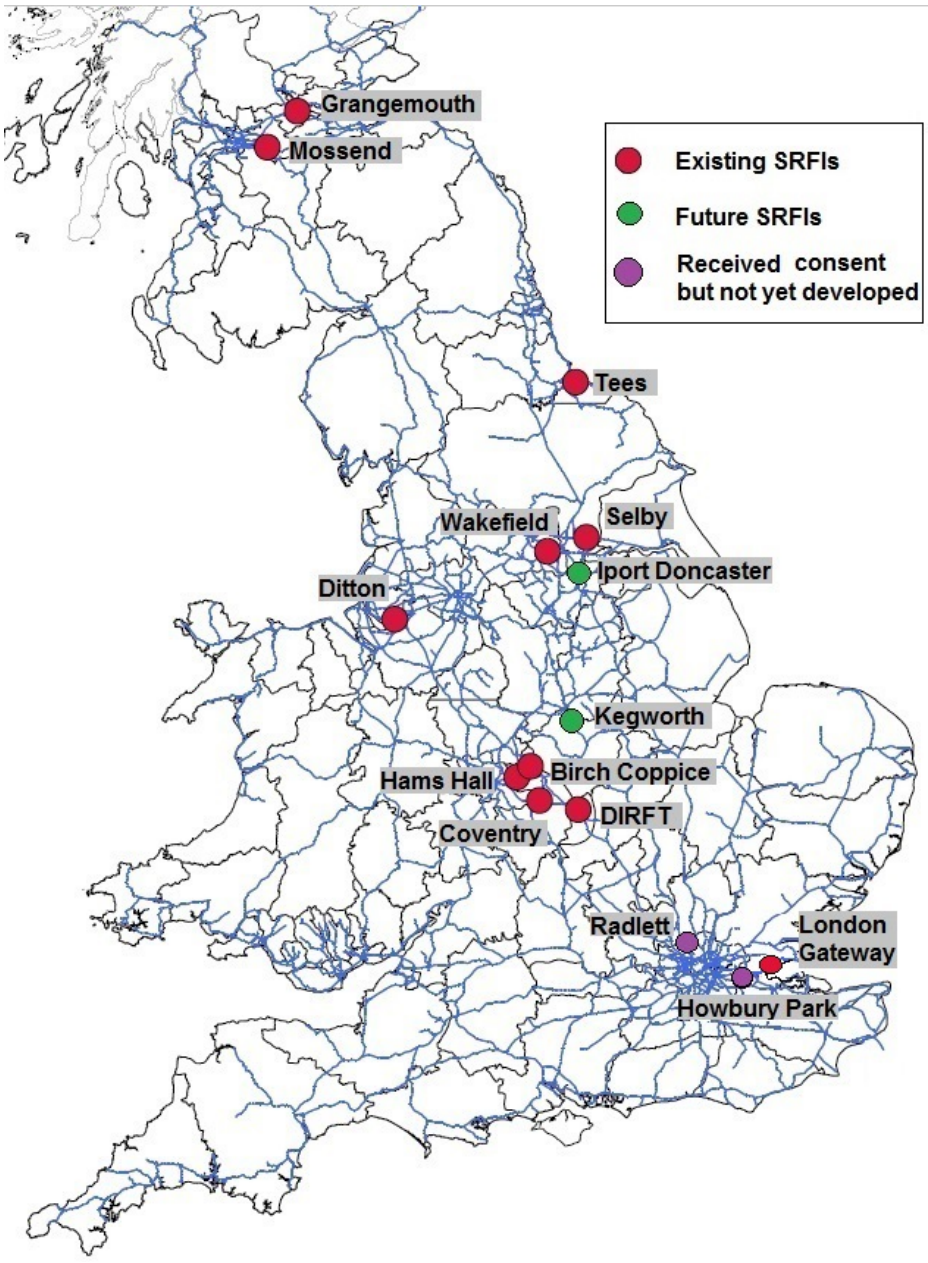


Figure 23: Location of Strategic Rail Freight Interchanges in GB

Source: MDS Transmodal

As for stand-alone distribution centres, SRFIs are funded by commercial property developers on a commercial basis and are essential to securing a shift of traffic from road to rail over medium- to long-distances. The relatively large distribution sites required by SRFIs generate a critical mass of rail freight traffic for the economic operation of rail freight services and also reduce operational costs for the operators of distribution centres. They are therefore key fixed infrastructure assets that are delivered and funded) by long-term private sector investment that is intended to provide a financial return for the investor.

However, delivery is ultimately reliant on the planning system; land needs to be allocated through local plans and consents need to be granted at the commercially attractive locations. These are generally close to strategic transport routes, markets to be served and a labour supply. Conflicts therefore often emerge, with many geographically competitive sites being

located in the greenbelt or competing with proposed residential developments. It is noteworthy that proposed SRFIs in London and the South East have experienced protracted consideration by the planning system. Both Radlett and Howbury Park were examined at public inquiries before consent was granted (twice in the case of Radlett, along with a judicial review), while a further scheme near Slough was twice rejected following a planning inquiry. Despite the Government's attempt to promote such schemes, the fact that the most optimal sites are located in the greenbelt or on similarly designated land means they are often open to challenge (particularly by local authorities) and detailed examination through the planning system. Schemes in the Midlands and North of England have generally experienced a smoother passage through the planning system.

5.5 Port infrastructure network

Ports in the UK fall into one of three categories, namely:

- Privately owned ports – usually by large publicly quoted companies, investment funds or multi-national port owning organisations;
- Trust ports – owned by an independent statutory body; and
- Municipal ports – owned by a local authority.

Most of the largest ports (in terms of traffic handled) are privately owned by Associated British Ports, Forth Ports, Peel Ports, PD Ports, Hutchison and DP World, while smaller ports tend to be Trust or Municipal. The notable exceptions are the larger ports of Dover, the Port of Tyne, London and Milford Haven (all trust ports) and Portsmouth (a municipally owned port).

Table 9 shows the traffic volumes for the top 10 UK ports in 2016. Many of these ports are multi-purpose ports handling a broad range of both unitised and bulk cargoes, such as Grimsby and Immingham, London, Southampton, Liverpool, Forth, Tees and Hartlepool and Belfast, but a few are focused principally on unitised cargoes (Felixstowe and Dover).

Table 9: Top 10 UK ports by traffic volume, 2016

Rank	Port name	Traffic volume in tonnes (million)
1	Grimsby & Immingham	54.4
2	London	50.4
3	Southampton	36.0
4	Milford Haven	34.8
5	Liverpool	31.9
6	Felixstowe	28.2
7	Forth	27.4
8	Dover	27.3
9	Tees & Hartlepool	26.9
10	Belfast	17.6

Source: DfT Port Freight Statistics

Irrespective of ownership, ports generally have two key functions, namely:

- Commercial – generating revenue from berthing vessels, handling cargo and renting land/facilities; and
- Conservancy – the safe movement of shipping within their respective ports.

There are a number of examples, however, where the (trust) port authority only has a conservancy role, with the cargo-handling facilities contained within them being owned by private companies. These ports, all of which have trust port status, include Harwich Haven Port Authority (providing conservancy for the estuary upon which the ports of Felixstowe, Harwich and Ipswich are located) and the Port of London. All ports, regardless of ownership, are operated on purely commercial terms without any Government or state support. Revenue must cover costs and investment in infrastructure (see below) has to be funded on commercial terms. In that respect, ports operate in an open market, competing with each other for traffics, and are able to charge whatever the market will bear.

There are broadly three types of port infrastructure, namely:

- Liquid or dry bulk – jetties or quays and associated discharge/loading equipment, often associated with a nearby production facility such as an oil refinery or steelworks.
- Unit load/unitised traffic – roll-on/roll-off (RoRo) ferry berths and lift-on/lift-off (LoLo) quays plus associated craneage; and
- Semi-bulk /general cargo quays plus associated loading/discharge equipment e.g. for the specialised handling of steel and forest products

Table 10 provides analysis of the GB port infrastructure network in terms of some of the key parameters that determine capacity and capability (MDS Transmodal, 2017). In total there are an estimated 16 km of container terminal quay for the handling of container ships and some 209 km of quay for handling bulk and general cargo traffic. At the same time there are an estimated 730 hectares of space at ports for the handling and storage of RoRo/ferry traffic and 470 hectares of land for the handling and storage of trade vehicles. As well as the three main types of port infrastructure shown above, specialist facilities for trade vehicles are also shown as they require large amounts of land for vehicle storage.

Table 10: GB port infrastructure by type and region in 2015

Region	LoLo facilities		RoRo/ferry facilities		Trade vehicle facilities		Bulk/general cargo facilities	
	No. of facilities	Total quay length (km)	No. of facilities	Terminal space (hectares)	No. of facilities	Terminal space (hectares)	No. of facilities	Total quay length (km)
East Midlands	1	0.2	-	-	-	-	3	1.2
East of England	7	4.0	4	59.9	2	139.2	24	10.6
London	9	1.5	4	75.0	1	150.0	87	18.9
North East	4	1.5	3	40.6	2	48.9	27	13.8
North West	2	1.1	9	49.3	2	7.7	44	30.6
Scotland	6	1.8	17	54.9	1	0.2	70	40.4
South East	2	1.9	12	107.6	2	83.0	60	20.3
South West	1	0.9	1	27.5	2	146.7	21	16.2
Wales	4	1.0	9	42.0	1	0.3	37	29.0
Yorks & Humber	4	1.9	6	123.1	3	43.9	36	27.6
Grand Total	40	15.8	67	579.9	16	473	619.9	208.5

Source: MDS Transmodal GB Port Infrastructure Database

In some cases, the port's commercial role might only extend to being effectively 'landlords'; land is leased to third party private operators on commercial terms, who subsequently invest in berthing, loading/discharge and other handling infrastructure such as rail terminals or distribution centres. In other cases, the ports will invest in, own and physically operate the infrastructure, charging shipping lines fees to generate revenues and a financial return. In addition to the actual berths and direct loading/discharge equipment, ports also invest in other 'added value' infrastructure. This can include landside storage and handling infrastructure such as warehousing, silos and rail freight terminals. As an example, the rail terminals at the Port of Felixstowe were provided by the port, and London Gateway has an associated distribution centre development within the port estate.

Overall, and on a similar basis to distribution centres and SRFIs, ports are key fixed infrastructure assets that are delivered through long-term private sector investment. As with all commercial investments, the decision on whether to proceed will take into account the capital costs alongside future revenue streams, the likely payback time and overall financial return. Securing traffic on long-term contracts is therefore important as they will effectively

help to secure funding for investment. With the exception of Peel Ports and Forth Ports, the other large private port groups are ultimately owned by overseas interests. However, given the longstanding Government policy of encouraging inward investment from overseas, overall this should not affect (and indeed could benefit) future investment in UK port infrastructure. Again, delivery is ultimately reliant on the planning system; land needs to be allocated through local plans and consents need to be granted.

5.6 Airports

As explained in section 3.5, UK airports handled some 2.4 million tonnes of high-value freight in 2016 and the market is dominated by London Heathrow with some 64% market share (Civil Aviation Authority Airport Statistics, 2017). The most important airports for handling freight – London Heathrow, East Midlands, London Stansted, London Gatwick and Manchester – are either privately owned or operated on a commercial basis.

Unlike ports, much of the infrastructure at airports is designed to meet passenger demand; however, specialist air cargo distribution centres are required by air freight forwarders for the sorting and consolidation of air freight into air container loads and these may be located in the vicinity of the airports rather than actually within the airport itself. Otherwise, airport infrastructure is developed on a commercial basis, with delivery reliant on the planning system when additional land is required.

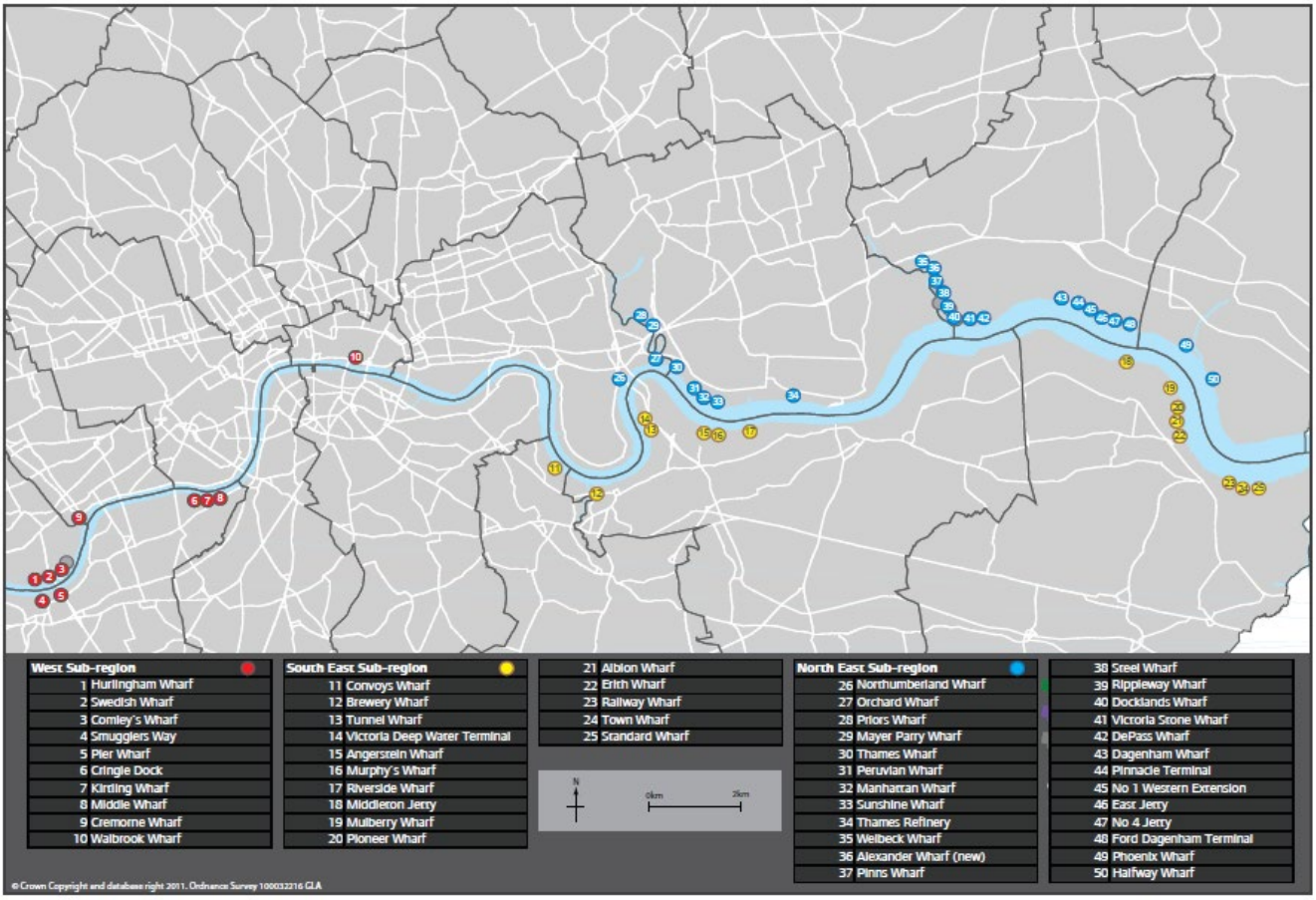
5.7 Waterborne freight network

The UK has an indented coastline, with deep-water access to its major estuarial ports and wharves on the Forth, Tees, Tyne, Humber, Harwich Haven and Thames on the east coast, the Solent on the south coast and on the Severn estuary, Milford Haven, Mersey and Clyde on the west coast. Many of these seaports are privately owned since a round of privatisations in the 1980s and 1990s.

Short-sea and coastal shipping movements along these major estuaries are recorded as inland waterway movements for statistical purposes and there are also numerous (mainly privately owned) wharves on major rivers, such as the rivers Humber, Hull and Trent. Significant movements of freight on man-made canals are limited to traffic to and from wharves on the Manchester Ship Canal.

There are a large number of wharves on the Thames which need to be safeguarded through the planning system against, in particular, residential development so they are available in the future for the loading and unloading of cargo. The number of safeguarded wharves is shown in Figure 24.

Figure 24: Safeguarded wharves on the River Thames (source: Port of London Authority)



The Canal and River Trust has been responsible for the development of freight activity on most rivers and canals in England and Wales since 2012, while the British Waterways Board (operating as Scottish Canals) continues as a public body with the role of supporting the development of freight on canals and rivers in Scotland.

5.8 Pipeline network

The overall length of the pipeline network has remained largely unchanged since 2007 at about 4,400km, reflecting the relatively mature nature of this mode of transport.

5.9 Planned investment in freight transport infrastructure

Highways network

The first Road Investment Strategy (RIS1) provided a long-term programme of investment for the SRN in England, with a plan between 2015 and 2020. The headline figure for investment was £15.2 billion for over 100 projects during a six year period. While there has been investment in constructing some new roads, the main focus has been on upgrading the existing network. This includes the developing network of 'smart motorways', which secures more capacity at peak times by allowing use of the hard shoulder and variable speed limits to improve traffic flow.

The Government is now working with Highways England and other stakeholders to develop RIS2, with research being carried out on six strategic studies and updating route strategies for the whole network. The six strategic studies address the following sections of the SRN:

- Northern Trans-Pennine: the A66 and A69 corridors
- Trans-Pennine tunnel: the potential enhanced link between Manchester and Sheffield
- Manchester north-west quadrant: the M60 from junctions 8 to 18
- A1 in the east of England from the M25 to Peterborough
- The Oxford to Cambridge expressway
- M25 south-west quadrant

In 2015 the Government announced that tax receipts from vehicle excise duty will be hypothecated for investment in the highways network from 2020–21 rather than being available for other uses. As the highway network is funded from taxation, investment in highway infrastructure is decided on the costs of the scheme measured against the wider economic and societal benefits that will be generated by that scheme – unlike investments in port, distribution centre and SRFI infrastructure, which are based on commercial decisions. The DfT's WebTAG (Transport Appraisal Guidance) provides a structured appraisal system that allows the benefits to cost ratio (BCR) of publicly funded schemes to be estimated. A positive BCR is normally required for a scheme to proceed, and where multiple schemes are 'competing' for limited funding, the schemes with the higher BCRs normally secure the funding. The appraisal of such schemes in relation to freight transport should take account of

both changes in user costs (i.e. the change in operating costs, including the cost of time, for the freight transport industry) and non-user costs (such as changes in levels of congestion, the level of environmental emissions and the cost of accidents) and should be carried out in a consistent way across all relevant modes of transport.

Rail network

As a monopoly infrastructure provider, Network Rail is subject to economic regulation by the Office of Rail and Road (ORR). The ORR determines what Network Rail is permitted to spend on day-to-day operations, asset maintenance/renewals and enhancements, and operational performance indicators are also defined. The ORR's process of determining Network Rail's spending, funding and performance is known as a Periodic Review. The subsequent settlement lasts for five years and is known as a Control Period. The current Control Period, CP5, runs from April 2014 to March 2019.

To inform each Periodic Review, the Government is required by legislation to publish a High Level Output Specification (HLOS). This sets out at a strategic level what the Government wants the railway to achieve and deliver during the following Control Period. Alongside the HLOS, the Secretary of State is also required to publish a Statement of Funds Available (SoFA), which sets out the amount of direct funding Network Rail can expect to receive from Government.

The HLOS and SoFA which informed the CP5 Periodic Review were both published in July 2012; they set out a series of capacity and capability enhancements which were expected to cost around £13 billion, out of a total Network Rail spend for CP5 of £38 billion (the balance covering asset maintenance/renewals, day-to-day operations, overheads and interest charges). Enhancements commenced in CP5 included some electrification schemes, such as in the North West, on the Great Western Main Line (GWML) from West London to South Wales, and on the Midland Main Line (MML).

While these are essentially passenger schemes, freight benefits were also expected to be generated in the form of loading gauge enhancement and greater opportunities for using electric traction.

The HLOS and SoFA also made available a 'ring fenced allocation' of £253 million over CP5 to fund investments in the SFN identified by the rail freight industry (a stakeholder panel including Network Rail and the freight operators). These funds have predominantly been spent on a series of loading gauge enhancements between the main deep-sea container ports located in the South of England and the Midlands and North of England and some capacity enhancements specifically for freight. These include:

- East Coast Main Line gauge clearance – from London to Scotland;
- Doncaster to Water Orton (Birmingham) gauge clearance;
- Southampton – diversionary route gauge clearance;
- Ipswich Yard train lengthening; and
- Peak Forest to London train lengthening.

Due to a variety of factors, the final capital costs for some upgrade schemes went significantly beyond that estimated when CP5 was determined by the ORR.

A review was carried out of Network Rail's enhancements programme (and the costs) in 2015 (the Hendy Review). With respect to freight, the review noted that the loading gauge enhancement schemes to Felixstowe (via Ely, Peterborough and Leicester to Nuneaton), the south coast (Southampton) and the North of England/Scotland have been completed. However, the report also stated that while a number of important capacity upgrades planned for the network are still planned to go ahead, their funding and completion dates are pushed back into the following CP6 (2019–2024). This includes the capacity upgrades on the Felixstowe to Nuneaton route and on the Midland Main Line (MML). However, it does note that extra capacity on the Felixstowe branch line should be delivered by 2019, along with loading gauge enhancements on the GWML, to the Yorkshire intermodal terminals and Immingham port.

The HLOS which is informing the CP6 (April 2019 to March 2024) Periodic Review was published in July 2017 and the SoFA informing the CP6 Periodic Review was subsequently published in October 2017. Unlike the 2012 HLOS, the current document is only concerned with operations, maintenance and renewals on the existing railway for CP6, in the context of rising passenger demand and the need to deliver greater levels of performance. It does not commit to enhancements, noting that these are expected to be dealt with separately. The SoFA subsequently confirmed this position in October 2017, stating that the level of expenditure is focused on and provides for the operations, maintenance and renewal of the existing railway over CP6. A maximum direct grant of just under £35 billion to Network Rail over CP6 is stated. This includes 'some provision for the funding of enhancements', assumed to be in part those aforementioned schemes which have been pushed back into CP6. However, the 'Secretary of State expects decisions regarding specific enhancements to be dealt with separately'.

It is therefore likely that some SFN funding will be available for freight enhancements in CP6. However, as yet the value of this funding is not known and the ORR's final determination is scheduled for October 2018. Exactly which options will be chosen is an open question.

In addition to installing grade separation at key flat junctions, the gradual introduction of the European Rail Train Management System (ERTMS) could help to generate additional capacity for the long term. ERTMS is a set of common standards and operating practices that is due to be adopted by modern signalling systems across the EU. This could allow trains to run closer together, when compared with existing fixed-block lineside signals, thereby increasing capacity, and could also help to reduce average end-to-end journey times.

6 THE FUTURE OF FREIGHT

6.1 Introduction

As explained in section 1 of this report, the main focus of this study is to review the current 'landscape' of the freight transport system in the UK rather than to provide detailed observations on the future of freight. GO-Science has commissioned a number of additional pieces of work which seek to provide more detailed insights into the future of freight transport up to 2040.

Having said that, the review of the existing landscape in sections 1–5 highlights some of the key challenges for the UK freight transport system in the future:

- How can the freight transport system become even more cost-effective and help to increase the productivity and competitiveness of the UK economy?
- How can the freight transport system reduce its negative externalities, particularly in terms of its impact on local air quality and on greenhouse emissions?
- How can the use of network infrastructure by freight be made more efficient given the levels of congestion on road and rail networks and on links to and from ports?
- How will the freight transport system need to adapt to the changing trading relationship with the EU?
- How can the land use planning system cater for the future needs of the freight transport system, allowing the development of infrastructure that supports the economic needs of the UK while also reducing negative externalities?
- How can the freight transport system best adapt to rapid changes in consumer demand, in digital and manufacturing practices and transport technology, while providing a reasonably stable investment environment for the private sector?

This section includes some observations on how some of these challenges could be met over the next 10 years (i.e. up to about 2028), with a focus on:

- The impact of regulation, particularly in relation to environmental emissions;
- The impact of alternative fuel technologies;
- The impact of e-commerce;
- The impact of local manufacturing;
- The impact of autonomy and automation;
- The impact of the sharing economy;
- The impact infrastructure pricing and land use planning.

While a number of other issues could have been considered in this section, we believe the points listed above are some of the key areas that will have a particular impact on the UK freight transport system over the next 10 years.

6.2 The impact of regulation

The major focus of regulation is on reducing the emissions of environmental pollutants from HGVs at a local level, and this has been driven by EU emissions standards legislation. The HGV fleet is gradually becoming cleaner as road hauliers increasingly purchase new HGVs which have to conform to Euro 6 standards since the standard was introduced in January 2015. These vehicles meet stricter emissions standards under both laboratory and real-world conditions and remove almost all emissions of particulate matter and reduce nitrogen oxide emissions from HGVs by up to 95%.

However, with the increasing political attention being paid to the impact that poor air quality has on human health at a local level, there is likely to be a much greater focus on regulating access to urban areas by the most polluting freight vehicles. This is likely to be through the introduction of Clean Air Zones in a number of urban areas and will have the effect, at least in the next few years, of encouraging the development of RDCs and depots on the edge of major conurbations so they are within the range of electric vehicles using the existing battery technology.

Greater use of ultra-low emission vehicles for freight movements will also have the advantage of helping to reduce greenhouse gas emissions from road freight transport and therefore contribute to reducing the risks from global warming. This will only be the case, however, if the electricity that the UK generates is from low carbon sources. The trends in electricity generation are positive with generation from renewables reaching a new quarter 3 record high of 30.0% in 2017, while low carbon sources (i.e. renewables plus nuclear) reached a new record of 54.4% during the same period (Office of National Statistics, 2018).

Greater regulation of freight vehicles to improve air quality in local areas will be most likely to have an impact on urban logistics – for the so-called ‘last mile’ delivery of goods into urban areas, as well as the reverse logistics involved in removing waste material such as packaging. This is because most of the Clean Air Zones (CAZs) that will be designated by local authorities will be located in urban areas where there are concentrations of economic activity and traffic. The precise measures that will be introduced for CAZs will vary between urban areas, but they may include high access charges for – or even bans on the use of – more polluting HGVs and LGVs. This would incentivise the introduction of a range of other means to make collections and deliveries in urban areas more sustainable, such as:

- Use of electric vehicles (EVs) for deliveries and collections from urban distribution centres (UDCs), which are large-scale consolidation centres that receive goods and then consolidate them into full loads for last-mile deliveries by EVs. These UDCs would be located on the edge of large conurbations and should, ideally, be located on rail- or water-connected distribution parks so that inbound flows over medium to long distances can be achieved using more sustainable modes of transport;

- Development of smaller-scale road-only consolidation centres on the edge of smaller urban areas to allow the transfer of goods from larger freight vehicles into smaller electric vehicles for final delivery within CAZs.

- Increased use of cycle logistics and walking for last-mile logistics of goods such as parcels in city centres that are also CAZs.

Given that rail freight services are mainly provided by diesel-powered locomotives, looking forward the industry faces the issue of how to decrease emissions cost effectively. Current DfT ambition is to phase out diesel only traction by 2040 (DfT, 2018b). There are various possible routes for the railway industry to achieve this ranging from electric locomotives and extensive network electrification, and/or battery power for 'last mile' operations on non-electrified lines and terminals, to alternative fuels such as hydrogen.

Greater attention will also be paid to emissions from shipping. While the Sulphur Emissions Control Area (SECA), implemented by the International Maritime Organisation and the EU since 2015, has restricted the use of heavy fuel oil as a bunker fuel in much of North West Europe, ships are still permitted to use diesel to provide electricity while in port. It is likely that major ports, with concentrations of ships sitting alongside berths for lengthy periods, will be under increasing pressure to provide shore-based electrical power supplies for shipping over the next 10 years.

6.3 The impact of alternative fuel technologies

Given the ambition to limit the sale of new diesel and petrol cars and LGVs from 2040, it seems increasingly likely that there will gradually be a greater take-up of electric LGVs at a national level for relatively short-distance flows, but unless there is a step-change in battery technology, or advances in other alternative fuel solutions such as hydrogen fuel-cells, this is most likely to be for deliveries from distribution centres located close to the major conurbations rather than to towns and cities in more peripheral locations. This potentially also implies a greater demand for distribution buildings on the edge of major conurbations (particularly London), from where electric vehicles can then undertake deliveries to homes, offices and retail outlets. This has implications for planning policy, given the additional pressures this places on land located in the metropolitan greenbelt.

Existing battery technology tends to encourage the use of electric 'white vans', which lack the economies of scale provided by an HGV; however, manufacturers are focused on developing the battery technology and there is already, for example, a Mercedes electric HGV on the market (Electrek, 2018) and Tesla has launched its Semi HGV (Tesla, 2017), which is being marketed as having a range of 500 km.

Furthermore, existing battery technology is significantly heavier when compared with a tank of diesel fuel. This eats into the gross laden weight, thereby reducing a vehicle's payload capacity. In order to encourage greater use of electric HGVs, the gross weight regulations may need to be amended to allow for heavier electric HGVs that are able to carry the same payload capacity when compared with a diesel vehicle. For longer-distance flows between urban areas, other technological solutions may be required to allow the greater electrification of road haulage. These could include the development of trolley-bus infrastructure for freight, and Siemens has carried out a trial of this technology in Germany along a short section of the highways network (Siemens, 2015). Another potential solution is the 'electric road' concept where electric vehicles receive electric current from the highway using wireless induction charging technology (Autocar, 2017).

6.4 The impact of e-commerce

One of the key trends affecting the freight and logistics market is the increase in e-commerce sales at the expense of 'bricks and mortar' retail activity and the desire for next-day or even same-day delivery. This trend is set to continue over the next 10 years and is likely to have three broad impacts:

- The substitution of journeys in cars or by public transport to and from retail outlets with 'white vans' carrying out deliveries where people live or work;
- Changes in distribution activity and distribution patterns as the unit of freight becomes a parcel rather than (say) a pallet. The parcels operators have their final sorting offices/depots located close to individual major population centres and this implies greater use of double-deck HGVs (providing greater volumetric capacity) for trunking from NDCs located in the Midlands;
- Distribution centres increasingly become 'fulfilment' centres, re-distributing goods at the individual consignment level. As many older distribution centre buildings are unable to accommodate the automated picking/packaging equipment associated with this process, this implies a continuing need to build large modern distribution centre units, designed around automated handling and at commercially attractive locations, which in many cases will replace the older life-expired capacity. If these are on rail- and/or water-connected distribution parks, then there is an opportunity to increase the use of more sustainable modes for medium to long-distance distances.

Information and communications technology (ICT) is already used extensively by the logistics industry to manage bookings and reservations of capacity, to manage operations (including managing fleets), for tracking and tracing of consignments, for financial management and for cost-effective routing. The further development of the use of 'big data', the digitisation of transport and trade documentation and data sharing between collaborators in supply chains is likely to help reduce costs and increase efficiency over the next 10 years.

6.5 The impact of local manufacturing

The combination of reducing trade barriers due to the process of globalisation and the availability of relatively cheap inter-continental freight transport by container ship allowed multinational companies to manufacture in relatively low cost locations such as China and Vietnam and then distribute the goods to consumer markets such as the UK. However, in a practice called 'onshoring' or 'reshoring', some businesses have started to transfer business operations that were moved overseas back to the country from which it was originally relocated. There is some evidence for this practice in the UK as manufacturing costs start to increase in China (Financial Times, 2013), but it is often anecdotal and may not have been sustained, particularly as container shipping is highly cost-effective for inter-continental transport. If it was to become a significant trend in the UK, perhaps incentivised by any increase in protectionism around the world, it could lead to shortening of supply chains and more focus on the import of raw materials rather than final products via ports and the co-location of final assembly of products at NDCs.

3D printing is now readily available for the manufacture of a variety of goods, such as parts for manufacturing processes, at a local level and therefore allows the co-location of manufacturing and consumption. It seems unlikely, however, that 3D printing will replace factories to any great extent over the next 10 years due to the lack of manufacturing economies of scale and the fact that the existing 3D printers are designed to work with only a single raw material (e.g. plastic) rather than a combination (e.g. plastic and metal).

6.6 The impact of autonomy and automation

The main technological change in the road haulage industry up to 2030 at a national level may be the introduction of 'platoons' of HGVs that travel together on the strategic highways network and provide fuel efficiencies to road hauliers due to the reduction of drag. These would not be genuinely autonomous vehicles because they would still require a driver to be located in each cab for the departure and the final approach to the destination. Without significant technological improvements it seems likely that these platoons would be restricted to use on motorways and dual carriageways so that there are opportunities for overtaking and to ensure safety.

Many distribution centre functions have been automated over the past 15–20 years, a trend that is likely to continue; in part this is linked to the growth of e-commerce as automation is ideally suited to picking and packaging goods at the individual consignment level rather than full pallet loads. Further automation of warehousing is likely to have a significant impact on the levels of employment that will be available in DCs and sorting centres over the next 10 years. This will be driven by further e-commerce growth and, as technology develops, will enable distribution centre operators to reduce their operating costs. However, many older distribution centre buildings are unable to accommodate the automated picking/packaging equipment associated with fulfilment, implying a continuing need to build large modern distribution centre units (designed around automated handling) at commercially attractive locations.

6.7 The impact of the sharing economy

Sharing of capacity is already commonplace in freight transport and logistics as freight transport providers are constantly seeking to secure economies of scale and minimise their costs in a highly competitive market. For example, road haulage companies collaborate to provide pallet load networks (where they transport individual pallets for individual customers and then combine them with those of other customers to fill their vehicles) or shared warehousing facilities for their customers. Container shipping, ferry and intermodal rail freight services all need to secure a critical mass of cargo from different customers in order to be competitive.

There may, however, be some scope for 'disruptive' technology which will facilitate the sharing of the capacity provided by freight transport operators – which would therefore facilitate collaboration between shippers/receivers and freight transport providers. However, collaboration is often difficult to achieve in practice because the cost of road haulage is so much lower than the value of the goods being transported; this means that the priorities for shippers and receivers are related to receiving the goods quickly and on time rather than seeking to reduce costs by sharing capacity. However, ICT could help to automate the process of negotiating the balance of costs and benefits from collaboration which can be a major barrier to the take-up of this practice.

6.8 The impact of infrastructure pricing

Capacity on the road network, particularly during the peak periods, is a scarce resource and, at the same time, road freight may not be paying for the full costs it imposes on society which include not only the impact on congestion but also the cost of environmental emissions and accidents.

The Chartered Institute of Logistics and Transport (CILT, 2015) and other organisations including the European Commission have advocated the introduction of a system of infrastructure charging for both freight and passengers. This could involve re-distributing the existing taxation levied on the different modes of transport and applying additional charges where these can be justified on the basis of net externalities – using a distance-based system which could take account of the time of day, the specific section of the network and the type of vehicle as well as the distance travelled. In the road sector, this would be facilitated by the use of fairly mature technology such as GPS and on-board units in the cabs of HGVs and LGVs.

This approach, which should be adopted on a consistent basis across all modes that use publicly owned infrastructure, would have the effect of ensuring that economic resources are allocated efficiently across the different modes while also taking into account the externalities that are generated by all modes of freight transport. It would also have the effect of providing revenue streams for Government that can be applied to the maintenance and enhancement of infrastructure for freight transport.

Such an approach to infrastructure charging would help to ensure that the private sector invests in key freight infrastructure, such as distribution parks and Strategic Rail Freight Interchanges, in competitive locations. However, this will only be possible if the land use planning system is able to bring forward large sites in competitive locations, and this may require a more strategic approach to the selection and promotion of nationally significant sites by Government.

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Government Office for Science
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Email: contact@go-science.gov.uk

Appendix A

7. Noise and Vibration

7.1 Introduction

7.1.1 This chapter of the Environmental Statement (ES) has been prepared by Bickerdike Allen Partners LLP and assesses the likely significant effects of the Proposed Development with reference to noise and vibration. The chapter should be read in conjunction with **Chapter 2: Description of the Proposed Development**. The chapter considers the noise and vibration associated with the following activities at Bristol Airport:

- Flights into and out of Bristol Airport (air noise and vibration);
- Aircraft operations at Bristol Airport (ground noise);
- Bristol Airport related road traffic movements (road traffic noise); and
- Construction of the infrastructure associated with the Proposed Development (construction noise and vibration).

7.1.2 The operational noise and vibration is assessed for 2017 and for future years, both with and without the Proposed Development.

7.1.3 This chapter commences by describing the noise related planning context against which the Proposed Development will be considered. It goes on to present and discuss the baseline noise environment at Bristol Airport and then considers the likely significant effects of changes to air, ground, road traffic and construction noise and vibration in both the 'with' and 'without the Proposed Development' scenarios. Within these sections the assessment criteria and methodology are presented, the baseline noise conditions discussed where relevant, and assessments are made of any effects (beneficial and adverse) associated with the Proposed Development. Mitigation measures are also described, where appropriate, as are cumulative and residual effects.

7.1.4 The assessment of noise and vibration involves a significant amount of technical detailed work and to seek to maintain this chapter as concise and informative as possible, this chapter is supplemented by a series of appendices which provide further detail on each of the specific topics. These are referenced throughout this chapter to aid an understanding of the topic being described. The appendices supporting this noise chapter are as follows:

- **Appendix 7A** – Glossary;
- **Appendix 7B** – Relevant legislation, policy, technical guidelines and assessment criteria;
- **Appendix 7C** – Baseline Noise and Vibration;
- **Appendix 7D** – Air Noise and Vibration;
- **Appendix 7E** – Ground Noise;
- **Appendix 7F** – Road Traffic Noise; and
- **Appendix 7G** – Construction Noise and Vibration.

Noise indices

7.1.5 The $L_{Aeq,T}$ index is the average noise exposure level that occurs over a time period T. In the case of aircraft noise therefore, it accounts for the sound energy produced both by the number of aircraft

events and the noisiness of each aircraft event, over a defined time period. It is the primary metric for quantifying community effects of aircraft noise in the UK, specifically $L_{Aeq,16h}$ covering the daytime period from 07:00 to 23:00 and $L_{Aeq,8h}$ covering the night-time period from 23:00 to 07:00. The convention is to assess aircraft movements over three summer months, specifically a 92 day period from 16 June to 15 September inclusive. Summer in this chapter refers to this 92-day period unless stated otherwise.

7.1.6 The L_{den} is a unit that considers an average annual day of aircraft traffic (although it can be applied equally to either rail or road traffic) over a 24-hour period, providing greater emphasis, by way of adding noise penalties of 5 dB and 10 dB to noise levels arising from aircraft traffic in the evening (19:00 to 23:00) and night (23:00 to 07:00) periods respectively. For many airports, the L_{den} equates approximately to the $L_{Aeq,16h}$ index by the relationship $L_{den} = L_{Aeq,16h} + 2$ dB. The precise relationship however depends on the distribution of aircraft traffic over the 24-hour period.

7.1.7 The L_{night} equates approximately to the $L_{Aeq,8h}$ index commonly used to rate night noise in the UK with the exception that it is based on an average annual night of aircraft movements rather than an average summer night.

7.1.8 The L_{A90} is a unit that is often used to describe the background noise level at a location. It is defined as the noise level that is exceeded for 90% of the time.

7.1.9 Similarly, the L_{A10} is the noise level that is exceeded for 10% of the time. In the UK, the convention for assessing road traffic noise is in terms of $L_{A10,18h}$, This is the L_{A10} for the 18-hour period between 06:00 and midnight.

7.1.10 The Government, as set out in the Aviation Policy Framework (APF) [1] and supported by SoNA [2], confirms that the current convention in the UK is to assess the effect of daytime aircraft noise in terms of daytime $L_{Aeq,16h}$ noise contours determined from an average summer day of aircraft movements. As a result, emphasis on the assessment of daytime noise in this chapter is placed on the UK methodology and $L_{Aeq,16h}$ unit. This unit has been used historically within the UK over the past 30 years to assess the effects of aircraft noise.

7.1.11 For night-time, the recent publication of the Government's response[3] to the airspace change consultation[4] confirms the use of $L_{Aeq,8h}$ noise exposure contours determined from an average summer night of aircraft movements for assessing aircraft noise effects at night. These contours are also now prepared and published annually for the designated airports such as Heathrow, Stansted and Gatwick, along with daytime $L_{Aeq,16h}$ contours. The L_{night} index is also referenced, alongside the $L_{Aeq,8h}$ index, as both are very similar.

7.1.12 In Europe, noise indicators based on the L_{Aeq} unit, known as the L_{den} and L_{night}, are used to assess environmental noise effects and are used in the UK to prepare Strategic Noise Maps and Noise Action Plans. Noise contours, in terms of L_{den} and L_{night}, are therefore produced on a five-yearly basis for all major airports, including Bristol Airport. The development of criteria by which to judge this European index is in its relative infancy compared to the body of knowledge built around the $L_{Aeq,16h}$ unit, although guidance is continuing to emerge, particularly regarding noise exposure and potential health effects.

[1] Department for Transport (2013). Aviation Policy Framework.
[2] Civil Aviation Authority (2017). Survey of noise attitudes 2014: Aircraft, CAP 1506.
[3] Department for Transport (2017). Consultation Response on UK Airspace Policy: A framework for balanced decisions on the design and use of airspace. [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/653801/consultation-response-on-uk-airspace-policy-web-version.pdf [Checked 7/09/2018].
[4] Department for Transport (2017). UK Airspace Policy: A framework for balanced decisions on the design and use of airspace. [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/588186/uk-airspace-policy-a-framework-for-balanced-decisions-on-the-design-and-use-of-airspace-web-version.pdf

7.1.13 While average exposure noise contours of this type are well established and important at demonstrating trends in total noise around an airport, it is recognised in the APF that people do not always experience aircraft noise in an averaged manner and that the L_{Aeq} indicator does not necessarily reflect all aspects of the perception of aircraft noise. Supplementary indices are therefore considered as part of this air noise assessment which reflect how aircraft noise may be experienced in different localities. The purpose of this is to ensure a better understanding of noise effects and to inform the development of targeted noise mitigation measures.

7.1.14 Night-time aircraft noise can be evaluated in a number of different ways. The common method is to rate night noise in terms of noise exposure, using the $L_{Aeq,8h}$ index and the L_{night} index (for the period 23:00 to 07:00). It is also important however to consider the typical noise levels of individual aircraft, using noise indices such as the Single Event Level (SEL) and/or the L_{ASmax}.

7.1.15 The SEL is a measure of the noise energy produced during a noise event, such as an aircraft passby, averaged over a reference time of a single second. It therefore accounts for both the level and duration of the noise event. This is commonly used in the UK to describe noise produced by single aircraft (and rail) events, particularly at night.

7.1.16 The L_{ASmax} in contrast reflects what a person hears as the maximum noise level during an aircraft passby and is an index that is most understandable to people without the need for technical understanding. Like the SEL, it is used to rate the noise of an individual event, particularly at night.

7.1.17 L_{Amax} is commonly expressed in either "fast" or "slow" time weighting, denoted L_{AFmax} and L_{ASmax} respectively. For aircraft noise, the convention is to use L_{ASmax} whereas for other noise sources, L_{AFmax} is used.

7.1.18 The N index is becoming more commonly used to describe aircraft noise, often using the N70 parameter for daytime and N60 parameter for night-time aircraft noise assessment. This index describes the number of times in a defined period, such as the daytime or night-time, that a receptor will experience a given maximum noise level as a result of an aircraft passby. For example, an N70 of 20 means that a receptor will experience 20 aircraft events producing 70 dB L_{ASmax} or more during the defined period of time. This allows an understanding of how, for a given noise level and above, the number of flights during the daytime might alter when comparing two scenarios, such as with or without an airport development. There are no specific criteria for rating the acceptability of N70 or N60 contours although they further assist a comparison of two different operational scenarios.

7.1.19 Noise annoyance ratings are also a useful way of explaining how a given noise environment is likely to affect the local community, by identifying those likely to be 'highly annoyed' by aircraft noise. The measure considers the general population and it is accepted that some people would be more annoyed or less annoyed for a given daytime noise exposure level. This method of assessment offers some advantages over simply banding a population into "low", "moderate" and "high" annoyance categories since it recognises that even at relatively low levels of aircraft noise, some people can by highly annoyed. It can therefore be usefully used as a means of evaluating differences between scenarios. Similar ratings for sleep disturbance also exist for night-time activities.

7.1.20 While noise exposure contours take account of both the noisiness of aircraft events and the number of operations that occur during a day or night, they only provide an 'average' value. While this is required by Government for planning purposes, it does not reflect the change that occurs over a day. It is therefore also relevant to consider how the noise level might vary at a given receptor in a given day, particularly when comparing two scenarios. This is often represented by considering the following:

- Single mode contours produced assuming either 100% westerly operations or 100% easterly operations. There are no specific criteria available to rate noise levels associated with single mode contours. However, such contours show the noise exposure levels expected for a given day when operations occur from a single runway direction; and
- The variation in noise level at representative locations over a typical day, for example, on an hourly basis.

7.1.21 Consideration is given to both these methods within this noise chapter and accompanying appendices.

7.1.22 In undertaking an assessment for an ES, it is necessary to establish those effects that are considered to be adversely or beneficially significant. The thresholds to be adopted for this purpose are discussed later in the Assessment Criteria (**Section 7.3**) and Significance Criteria (**Section 7.9**) sections of this chapter.

Aircraft movements and scenarios

7.1.23 Three key scenarios have been considered in this chapter:

- Baseline (taken to be 2017);
- 10 million passengers per annum (mppa) Without Proposed Development in 2026. For air noise, a scenario of 10 mppa in 2021 has also been assessed since this is when this passenger capacity is expected to be reached; and
- 12 mppa With Proposed Development in 2026.

7.1.24 If the Proposed Development does not proceed, Bristol Airport would be constrained from 2021 onwards to a limit of 10 mppa. This would constrain Bristol Airport to operating no more aircraft movements in 2026 than occurred in 2021.

7.1.25 To reflect this, a sensitivity scenario for air noise has been included for 10 mppa in 2026 (Without Proposed Development) assuming that fleet modernisation occurs at the same rate as for growth to 12 mppa in 2026. In practice, the likelihood that more modern, quieter aircraft will be allocated to Bristol Airport will be reduced compared to the 12 mppa scenario since no potential for growth will be present for the airlines. Airlines are already securing flights to destinations and associated 'slots' at airports as far ahead as summer 2020 at the time of writing. If an airline can be assured growth at another airport it may seek to deliver a competitive advantage to secure capacity now. As airports are coming under increased pressure to reduce noise impacts, securing more modern aircraft fleets coupled with growth is a key way in which this can occur sustainably. Therefore, the 10 mppa 2026 scenario is a worst-case comparison for the 12 mppa scenario as the expectation of aircraft modernisation is similar.

7.1.26 As a result, in the case of air noise, the noise effects in the 10 mppa in 2021 scenario are likely to reflect the noisiest that will arise at Bristol Airport if it is constrained to 10 mppa. Moving forward in time would not alter the amount of aircraft movements or passenger throughput without additional development but noise levels would be likely to reduce as a result of gradual on-going fleet replacement with more modern and quieter aircraft.

7.1.27 The number of summer aircraft movements associated with each of the key scenarios for the daytime and night-time periods is given in **Table 7.1**, alongside the total number of annual movements.

Table 7.1 Annual aircraft movements for assessment scenarios

Scenario		Number of Aircraft Movements		
		92-day Summer Daytime (07:00-23:00)	92-day Summer Night-time (23:00-07:00)[1]	Annual Total
Key scenarios	**Baseline 2017**	18,924	2,735	73,562
	10 mppa 2021 (Without Proposed Development)	19,294	4,022	86,973
	12 mppa 2026 (With Proposed Development)	22,540	4,639	97,393
Air noise sensitivity scenario	**10 mppa 2026 (Without Proposed Development)**	19,294	4,022	86,973

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

7.1.28 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 12 mppa application seeks to keep the annual limit of 4,000 but remove the segregation of summer and winter periods. In this chapter, the assessment of the 12 mppa scenario is on the basis that this change is approved. Therefore the comparisons to the without development scenarios offer a worst case comparison.

7.1.29 The 12 mppa application does not seek any change to the 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. The QC budgets are to remain at 1,260 in the summer and 900 in the winter.

7.2 Limitations of this assessment

7.2.1 Air noise and ground noise assessments in the future have been based on forecast aircraft movement data, while assessments for 2017 have been based on actual data. The forecasts used in this assessment have been prepared by Bristol Airport Limited (BAL) and verified by Mott McDonald, independent aviation consultants.

7.2.2 The road traffic noise assessment has been based on traffic counts undertaken in 2018 to determine current conditions as 2017 information is not available. It has been assumed that conditions in 2017 were identical. The baseline year has been referred to as 2017 throughout this chapter for consistency with other noise sources.

7.2.3 The assessment of construction noise is based on detailed construction plant schedules and programmes of works provided by BAL, supplemented with additional plant where relevant based on professional judgement.

7.3 Relevant legislation, planning policy and technical guidance

Legislative context

7.3.1 The following legislation is relevant to the assessment of the effects on noise and vibration receptors:

- *EU Regulation 598-2014*[5] sets out, for airports where a noise problem has been identified, the process to be followed for the introduction of noise-related operating restrictions in a consistent manner on an airport-by-airport basis, so as to help improve the noise climate and to limit or reduce the number of people significantly affected by potentially harmful effects of aircraft noise, in accordance with the Balanced Approach[6];
- *Environmental Noise Directive (END) 2002/49/EC 2002*[7] aims to define a common approach across the European Union with the intention of avoiding, preventing or reducing on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise including from aviation;
- *The Control of Pollution Act 1974*[8] provides a means for regulating construction noise and vibration;
- *The Aeroplane Noise Regulations 1999*[9] require that all civil propeller and jet aeroplanes registered in the UK shall have a noise certificate;
- *Aerodrome (Noise Restrictions) (Rules and Procedures) Regulations 2003*[10] apply to larger civil airports in the EU. Where it is proposed to introduce noise-related operating restrictions, the competent authority (currently BAL itself) is required to undertake a detailed assessment of the noise situation in the locality, and the full range of possible measures to address any noise problems identified. An EIA can be used under this legislation for introducing any noise-related changes that occur as a result of infrastructure or significant airport operational changes;
- *The Civil Aviation Act 2006*[11] includes a number of measures aimed at strengthening the powers available to control noise. These included provisions for airport operators to fix charges in respect of an aircraft or a class of aircraft based on the noise or amount of emissions produced by the aircraft. The Act also gave airport operators statutory powers to introduce noise control schemes for the purpose of avoiding, limiting or mitigating the effect of noise connected with the taking off or landing of aircraft;

[5] European Commission (2014). Regulation (EU) No 598/2014 of the European Parliament and of the Council of 16 April 2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach and repealing Directive 2002/30/EC, [online]. Available at: https://publications.europa.eu/en/publication-detail/-/publication/b6947ca7-f1f6-11e3-8cd4-01aa75ed71a1/language-en [Checked 21/08/2018].

[6] 'Balanced Approach' as defined in EU Regulation 598-2014 is the process developed by the International Civil Aviation Organization under which the range of available measures, namely the reduction of aircraft noise at source, land-use planning and management, noise abatement operational procedures and operating restrictions, is considered in a consistent way with a view to addressing the noise problem in the most cost-effective way on an airport-by-airport basis;

[7] European Commission (2002). Directive 2002/49/EC Directive Of The European Parliament and of the Council of 25th June 2002 relating to the assessment and management of environmental noise, [online]. Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32002L0049&from=EN [Checked 21/08/2018].

[8] Control of Pollution Act (1974), c.40. [Online]. Available at: http://www.legislation.gov.uk/ukpga/1974/40/pdfs/ukpga_19740040_en.pdf [Checked 21/08/2018].

[9] The Aeroplane Noise Regulations (1999). No. 1452. [online]. Available at: http://www.legislation.gov.uk/uksi/1999/1452/contents/made [Checked 30/08/2018].

[10] The Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations (2003) SI 1986/925. [Online]. Available at: http://www.legislation.gov.uk/uksi/2003/1742/made [Checked 25/09/2018].

[11] Civil Aviation Act (2006), c34. [online]. https://www.legislation.gov.uk/ukpga/2006/34/contents [Checked 30/08/2018].

- *The Civil Aviation Act 2012*[12] placed a new duty on the Civil Aviation Authority (CAA) to make information about the environmental performance of the aviation sector and measures taken to limit adverse environmental effects available to the general public, and;
- *Environmental Noise (England) Regulations 2006 (as amended)*[13] transpose the *European Environmental Noise Directive (Directive 2002/49/EC)*[2] into English law. They require operators of non-designated major civil airports, such as Bristol Airport, to make and submit strategic noise maps to the Secretary of State every five years starting in 2007 which reflect the noise situation in the preceding calendar year. Regulation 18 places a duty on the operators of major airports, as the competent authority, to draw up a Noise Action Plan for places near the airport and submit this to the Secretary of State. There is then a continuing obligation on airport operators to review (and revise, if necessary) the Noise Action Plan every five years or sooner where a major development occurs.
- *The Town and Country Planning (Environmental Impact Assessment) Regulations 2017*[14] set out the process of Environmental Impact Assessments to be carried out in England, in accordance with corresponding European *Directive 2014/52/EU*[15].

7.3.2 Further details of how this legislation relates to noise and vibration is given in **Appendix 7B**.

Planning policy context

7.3.3 There are several policies and guidance at the national and local level that will be relevant to the noise assessment contained in this ES. In addition to policy referenced in **Chapter 5: Legislative and Policy Overview**, policy directly applicable to this noise assessment is listed in **Table 7.2** below.

Table 7.2 Relevant policies and their implications for noise and vibration

Policy reference	Implications
Noise Policy Statement for England (NPSE) 2010[16]	
Paragraph 1.7	Provides the framework for noise management decisions to be made that ensure noise levels do not place an unacceptable burden on society.
Paragraph 2.20	Introduces the concepts of NOEL (No Observed Effect Level), LOAEL (Lowest Observed Adverse Effect Level) and SOAEL (Significant Observed Adverse Effect Level).
National Planning Policy Framework (NPPF) 2018[17]	
Paragraph 180	States that planners should seek to mitigate and minimise potential adverse noise impacts from a new development.

[12] Civil Aviation Act (2012), c19. [Online]. http://www.legislation.gov.uk/ukpga/2012/19/contents/enacted [Checked 30/08/2018].
[13] The Environmental Noise (England) Regulations (2006). No. 2238. [Online]. http://www.legislation.gov.uk/uksi/2006/2238/contents/made [Checked 30/08/2018].
[14] The Town and Country Planning (Environmental Impact Assessment) Regulations 2017. [Online]. Available at: http://www.legislation.gov.uk/uksi/2017/571/pdfs/uksi_20170571_en.pdf [Checked 23/11/2018].
[15] European Commission (2014). Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. [Online]. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0052&from=EN [Checked 23/11/2018].
[16] Defra (2010). Noise Policy Statement for England, [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf [Checked 10/04/2018].
[17] Ministry of Housing, Communities and Local Government (2018). National Planning Policy Framework, [Online]. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf [Checked 08/10/2018].

Policy reference	Implications
Aviation Policy Framework (APF) 2013[1]	
Paragraph 3.12	Defines the Government's objectives and policies on the impacts of aviation in the UK and states that the Government's overall objective on noise is to "Limit and where possible reduce the number of people in the UK significantly affected by aircraft noise".
Paragraph 3.13	Guidance provided on the noise metric used to rate airborne noise (summer $L_{Aeq,16h}$ and $L_{Aeq,8h}$).
Paragraph 3.17	Interpretation given of the 57 dB $L_{Aeq,16h}$ contour as an average level of summer daytime aircraft noise marking the approximate onset of significant community annoyance.
Paragraph 3.36 to 3.38	Government expectations and guidance with respect to noise levels where airport operators are to provide exposed households assistance with the cost of moving and acoustic insulation.
Paragraph 3.39 to 3.41	Government expectations and guidance where households are exposed to increased noise levels due to new developments.
UK Airspace Policy: A framework for balanced decisions on the design and use of airspace 2017 consultation[3]	
Paragraph 9	States that although the Government's current aviation policy is set out in the APF[1], the policies set out within this document provide an update to some of the policies on aviation noise contained within the APF, and should be viewed as the current government policy.
Paragraph 2.39	Removal of the 3 dB minimum change requirement for financial assistance towards acoustic insulation to residential properties in the 63 dB $L_{Aeq,16h}$ level or above.
Paragraph 2.70	A level of 54 dB $L_{Aeq,16h}$ is acknowledged to correspond to the onset of significant community annoyance and replaces the 57 dB $L_{Aeq,16h}$ level in the APF.
Paragraph 2.72	For assessing and comparing noise impacts of airspace changes, LOAEL is taken as 51 dB $L_{Aeq,16h}$ and 45 dB L_{night}, for daytime and night-time noise respectively. 45 dB $L_{Aeq,8h}$ is considered appropriate as the LOAEL for airspace change assessment.
Airports National Policy Statement (NPS)[18]	
Section 2	Sets out the Government's policy on the need for new airport capacity in the South East of England

Technical guidance

7.3.4 A summary of the technical guidance used to assess the likely significant effects of the Proposed Development with respect to noise and vibration is given in **Table 7.3**. Details of technical guidance are given in **Appendix 7B.**

Table 7.3 Technical guidance relevant to noise and vibration

Technical guidance	Relevance to this assessment
General	
WHO *Guidelines for Community Noise*[19]	Sets out noise targets which represent goals for minimising the adverse effects of noise on health.

[18] Department for Transport (2018). Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England. [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714106/airports-nps-new-runway-capacity-and-infrastructure-at-airports-in-the-south-east-of-england-web-version.pdf [Checked 30/08/2018].

[19] Berglund, B. et al (1999). Guidelines for community noise. [Online]. Available at: http://apps.who.int/iris/bitstream/handle/10665/66217/a68672.pdf?sequence=1&isAllowed=y [Checked: 30/08/2018].

Technical guidance	Relevance to this assessment
WHO *Night Noise Guidelines*[20]	Effects on health and sleep from transportation sources.
WHO Environmental Noise Guidelines for the European Region: A Systematic Review on Environmental Noise and Effects on Sleep [21]	Reports the latest findings from the WHO concerning night noise from transportation sources and its effects on health and sleep.
BS8233:2014 *Sound insulation and noise reduction for buildings – Code of practice*[22]	Provides guidance on the control of external noise. The standard presents a number of design ranges for indoor noise levels for different types of space.
Department of Education *BB93*[23]	Gives upper limits for indoor ambient noise level for new and refurbished schools, and schools formed by a material change of use.
Department of Health *HTM 08-1*[24]	Guidance on recommended internal noise levels for healthcare facilities.
Air noise	
IEMA *Guidelines on Environmental Noise Impact Assessment*[25]	Significance rating for a change in air noise level.
Civil Aviation Authority *Survey of Noise Attitudes 2014*[26]	Methods to determine noise annoyance.
Report of a Field Study of Aircraft Noise and Sleep Disturbance[27]	Eligibility threshold for a sound insulation scheme due to night time aircraft noise.
Environmental Noise: Valuing impacts on: sleep disturbance, annoyance, hypertension, productivity and quiet[28]	Percentage of those people likely to be highly sleep disturbed.
Airborne aircraft vibration	

[20] World Health Organisation Europe (2009). Night Noise Guidelines for Europe, [Online]. Available at: http://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf [Checked 7/09/ 2018].
[21] Basner, M. et al. (2018). WHO Environmental Noise Guidelines for the European Region: A Systematic Review on Environmental Noise and Effects on Sleep. Int. J. Environ. Res. Public Health 2018, 15, 519. [Online]. Available at: https://www.mdpi.com/1660-4601/15/3/519 [Checked 25/09/2018].
[22] British Standards Institution (2014). BS 8233:2014 Sound insulation and noise reduction for buildings – Code of practice. [Online]. Available at: https://shop.bsigroup.com/ProductDetail/?pid=000000000302415798_ga=2.85437209.1462736480.1535108011-979344642.1535108011 [Checked: 24 /08/2018].
[23] Department of Education (2015). Acoustic design of schools: performance standards Building bulletin 93, [Online]. Available at: https://www.gov.uk/government/publications/bb93-acoustic-design-of-schools-performance-standards [Checked 24/08/2018].
[24] Department of Health (2013). Specialist Services, Health Technical Memorandum 08-01: Acoustics, [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/144248/HTM_08-01.pdf [Checked 24/08/2018].
[25] Institute of Environmental Management and Assessment (2014). Guidelines on Environmental Noise Impact Assessment. London: IEMA.
[26] Civil Aviation Authority (2017). Survey of noise attitudes 2014: Aircraft, CAP 1506, [Online]. Available at: https://publicapps.caa.co.uk/docs/33/CAP%201506%20FEB17.pdf [Checked 30/08/2018].
[27] Ollerhead, J.B. et al (1992). Report of a Field Study of Aircraft Noise and Sleep Disturbance: A Study Commissioned by the Civil Aviation Policy Directorate of the Department of Transport from the Department of Safety, Environment and Engineering, Civil Aviation Authority. London: HMSO.
[28] Department for Environment Food and Rural Affairs (2014). Environmental Noise: Valuing impacts on: sleep disturbance, annoyance, hypertension, productivity and quiet. [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/380852/environmental-noise-valuing-imapcts-PB14227.pdf [Checked 26/09/2018].

Technical guidance	Relevance to this assessment
Aviation Noise Metric – Research on the Potential Noise Impacts on the Historic Environment by Proposals for Airport Expansion in England[29]	Summarises research into vibration effects from aircraft.
Airports and the Environment[30]	Description of potential vortex damage to buildings due to aircraft.
Ground noise	
National Noise Incidence Study[31]	Percentage of population exposed to noise levels which exceed the guideline for 'serious' community annoyance.
Road traffic noise	
Design Manual for Roads and Bridges[32]	Road traffic noise assessment criteria.
Construction noise and vibration	
BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites. Noise*[33]	Provides methods to predict, measure and assess the impact of construction and demolition noise.
BS 5228-2:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites. Vibration*[34]	Recommends basic methods to control vibration on construction and open sites with significant vibration levels arising from work activities/operations.

7.4 Data gathering methodology

Study area

7.4.1 The study area is based on the largest extent of likely effects due to noise. This area is different for different noise and vibration sources considered.

7.4.2 The largest ZoI considered for the assessment is for air noise. This zone consists of a rectangle that extends 20km to the east, 25km to the west, 4km to the north and 4km to the south of the Bristol Airport runway and is shown in **Figure 7.7**.

7.4.3 The only properties likely to potentially experience significant levels of vibration from airborne aircraft are those closest to aircraft in flight, which are the dwellings bordering Felton Common.

7.4.4 For ground noise the ZoI considered consists of a 6km square centred on the Bristol Airport runway.

[29] Historic England (2014). Aviation Noise Metric – Research on the Potential Noise Impacts on the Historic Environment by Proposals for Airport Expansion in England, [Online]. Available at: https://research.historicengland.org.uk/Report.aspx?i=15740 [Checked 26/11/2018]
[30] Anne Paylor (1994). Airports and the Environment.
[31] BRE (2002). The National Noise Incidence Study 2000/2001 (United Kingdom): Volume 1 – Noise Levels, Client report number 206344f, [Online]. Available at: http://randd.defra.gov.uk/Document.aspx?Document=10280_NIS1206344f.pdf [Checked 7/09/2018].
[32] Highways England (2018). Design Manual for Roads and Bridges, [Online]. Available at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/index.htm [Checked 24/04/ 2018].
[33] British Standards Institution (2008). BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise, [Online]. Available at: https://shop.bsigroup.com/ProductDetail?pid=000000000030258086 [Checked 24/08/2018].
[34] British Standards Institution (2008). BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Vibration, [Online]. Available at: https://shop.bsigroup.com/ProductDetail/?pid=000000000030258089 [Checked 2/10/2018].

7.4.5 For road traffic noise the ZoI considered consists of a rectangle that extends approximately 1km to the east, 2km to the west, 1km to the north and 2km to the south of the Bristol Airport runway. The receptors considered are shown in **Figure 7F.2**.

7.4.6 For construction noise and vibration, the ZoI considered consists of the immediate vicinity of the construction sites. The receptors considered are shown in **Figure 7.2**.

Desk study

7.4.7 An initial desk top study has been undertaken to review the existing airport including Google Earth™ imagery and Ordnance Survey (OS) mapping of the surrounding environment to determine the context of the proposal. The desk top study identified the main scope of the noise surveys undertaken to assess the existing environment and the location of the closest noise sensitive receptors to the proposed operations for the impact assessment. Dwelling data and data regarding noise sensitive community buildings has been acquired from the sources listed below. A summary of the organisations that have supplied data, together with the dates the data was supplied and the nature of that data is as follows:

- National Air Traffic Services – June 2018:
  - Geographical information about the location and height of the runway have been taken from the latest version of the UK Aeronautical Information Package (AIP) for Bristol Airport.
- OS – May 2018:
  - Local topography based on the OS Landform Panorama Digital Terrain Model (DTM) product processed for use in the air noise modelling software;
  - 1:50,000 base map; and
  - AddressBase Plus product to identify non-residential property types.
- BAL – May to October 2018:
  - Current and future aircraft types and movement information, arrival and departure flight tracks;
  - Current (2017) and forecast (2026) road traffic numbers; and
  - Construction noise information.
- CACI Ltd – October 2017:
  - Dwelling counts and populations.

Survey work

7.4.8 The noise climate around Bristol Airport includes noise from aircraft activity, as well as non-aircraft related activities. The baseline at any given location will depend on its proximity to Bristol Airport and aircraft flight paths as well as to major or minor roads and any other local noise sources. The A38 in particular is a major contributor to the baseline noise environment close to Bristol Airport, with the M5 and A370 also contributing significantly to the noise environment to the west of Bristol Airport. Some noise is also produced by traffic on minor roads, for example Downside Road, alongside departing and arriving aircraft at Bristol Airport and aircraft activity on the ground.

7.4.9 Noise monitoring locations have been selected to obtain representative ambient and background noise levels at those noise sensitive receptor locations close to Bristol Airport, that is, at receptors most at risk of being affected by aircraft operations from the development of Bristol Airport.

7.4.10 Details of the noise survey work is given in **Appendix 7C** and a summary is presented in this section.

Long-term noise monitoring

7.4.11 Day and night-time noise surveys were undertaken at four locations around Bristol Airport to establish the baseline noise environment. The locations are representative of the communities in closest proximity to Bristol Airport, which therefore are likely to experience the greatest noise effect from Bristol Airport operations.

7.4.12 The surveys were carried out during the period 13 March 2018 to 5 April 2018, where each survey lasted at least three weeks. Each noise survey comprised unattended, free-field and continuous monitoring of 5-minute periods. Observations were made at each monitoring location of the noise climate prevailing at the time that measurements were started.

7.4.13 Noise levels have been measured in terms of $L_{Aeq,T}$, which represents the average noise level, and L_{AF90}, which represents the background noise level, for the 16 hour day (07:00 to 23:00), 12 hour day (07:00 to 19:00) and 8 hour night (23:00 – 07:00) periods.

7.4.14 Details of the long-term noise monitoring locations are given in **Table 7.4** and are shown in **Figure 7C.1**.

Table 7.4 Long-term noise monitoring locations

Receptor	Location	Dates of noise survey
A	Cooks Bridle Path, Downside	14 March 2018 to 4 April 2018
B	Downside Road, Lulsgate Bottom	13 March 2018 to 5 April 2018
C	School Lane, Lulsgate Bottom	13 March 2018 to 3 April 2018
D	Red Hill (A38), Redhill	14 March 2018 to 5 April 2018

Ground noise monitoring

7.4.15 A daytime attended noise survey was undertaken at Bristol Airport on 26 July 2018 to measure the ground noise of taxiing arriving and departing aircraft.

7.4.16 Measurements were free-field, of 10 second duration and recorded in terms of $L_{Aeq,T}$, SEL and L_{AFmax}, with observations made of the aircraft type at each time.

7.4.17 The ground noise monitoring location was at the corner of Winters Lane to the north of the runway and is shown in **Figure 7C.2**.

Road traffic noise monitoring

7.4.18 A daytime attended noise survey was undertaken at Bristol Airport on 26 July 2018 to measure road traffic noise at four locations around Bristol Airport. The locations are representative of the communities in closest proximity to the roads affected by Bristol Airport, which therefore are likely to experience the greatest change in road traffic noise from Bristol Airport operations.

7.4.19 The principles of the Department of Transport's *Calculation of Road Traffic Noise*[35] (*CRTN*) shortened measurement method were used, with three measurements of 5-minute duration taken

[35] Department of Transport (1988). Calculation of Road Traffic Noise. Department of Transport Welsh Office. London: HMSO.

in three consecutive hours at each location. Values of $L_{A10,T}$ were obtained at each location, along with other environmental noise indices including $L_{Aeq,T}$, $L_{A90,T}$ and L_{AFmax}.

7.4.20 Details of the road traffic noise monitoring locations are given in **Table 7.5** and are shown in **Figure 7C.2**.

Table 7.5 Road traffic noise monitoring locations

Receptor	Location
R1	Downside Road
R2	A38 / Downside Road intersection
R3	A38 / North Side Road roundabout
R4	A38 / road to Old Barn Lane intersection

7.5 Overall baseline

Noise

7.5.1 The locations at which the baseline noise conditions have been assessed are shown in **Figure 7C.1** and **Figure 7C.2.** The results are summarised in **Table 7.6**, **Table 7.7** and **Table 7.8** for these locations in terms of the ambient noise level (L_{Aeq}), maximum noise level (L_{AFmax}) and background noise level (L_{A90}). Detailed results are given in **Appendix 7C.**

7.5.2 As well as airborne and ground-borne noise from Bristol Airport, the surrounding community is affected by noise from the local road network.

7.5.3 All noise sources affect the L_{Aeq} metric which, commonly used to denote the ambient noise level, signifies the single steady average noise exposure level which is equivalent in energy terms to that produced by the various fluctuating noise levels that occur in the given measurement period. The L_{AFmax} metric is the peak noise level recorded during the measurement period. The L_{A90} metric denotes the level of noise which is exceeded for 90% of the time and represents the prevailing background noise level in the absence of any noise from airborne aircraft.

Table 7.6 Current baseline noise measurements – long -term summary

Location	16-hour day (07:00 to 23:00)		8-hour night (23:00 to 07:00)		Dominant daytime noise source
	L_{Aeq} dB(A)	Average $L_{AF90,5m}$ dB(A)	L_{Aeq} dB(A)	Average $L_{AF90,5m}$ dB(A)	
A Cooks Bridle Path, Downside	53	38	49	37	Aircraft
B Downside Road, Lulsgate Bottom	58	49	54	47	Aircraft
C School Lane, Lulsgate Bottom	59	47	54	42	Aircraft
D Red Hill (A38), Redhill	50	42	47	37	Road traffic

Table 7.7 Current baseline noise measurements – ground noise summary

Location	Average $L_{Aeq,10s}$ dB(A)	Average SEL dB(A)	Average L_{AFmax} dB(A)	Dominant noise source
G1 Winter's Lane (corner N of Runway)	82	92	84	Aircraft taxiing

Table 7.8 Current baseline noise measurements – road traffic noise summary

Location	$L_{Aeq,15m}$ dB(A)	L_{A10} dB(A)	L_{A90} dB(A)	L_{AFmax} dB(A)	Dominant noise source
R1 Downside Road	69	71 – 73	42 – 47	87 – 92	Road traffic
R2 A38 / Downside Road intersection	75	78 – 79	63 – 65	86 – 89	Road traffic
R3 A38 / North Side Road roundabout	69	69 – 71	59 – 60	82 – 89	Road traffic
R4 A38 / road to Old Barn Lane intersection	72	75 – 77	47 – 52	83 – 86	Road traffic

7.5.4 **Table 7.6** indicates that the general ambient noise level around Bristol Airport is in the range of 50 to 59 dB L_{Aeq} during the daytime, with an underlying background noise level in the range 38 to 49 dB L_{A90}. During the night, ambient noise levels are lower and lie in the range 47 to 54 dB L_{Aeq}, with an underlying background noise level in the range 37 to 47 dB L_{A90}.

7.5.5 The noise environment at any given location in the immediate vicinity of Bristol Airport depends on its proximity to Bristol Airport and the A38. The A38 generates a consistent and steady noise around the area and is a contributor to the background noise level. Superimposed on this are departing and arriving aircraft at Bristol Airport, along with noise from aircraft activity on the ground.

Vibration

7.5.6 The baseline vibration conditions for most dwellings in the vicinity of Bristol Airport are generally dictated by local road traffic conditions. For dwellings along major roads, there is potential for perceptible vibration levels to be produced by passing heavy vehicles such as buses and Heavy Goods Vehicles (HGVs). For dwellings located away from busy roads, vibration levels will be low and the occupants are unlikely to be aware of any vibration within their premises from outside sources.

7.5.7 Dwellings that are situated close to Bristol Airport and are in line with the runway have the potential to experience perceptible vibration due to airborne aircraft. Some dwellings bordering Felton Common to the east of the runway fall into this category.

7.6 Consultation

7.6.1 North Somerset Council (NSC) have been consulted regarding the methodology of the assessment. BAL met with NSC on 11 October and 23 October 2018. **Table 7.9** provides a summary of the points raised by NSC and the responses given.

Table 7.9 Summary of issues raised during consultation regarding noise and vibration

Issue raised	Consultee(s)	Response and how considered in this chapter	Section Ref
NSC highlighted that while the scoping report referred to most relevant policies at both a local and national level, some were missing	NSC	Additional local and national policies referred to in final ES chapter.	**Section 7.3, Appendix 7B**
NSC noted that BAL 'do not intend to increase the number of 'night-time' flights per annum, which is limited to 4,000, but they do wish to include greater flexibility to their distribution, which is restricted to 3,000 in the summer time and 1,000 in the winter time. If this leads to a higher concentration of night-time flights in the summer season, which is when more residents may choose to sleep with windows open, the potential impacts on sleep disturbance and human health should be examined.'	NSC	The assessment of 12 mppa has assumed that the 3,000-summer restriction is lifted (but 4,000 annual remains). The comparisons to 12 mppa are therefore worst-case comparisons as the combined effect of both the increase in movements and relaxation of summer restriction is assessed.	**Section 7.10 and Section 7.11**
NSC requested a simplified version of the ES chapter on noise be prepared that can be used to engage with local communities	NSC	A summary version of the ES chapter on noise will be prepared following issue of the ES that can be used to engage with local communities. Bristol Airport has prepared a fact sheet for this purpose.	**n/a**
NSC wish to understand changes in aircraft fleet and modernisation between the 10 mppa and 12 mppa scenarios particularly with respect to past aircraft type adoption	NSC	Changes in aircraft fleet and modernisation between the 10 mppa and 12 mppa scenarios particularly with respect to past aircraft type adoption are given explicitly in **Appendix 7D**.	**Appendix 7D**
NSC requested an explanation for Significant Observed Adverse Effect Level (SOAEL) is provided	NSC	Request was based on summary report (Summary Findings of ES Air Noise Assessment 10.10.18) provided to NSC which did not include a definition of SOAEL. SOAEL is defined in this chapter and associated appendices.	**Section 7.9, Appendix 7B**
NSC raised a concern about noise due to car parking activities (such as doors slamming)	NSC	Assessment of noise due to car parking activities is included in **Appendix 7F**.	**Appendix 7F**

Issue raised	Consultee(s)	Response and how considered in this chapter	Section Ref
at unwelcome hours due to increased car parking capacity			
NSC requested that changes in road traffic noise levels at Defra-defined Noise Important Areas are presented	NSC	Changes in noise level at Noise Important Areas have been included in **Appendix 7F**.	**Appendix 7F**

7.7 Scope of the assessment

Assessment activities

Air noise and vibration

7.7.1 Air noise contours have been prepared in terms of the usual UK noise indicator for daytime airborne noise, the $L_{Aeq,16h}$ index, and for night-time airborne noise, the $L_{Aeq,8h}$ index, using the *Federal Aviation Administration (FAA) Aviation Environmental Design Tool (AEDT)*[36].

7.7.2 Consideration has been given to other sources of aircraft performance data, such as those available from the Civil Aviation Authority (CAA) on the performance of future aircraft types, as well as aircraft performance information relating to operations of relevant aircraft types. In this assessment, this has included the Airbus A320neo and A321neo, and also the Boeing B738MAX aircraft.

7.7.3 The likelihood of vibration effects due to airborne aircraft have been assessed for the dwellings bordering Felton Common.

Ground noise

7.7.4 A ground noise assessment has been undertaken for the area around Bristol Airport where aircraft ground operations, such as engine running on stands and at hold positions, taxiing, manoeuvring and the operation of auxiliary power units (APUs) while on stands, will give rise to the greatest potential noise effects.

7.7.5 Ground noise contours have been prepared in terms of the daytime $L_{Aeq,16h}$ index and the night-time $L_{Aeq,8h}$ index using Datakustik CadnaA[37] noise modelling software.

7.7.6 Consideration has been given to survey work of aircraft ground operations, both at Bristol Airport and at other airports where similar aircraft types operate.

Road traffic noise

7.7.7 Road traffic noise calculations at representative noise sensitive receptors have been undertaken using the UK recognised method of assessment set out in CRTN[35].

7.7.8 Road traffic noise contours have been prepared in terms of the $L_{A10,18h}$ index using Datakustik CadnaA[37] noise modelling software.

Construction noise and vibration

7.7.9 The construction plant noise emission details as set out in tables within BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites*[33] (BS 5228-1) along with the associated described methodologies have been used to assess and predict construction noise for different phases of the Proposed Development at key noise sensitive receptors.

7.7.10 For the vibration assessment, information from BS 5228-2:2009+A1:2014[34] (BS 5228-2) has been used where relevant to predict vibration levels at key noise and vibration sensitive receptors.

[36] Federal Aviation Administration (2017). Aviation Environmental Design Tool (AEDT) Version 2d, [Online]. Available at: https://aedt.faa.gov/2d_information.aspx [Checked 28/08/2018].
[37] DataKustik GmbH (2018). CadnaA - State-of-the-art Noise Prediction Software 2017 Version, [Online]. Available at: https://www.datakustik.com/en/products/cadnaa/ [Checked 1/10/2018].

Spatial scope

7.7.11 The spatial scope of the assessment application site together with the Zones of Influence (ZoI) that have formed the basis of the study area is described in **Section 7.4**.

7.7.12 The largest ZoI considered for the assessment is for air noise. This zone consists of a rectangle that extends 20km to the east, 25km to the west, 4km to the north and 4km to the south of the Bristol Airport runway and is shown in **Figure 7.7**.

Temporal scope

7.7.13 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 (2019-2026) and operational periods (2017, 2021 and 2026). The air, ground and road traffic noise assessments consider the following scenarios:

- Baseline year (2017);
- 10 mppa in 2021 (air noise only). This aircraft mix and number of movements corresponds to Bristol Airport reaching its current passenger limit;
- 12 mppa. This aircraft mix and number of movements corresponds to implementation of the Proposed Development in 2026; and
- 10 mppa in 2026. This aircraft mix and number of movements corresponds to the 10 mppa in 2021 scenario but assumes that aircraft modernisation occurs at the same rate as under the 12 mppa scenario. For the air noise assessment this is regarded as a sensitivity case as there is significant uncertainty regarding how much additional aircraft modernisation would occur beyond 2021 in the event that the Proposed Development is not implemented (refer to paragraph 7.1.25). For ground and road traffic noise aircraft modernisation does not affect the assessment.

Potential receptors

7.7.14 Potential noise receptors considered include dwellings as well as non-residential receptors, as follows:

- Residential receptors;
- Schools;
- Hospitals or residential healthcare facilities;
- Places of worship, and;
- Amenity areas.

Residential receptors

7.7.15 For the purposes of dwelling and population counts for air noise, the residential receptors have been identified using a 2017 dataset supplied by CACI Ltd. This data consists of dwelling count and population by postcode. CACI derive this data from the latest available census information and adjust it to account for developments that have been built out since the latest census.

7.7.16 For the purposes of dwelling counts for ground noise, the residential receptors have been identified using the OS AddressBase Plus product, which provides details of individual dwellings.

7.7.17 For the purposes of dwelling counts for road traffic noise, representative residential receptors have been identified from details of the location and layout of buildings around Bristol Airport supplied by BAL, and from the inspection of maps of the area.

7.7.18 Specific residential receptors used for the air noise assessment are given in **Table 7.10**. Similarly, **Table 7.11** gives the specific residential receptors used for the ground noise and construction noise assessments. These are shown in **Figure 7.1** and **Figure 7.2**. These receptors have been chosen as representative of the local communities most sensitive to noise effects from the Proposed Development.

Table 7.10 Specific residential receptors – air noise

Number	Air noise residential receptor
1	Henley Park, Yatton
2	Bishops Road, Cleeve
3	Fountain Treeworks, Brockley
4	Cooks Bridle Path, Downside
5	Downside Road, Downside
6	School Lane, Lulsgate Bottom
7	Hillview Gardens, Felton
8	Market Place, Winford
9	Chew Magna, North Wick
10	Church Road, Norton Malreward
11	Lye Mead, Winford
12	Red Hill, Redhill
13	Wrington Hill, Wrington
14	Southlands Way, Congresbury

Table 7.11 Specific residential receptors – general

Designator	Ground and construction residential receptor
A	Cooks Bridle Path, Downside
B	Downside Road (West), Lulsgate Bottom
C	School Lane, Lulsgate Bottom
D	Red Hill (A38) (North), Redhill
E	Winters Lane (South), Redhill
F	Downside Road (South), Downside
G	Downside Road (North), Downside

Designator	Ground and construction residential receptor
H	Downside Road (East), Lulsgate Bottom
I	Bridgwater Road (A38), Lulsgate Bottom
J	Red Hill (A38) (South), Redhill
K	Winters Lane (North), Redhill

Non-residential receptors

7.7.19 Specific non-residential receptors used for the air noise and ground noise assessments are given in **Table 7.12**, **Table 7.13** and **Table 7.14** for schools, places of worship and amenity areas respectively. These are shown in **Figure 7.3**, **Figure 7.4**, and **Figure 7.5** respectively. No hospitals or residential healthcare facilities were identified within the study area.

Table 7.12 Specific non-residential receptors – schools

Designator	Non-residential receptor - school
S1	Winford Primary, Winford
S2	St. Andrew's Primary, Congresbury
S3	Yatton Junior, Yatton
S4	Marksbury Primary, Marksbury
S5	St. Anne's Primary, Hewish
S6	Chew Magna Primary, Chew Magna
S7	Wrington Primary, Wrington
S8	Court de Wyck Primary, Cleeve
S9	Pensford Primary, Pensford
S10	Dundry Primary, Dundry
S11	Stanton Drew Primary, Stanton Drew
S12	Woodspring School, Weston-Super-Mare

Table 7.13 Specific non-residential receptors – places of worship

Designator	Non-residential receptor place of worship
W1	St. Thomas A Becket's Church, Pensford
W2	Marksbury Methodist Church, Marksbury
W3	St. Barnabas Church, Claverham
W4	St. Dunstan And St Anthony Church, Claverham
W5	Chew Magna Baptist Church, Chew Magna

Designator	Non-residential receptor place of worship
W6	Sacred Heart Church, Chew Magna
W7	All Saints Church, Publow
W8	St. James Church, Regil
W9	Holy Trinity Church, Cleeve
W10	St. Margaret's Church, Queen Charlton
W11	St. Mary and St Peters Church, Winford
W12	St. Mary's Church, Compton Dando
W13	Congresbury Methodist Church, Congresbury
W14	Chewton Keynsham Church, Chewton Keynsham
W15	Dundry Baptist Church, Dundry
W16	St. Nicholas Church, Brockley
W17	St. Andrews Church of England, Hartcliffe
W18	Wrington United Reformed Church, Wrington
W19	Holy Saviour's Church, Hewish
W20	Yatton Methodist Church, Yatton
W21	St. Andrews Church, Congresbury
W22	Holy Trinity Church, Norton Malreward
W23	St. Katherine's Church, Felton
W24	All Saints Church, Wrington
W25	All Saints Church, Kingston Seymour
W26	Claverham Free Church, Claverham
W27	The Church of Saint Mary The Virgin, Yatton
W28	Christ Church, Redhill
W29	St. Michael, Dundry
W30	Gospel Hall - Pensford Gospel Church, Pensford
W31	St. Michael's Church, Burnett
W32	St. Mary's Church, Stanton Drew
W33	St. Andrew's Church, Chew Magna
W34	Winford Baptist Chapel, Winford
W35	Horsecastle Chapel, Yatton

Table 7.14 Specific non-residential receptors – amenity areas

Designator	Non-residential receptor amenity area
A1	The Glebe Field, Wrington
A2	Yatton Village Green, Yatton
A3	Glebelands Gardens, Yatton
A4	Bishport Avenue Open Space, Hartcliffe
A5	Streamcross Playing Field, Claverham
A6	Crosscombe Walk Open Space, Hartcliffe
A7	Court Farm Road Open Space, Whitchurch
A8	Cadbury Hill, Yatton
A9	Vee Lane Play Area, Felton
A10	Manor Road Playing Field, Keynsham
A11	Marksbury Playground, Marksbury
A12	Chew Magna Playing Field, Chew Magna
A13	Orchid Drive Play Area, Keynsham
A14	Publow Lane Recreation Ground, Publow
A15	The Mead Play Area, Keynsham
A16	Hamilton Way Play Area, Whitchurch
A17	Congresbury Millennium Green, Congresbury
A18	Hangstones Playing Field, Yatton
A19	Rock Road Playing Field, Yatton
A20	Land at Saxon Court, St. Georges
A21	Holmoak Road Playing Field, Keynsham
A22	Chalfield Close Play Area, Keynsham
A23	Whitchurch Playground, Whitchurch
A24	Felton Common, Felton

Likely significant effects

7.7.20 The noise and vibration receptors that have been taken forward for assessment are summarised in **Table 7.15,** along with the potential likely significant effects that might arise as a result of the Proposed Development.

Table 7.15 Noise receptors scoped in for further assessment

Receptor	Relevant assessment criteria	Likely significant effects
Air noise		
Residential	NPPF[17], NPSE[16], APF[1], SoNA201420[26], WHO[19 20 21]	People exposed to significant air noise could experience worsening conditions, or new people become similarly exposed.
Schools	BB93[23]	Communication and learning could be affected adversely by any increase in air noise.
Places of Worship	As Residential	Increased risk of disturbance to people and activities.
Amenity Areas	BS 8223[22], WHO[19]	Increased risk of disturbance to people and activities.
Airborne aircraft vibration		
Residential	Historic England[29]	Perceptible vibration e.g. windows rattling.
Ground noise		
Residential	WHO[19]	People exposed to significant ground noise could experience worsening conditions, or new people become similarly exposed.
Schools	BB93[23]	Communication and learning could be affected adversely by any increase in ground noise.
Places of Worship	n/a	Increased risk of disturbance to people and activities.
Amenity Areas	BS 8223[22], WHO[19]	Increased risk of disturbance to people and activities.
Road traffic noise		
All Receptors	*Noise Insulation Regulations*[38 39], BS 8233[22]	People exposed to significant road traffic noise could experience worsening conditions, or new people become similarly exposed.
Construction noise and vibration		
All Receptors	BS 5228[33 34]	People could become exposed to significant construction noise levels, over a relatively prolonged period.

7.8 Environmental measures embedded into the development proposals

7.8.1 A range of environmental measures have been embedded into the development proposals as outlined in **Section 2.3**. **Table 7.16** outlines how these embedded measures will influence the noise and vibration assessment. A detailed account of the embedded mitigation through existing noise controls and mitigation procedures in place at Bristol Airport is also described.

[38] The Noise Insulation Regulations (1975). No. 1736. [online]. Available at: http://www.legislation.gov.uk/uksi/1975/1763/contents/made [Checked 4/10/2018].
[39] The Noise Insulation (Amendment) Regulations (1988). No. 2000. [online]. Available at: https://www.legislation.gov.uk/uksi/1988/2000/contents/made [Checked 4/10/2018].

7.8.2 In general, these controls and procedures are in place and have therefore been accounted for in the assessment. The exception is the noise insulation grants. These grants allow homeowners to reduce the noise levels inside dwellings as they provide funds towards the cost of noise insulation works. However, as the convention for aircraft noise assessment is to assess it in terms of the external noise levels, this mitigation is not accounted for in the assessment.

Table 7.16 Summary of the embedded environmental measures

Receptor	Changes and effects	Embedded measures
Dwellings exposed to ground noise to the north of Bristol Airport	Aircraft movements will increase with potentially a consequential increase in ground noise exposure.	As part of the Proposed Development, a new walkway will be constructed to the north of the existing eastern apron. This will offer screening from ground noise for receptors to the north of this location, in particular those on Downside Road.

Bristol Airport – existing planning controls

7.8.3 Bristol Airport has operated for many years under a number of planning consents and as such is already subject to planning controls and voluntary agreements relating to those consents as well as its own sustainability and noise management policies.

7.8.4 Most recently planning permission was granted in February 2011 for expansion of Bristol Airport to handle 10 mppa[40]. The current Section 106 Agreement includes planning obligations relating to the management and control of air and ground noise through the implementation of a noise control scheme and adoption of operational procedures and practices aimed at achieving ongoing improvements.

7.8.5 These are each briefly described in the following section and are given in detail in Bristol Airport's current *Noise Action Plan*[41].

7.8.6 A planning obligation required the establishment of an Airport Environmental Improvement Fund[42], the purposes of which includes the funding of initiatives to mitigate the impact of aircraft and ground noise in the local community. Bristol Airport paid an initial sum of £100,000 into the fund in 2012 with further annual payments exceeding £100,000 and increasing in line with the annual percentage increase in passenger numbers.

Air noise

7.8.7 Air noise is currently limited by a condition which states that the area enclosed by the 57 dB $L_{Aeq,16h}$ (07:00 to 23:00) summer noise contour shall not exceed 12.42km^2 using the standardised average mode (Planning condition 30).

7.8.8 Residential properties located within this 57 dB $L_{Aeq,16h}$ contour (which did not previously qualify for noise insulation in the A38 Diversion Scheme) are eligible for a grant under the noise insulation grant scheme (Planning condition 31). This grant scheme is on the same basis as the previous A38 Diversion Scheme and is described in more detail in paragraph 7.8.25.

[40] North Somerset Council (2011). Planning permission 09/P/1020/OT2, [Online]. Available at: https://planning.n-somerset.gov.uk/online-applications/ [Checked 6/09/2018].
[41] Bristol Airport (2014). Noise Action Plan 2014 to 2018, [Online]. Available at https://www.bristolairport.co.uk/~/media/files/brs/about-us/nap-14_18.ashx?la=en [Checked 27/04/2018].
[42] Bristol Airport (2018). Airport Environmental Improvement Fund, Guidelines for applying for a grant for noise insulation, [Online]. Available at: https://www.bristolairport.co.uk/~/media/files/brs/about-us/community/guidelines-2018_final.ashx?la=en [Checked 5/10/2018].

Ground noise

7.8.9 Bristol Airport has procedures in place to limit the use of Auxiliary Power Units (APUs).

7.8.10 These include requirements for the installation and availability of Fixed Electrical Ground Power (FEGP) before the use of stands for live aircraft movements (Planning condition 32) and for FEGP to be used in preference to APUs (Planning condition 33) on areas cited in these conditions.

7.8.11 Mobile diesel ground power generators and aircraft APUs cannot be used on stands 38 and 39 (Planning condition 34). As part of the application, a variation to this condition is proposed so that it only applies between the hours of 23:00 and 06:00 as per stands 34 to 37.

7.8.12 APUs cannot be used on stands 34 to 37 between the hours of 23:00 and 06:00 (Planning condition 35).

7.8.13 Planning conditions 4, 5 and 69 require the erection of 3m to 5m high noise attenuation walls around the western and eastern apron extensions, and a timber fence around the northern boundary of the north side car park.

Night flying

7.8.14 A night noise Quota Count (QC) limit is used to restrict night flying (Planning condition 36). This assigns each aircraft operation a QC score based on how loud they are. The noise classification of an aircraft is set out in a formal notice published by NATS on a regular basis.

7.8.15 The current annual quota is 2,160 points, with 1,260 points allocated for the summer season (approximately seven months, defined as the period from late March to late October when British Summer Time is in effect) and 900 points allocated for the winter season.

7.8.16 Bristol Airport reports the use of the quota at the end of every season to the Airport Consultative Committee and publishes it on Bristol Airport's website.

7.8.17 The number of take-offs and landings between 23:30 and 06:00 are limited to 3,000 in the summer season and 1,000 in the winter season (Planning condition 38). As part of the application Bristol Airport is seeking to amend this condition to a limit of 4,000 for two adjoining seasons.

7.8.18 The total number of take-offs and landings between 06:00 and 07:00 and between 23:00 and 23:30 are limited to 10,500 in any calendar year (Planning condition 39).

Noise monitoring

7.8.19 Aircraft noise is continually measured using noise monitors located at each end of the runway, near Felton and Congresbury. These monitors are positioned in accordance with ICAO standards for monitoring noise from aircraft arriving and departing using runway 27.

7.8.20 The Felton monitor is therefore located 2,289m from the touchdown point for arriving aircraft using runway 27 and the Congresbury monitor is 6,500m from the start of roll point for departing aircraft using runway 27.

7.8.21 A further monitor is located at Littleton Hill, 6,500m from the start of roll point for departing aircraft using runway 09.

7.8.22 A portable noise monitor can be used to record noise at specific locations in response to queries from the local community. Mobile noise monitoring has occurred at over 12 sites during 2018 including Felton, Congresbury, Winford, Wrington and Cleeve at the time of writing.

7.8.23 The monitoring system, known as the Aircraft Noise Operation Management System (ANOMS) also takes radar data from air traffic control (ATC) enabling the aircraft track to be recorded and compared with the published routes.

7.8.24 Processed data from the noise monitors are published annually in Bristol Airport's *Operations Monitoring Report* [43] which provides a year by year comparison of noise results.

Noise insulation grants

7.8.25 As part of the Bristol Airport Environmental Improvement Fund, grants are available from Bristol Airport to cover some or all of the costs of new glazing and ventilators for properties most closely overflown and impacted by noise from Bristol Airport flights. Depending on location a property could be eligible for a grant of 100% (up to a maximum of £5,000) or 50% (up to a maximum of £2,500).

7.8.26 Eligible properties are within the 63 dB, 60 dB and 57 dB noise contours. If a property is within the 63 dB contour, the grant can cover 100% of new double glazed windows or ventilators up to a sum of £5,000. If a property is within the 60 dB and 57 dB contours, the grant can cover 50% of new double-glazed windows or ventilators up to a sum of £2,500.

7.8.27 As there is a limit of annual funding grant applications are prioritised according to categories based on the contour the property is in, and whether it has had a grant before. Should the fund be oversubscribed in any one category, priority is given to those living closest to the extended centreline of the runway i.e. those closest to overflying aircraft.

Bristol Airport – noise abatement procedures

7.8.28 Details of opening hours and noise abatement procedures are given in the latest version of the UK Aeronautical Information Package (AIP) for Bristol Airport[44].

7.8.29 Bristol Airport offers a continuous day and night service. Prior permission is required for take offs and landings between 23:00 and 07:00 (22:00 and 06:00 BST). A night surcharge applies to all landings between 22:00 and 07:00 (21:00 to 06:00 BST).

7.8.30 The following procedures are followed to minimise the noise impact of departing and arriving aircraft around Bristol Airport unless otherwise instructed by ATC:

- Operators of all aircraft using Bristol Airport are to ensure that their aircraft conform to the noise abatement techniques laid down for the type of aircraft and that operations are conducted in a manner calculated to cause the least disturbance practicable in areas surrounding Bristol Airport; and
- When operating Instrument Flight Rules (IFR), any aircraft carrying out a visual approach must not join the final approach track at an altitude of less than 2,200ft (QNH[45]).

[43] Bristol Airport (2017). 2017 Operations Monitoring Report, [online]. Available at https://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwjb-r7GgZDdAhUEElAKHevOC5cQFjAAegQIABAC&url=https%3A%2F%2Fwww.bristolairport.co.uk%2F~%2Fmedia%2Ffiles%2Fbrs%2Fabout-us%2Fenvironment%2F2017-operations-monitoring-report.ashx%3Fla%3Den&usg=AOvVaw08RjZl1qAodXxwf_UpeuOC [Checked 28/08/2018]. (Use the airport website link please: https://www.bristolairport.co.uk/about-us/environment/sustainability

[44] National Air Traffic Services (2017). IAIP Bristol – EGGD Textual data and Charts related to the Airport, [Online]. Available at: http://www.nats-uk.ead-it.com/public/index.php%3Foption=com_content&task=blogcategory&id=36&Itemid=85.html [Checked 28/08/2018].

[45] QNH is a code indicating the atmospheric pressure adjusted to mean sea level. An altitude given in terms of QNH is the altitude above mean sea level, measured using atmospheric pressure.

7.8.31 Aircraft using the Instrument Landing System (ILS) in Instrument or Visual Meteorological Conditions (IMC or VMC) shall not descend below the altitude specified above before intercepting the glide path nor thereafter fly below it. Aircraft approaching without assistance from ILS or radar shall follow a descent path which will not result in its being at any time lower than the approach path which would be followed by an aircraft using the ILS glide path.

7.8.32 The Noise Preferential Routeings (NPR) given in **Table 7.17** are compatible with ATC requirements and shall apply in both VMC and IMC. The tracks are to be flown by all departing aircraft of more than 5,700kg maximum certified weight, unless otherwise instructed by ATC or unless deviations are required in the interests of safety.

7.8.33 The NPRs are incorporated in the ATC Standard Instrument Departure procedures (SIDs).

Table 7.17 Noise Preferential Routeings (NPRs)

Take-off runway	Details
09	Climb straight ahead to I-BON 4.7 nm DME to be no lower than 3000ft QNH at this point before commencing the turn
27	Climb straight ahead to I-BTS 4.5 nm DME to be no lower than 3000ft QNH at this point before commencing the turn.

7.8.34 The obligations of NPRs cease when an altitude of 4,000ft QNH or above has been reached.

7.8.35 Subject to ATC instructions, inbound aircraft are to maintain as high an altitude as practical and adopt a continuous descent profile, when appropriate.

7.8.36 Every aircraft using Bristol Airport shall, after take-off or 'go around' be operated in the quietest possible manner.

7.8.37 Pilots and engineers should restrict the use of Auxiliary Power Units (APU) to the minimum time necessary. Between 23:30 to 05:59 (22:30 to 04:59 BST) except when immediately prior to departure, APUs may only be run subject to approval from Airside Operations.

7.8.38 In order to avoid overflying Felton Village, when departing runway 09 and requiring to turn left, all aircraft shall climb ahead to 1nm DME before commencing the left turn.

7.8.39 Noise abatement procedures for light aircraft are given in

7.8.40 **Table** 7.18.

Table 7.18 Noise abatement procedures for light aircraft

Take-off runway	Details
09	(1) Practice engine failures after take-off by single-engine aircraft are not permitted. (2) Circuit direction is normally right hand only. However, ATC may require non-standard circuit direction for traffic integration.
27	(1) All pilots should arrange their flight so as to minimise noise nuisance. (2) Circuit direction is normally left hand.

7.9 Assessment methodology

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

7.9.2 The general assessment methodology involves the following:

- Derivation of assessment criteria for each type of noise source;
- Computation of existing and future noise levels under the various scenarios;
- Assessment of magnitude of impacts (absolute) on residential and non-residential receptors, for each scenario;
- Determination of the change in noise levels, and associated impacts (relative) as a result of the introduction of the Proposed Development;
- Consideration of the likely significant effects of changes in noise levels from Without to With Proposed Development;
- Description of the potential effects (beneficial and adverse) associated with the Proposed Development; and
- Description of any mitigation measures, where appropriate, in relation to the Proposed Development and describe any residual effects.

7.9.3 While the technical assessment methodology adopted for a given source of noise is generally unique (each of which is described in the relevant section later in this chapter), there are some common concepts that apply across all noise topics based on Government guidance through the Noise Policy Statement for England (NPSE)[16].

7.9.4 The Government, through the NPSE, and the introduction of the Significant Observed Adverse Effect Level (SOAEL), has presented the concept of significance thresholds to rate health effects and quality of life. It is generally accepted that "significance" in this context differs from that used in an ES. This is because it refers to the significance of the absolute noise level, whereas an ES assesses the significance of the proposed change. For example, a receptor may be exposed to significant levels of noise regardless of any development, but if the noise level remains the same then the receptor would not be said to be significantly impacted by the development.

7.9.5 The thresholds for assessing health effects and quality of life are important, particularly when considering and comparing different scenarios as well as establishing the need for and extent of

noise mitigation. The NPSE introduces the concept of the NOEL (No Observed Adverse Effect Level), LOAEL (Lowest Observed Adverse Effect Level), and SOAEL. The National Planning Policy Guidance also introduces the concept of the UAEL (Unacceptable Adverse Effect Level). It is appropriate to consider what level of noise at Bristol Airport might be attributed to these levels, in light of emerging guidance on the effects of noise on health and also Government guidance.

7.9.6 The NOEL, LOAEL, SOAEL and UAEL can vary depending on the source, receptor, and time period (e.g. day or night), and in this way the sensitivity of the receptor is embedded into the criteria. For example, the SOAEL for a dwelling at night will be lower than during the day, to reflect the fact that dwellings are more sensitive to noise at night.

7.9.7 The technical guidance, summarised in **Table 7.3** and described in detail in **Appendix 7B**, has been used to develop noise and vibration assessment criteria and also used to derive values of LOAEL, SOAEL and UAEL as given in NPSE[16] and National Planning Practice Guidance (NPPG)[46], where appropriate. The definition of these is as follows:

- LOAEL – Lowest observed adverse effect level. This is the level above which adverse effects on health and quality of life can be detected; and
- SOAEL – Significant observed adverse effect level. This is the level above which significant adverse effects on health and quality of life occur.
- UAEL – Unacceptable adverse effect level. Noise above this level should be prevented.

7.9.8 Further guidance on how planning authorities should take account of the acoustic environment and the mitigation strategies which should be applied in relation to the above terms is provided in the NPPG[46] .

7.9.9 The advice is that noise above the SOAEL should be avoided using appropriate mitigation while taking into account the guiding principles of sustainable development.

7.9.10 Where noise is between LOAEL and SOAEL, the advice is to take all reasonable steps to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. Noise in this category is described as an observed adverse effect which is noticeable and intrusive.

7.9.11 NPSE states that it is not possible to give a single objective noise-based measure that defines a SOAEL that is applicable to all sources of noise for all situations. It acknowledges that the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It also acknowledges that further research is required to increase understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, it states that not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

7.9.12 Where any adverse noise effects are predicted, these are identified and if these cannot be avoided, mitigation measures are recommended to ensure no significant residual effects on health and quality of life arise. This approach is considered consistent with the principal aims of the NPSE. It is important to note that findings against the LOAEL and SOAEL are measures of the effect of noise on health and quality of life, and not environmental impact assessment findings.

7.9.13 During the course of this assessment (October 2018), the World Health Organization (WHO) published their updated *Environmental Noise Guidelines*[47]. These guidelines strongly recommend

[46] Defra (2014). National Planning Policy Guidance, Planning Practice Guidance, Noise, [Online] Available at: https://www.gov.uk/guidance/noise--2 [Checked 21/08/2018].
[47] 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: 25/10/2018].

that aircraft noise does not exceed 45 dB L_{den} or 40 dB L_{night} outside a dwelling. These recommendations are extremely stringent but can be considered in the context of the noise levels assessed and reported here as occurring now and in the future around Bristol Airport. They are aspirational targets and have not yet been adopted as policy. As a result, this assessment still relies on previous advice from the World Health Organisation as relevant to this assessment as this has informed Government policy that applies today.

7.9.14 The assessment criteria for different noise sources is given in the following sections. Full details of how this assessment criteria is developed is given in **Appendix 7B**.

Air noise and vibration assessment criteria

Air noise

7.9.15 Air noise encompasses that produced by aircraft during their departure and arrival at Bristol Airport. It is produced when an aircraft starts its departure, travels along the runway and climbs into the air as well as when an aircraft approaches Bristol Airport, touches down and slows to taxiing speed on the runway. It therefore includes reverse thrust noise when this takes place.

7.9.16 The assessment methodology for the calculation of air noise is set out in detail in **Appendix 7D**, along with the assumptions used to rate air noise and the results of the assessment.

Residential receptors – absolute levels

7.9.17 The Government, in the APF[1], acknowledges research in recent years which suggests that the balance of probability is that people are now relatively more sensitive to aircraft noise than in the past. At that time, the Government considered there was insufficient evidence to indicate a clear threshold noise level denoting the "onset of significant community annoyance". As a result, they retained within the APF the 57 dB $L_{Aeq,16h}$ contour as the average level of daytime aircraft noise marking the approximate onset of significant public annoyance.

7.9.18 In 2017, following the Government's response to the UK Airspace Change consultation, the Government set out policies that provide an update to some of the policies on aviation noise contained within the APF. They advised that these should be viewed as the current government policy. Specifically, it advised that a level of 54 dB $L_{Aeq,16h}$ is now acknowledged to correspond to the onset of significant community annoyance and replaces the 57 dB $L_{Aeq,16h}$ level in the APF.

7.9.19 The Government also advise that some adverse effects of annoyance can now be seen to occur down to 51 dB $L_{Aeq,16h}$ and that this should be used as the LOAEL when assessing and comparing noise impacts of airspace changes.

7.9.20 Based on Government guidance as described above, the following contour values are relevant in terms of assessing daytime airborne aircraft noise:

- 51 dB $L_{Aeq,16h}$ which provides a threshold below which there are no observed adverse effects from air noise. This represents the LOAEL; negligible effect;
- 54 dB $L_{Aeq,16h}$ which currently provides an indication of the onset of significant community annoyance; minor effect;
- 63 dB $L_{Aeq,16h}$ which denotes moderate levels of community annoyance, commonly used at airports and recommended by the Government as an eligibility criterion for sound insulation grant schemes. As a result, this value is commonly considered to represent the SOAEL; moderate effect; and

- 69 dB $L_{Aeq,16h}$ which denotes high levels of community annoyance where UK Government guidance is for consideration to be given by airports to assist in the costs of re-locating people from exposed dwellings, or, under certain circumstances, to offer to purchase such dwellings. This represents the UAEL; very substantial effect.

7.9.21 Night-time aircraft noise can be evaluated in a number of different ways. The common method is to rate night noise in terms of noise exposure, using the $L_{Aeq,8h}$ index (for the period 23:00 to 07:00). The $L_{Aeq,16h}$ and $L_{Aeq,8h}$ indices are the primary indicators used in this assessment, in line with those recommended by UK Government in the APF and the recent response to the air space change consultation.

7.9.22 Alongside the primary indicators, a number of supplementary indicators as recommended in the APF have been used to better describe the changes in the air noise environment between the different scenarios. These are as follows:

- L_{den}, which is an annual average 24-hour metric that penalises movements occurring in the evening (19:00 to 23:00) and night (23:00 to 07:00) periods by 5 dB and 10 dB respectively;
- L_{night}, which is an annual average 8-hour night (23:00 to 07:00) metric;
- 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;
- N70 (daytime) and N60 (night-time) contours, which demonstrate the areas exposed to a given number of events above the specified L_{ASmax} value;
- Single mode contours, which assume either 100% easterly or westerly operations and show the noise exposure levels expected for a given worst-case day with operations occurring in a single direction; and
- Variation in noise level at representative locations, both between scenarios and over the day.

7.9.23 These supplementary indicators have been provided for information and do not form the primary basis of the assessment of significance. They do however provide context to the significance, helping to show how the noise environment will change between one scenario and another. Further information on how these supplementary indicators can be interpreted is given in **Appendix 7B**.

7.9.24 The WHO[20] sets out night noise guidelines in terms of L_{night} which are commonly used in Europe to rate the acceptability of environmental noise at night. While the guideline value of 40 dB L_{night} is set out as an environmental goal to aspire towards, 55 dB L_{night} has been suggested as an interim target. The UK Government also recognise 45 dB L_{night} as representing the LOAEL while adopting the 45 dB $L_{Aeq,8h}$ index for this purpose for consistency with the $L_{Aeq,16h}$ daytime noise index.

7.9.25 The $L_{Aeq,8h}$ index differs only slightly from the L_{night} index in that it relates to an average summer day of aircraft activity, as opposed to an average annual day. As summer activity is generally higher than at other times of the year, the adoption of the $L_{Aeq,8h}$ unit, in place of the L_{night} unit represents a conservative approach. Similarly, on this basis, 55 dB $L_{Aeq,8h}$ is adopted as the SOAEL in this assessment.

7.9.26 It is also important however to consider the noise of individual aircraft, using noise indices such as the SEL and/or the L_{ASmax}.

7.9.27 The WHO guidelines provide advice that for a good sleep, indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night. Accounting for sleeping with a

bedroom window slightly open (and a reduction from outside to inside of 15 dB), this translates to an outside sound pressure level of 60 dB L_{Amax}. (approx. 70 dB(A) SEL for aircraft noise).

7.9.28 In the UK, where night noise is considered sufficiently high, a value of 90 dB(A) SEL (approx. 80 dB L_{ASmax}) is commonly used as the eligibility threshold for a sound insulation scheme, often based on the noisiest or most common aircraft operation occurring once or more on average per night. This threshold was developed based on research published in 1992 by the Department of Transport[48].

7.9.29 On the basis of the above, the absolute noise values used to assess the impact magnitude of air noise at residential receptors are given in **Table 7.19**.

Table 7.19 Air noise impact assessment criteria (absolute) – residential, outdoors

Subjective description of Impact	Daytime criteria[1] $L_{Aeq,16h}$ dB	Night-time criteria[2] $L_{Aeq,8h}$ dB	L_{ASmax} dB	SEL dB(A)	Description
Negligible	51 (LOAEL)	45 (LOAEL)	60	70	More than 10-15 events per might
Very minor	54	48			
Minor	57	51			
Minor/Moderate	60	54			
Significant - Moderate	63 (SOAEL)	55 (SOAEL)	80	90	More than one event per night
Significant - Substantial	66	60			
Significant – Very Substantial	69 (UEL)	63 (UEL)	90	100	More than one event per night

Note: 1. Equivalent L_{den} criterion value, ≈ $L_{Aeq,16h}$ + 2 dB.
2. Approximately equivalent to L_{night} value.

Non-residential receptors – absolute levels

7.9.30 Absolute noise criteria for non-residential receptors are given in **Table 7.20** and their derivation is explained in **Appendix 7B**.

[48] Ollerhead, J.B. et al (1992). Report of a Field Study of Aircraft Noise and Sleep Disturbance: A Study Commissioned by the Civil Aviation Policy Directorate of the Department of Transport from the Department of Safety, Environment and Engineering, Civil Aviation Authority. London: HMSO.

Table 7.20 Air noise impact assessment criteria (absolute) – non-residential, outdoors

Receptor	External noise level threshold
Schools[23]	55 dB $L_{Aeq,30min}$ (daytime)
Places of worship[22]	As per daytime residential – see **Table 7.19**.
Amenity areas[22]	55 dB $L_{Aeq,T}$

Relative levels

7.9.31 In addition to the absolute noise level, the relative change in noise level between operational scenarios is used to assess air noise. A potential impact rating for a change in level is given in **Table 7.21**. A semantic scale of this type, based on the *Institute of Environmental Management and Assessment noise impact guidelines*[49], has been accepted in various airport Public Inquiries.

Table 7.21 Air noise impact ratings - change in 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

Magnitude of effect and significance

7.9.32 The magnitude of an effect from changing from one scenario to another, such as from without to with the Proposed Development, is established from a consideration of both the absolute noise level after the change along with the magnitude of the change in noise level that occurs at a receptor.

7.9.33 The effect of a change in noise level tends to increase with the absolute level of noise experienced at a receptor. If, for example, the daytime noise level at a dwelling were to change from 45 dB to 50 dB $L_{Aeq,16h}$, (below the LOAEL) the overall effect for the occupants would be less than if the daytime noise level were to increase by the same amount from 63 dB to 68 dB $L_{Aeq,16h}$ (above the SOAEL).

7.9.34 There is no clearly accepted method of how to rate the magnitude of the effect of a change in the absolute air noise level and the associated change in noise level. Some guidance has however been provided in the NPPG[46] which states among "What factors influence whether noise could be a concern?" the following:

> *"In cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring even though little or no change in behaviour would be likely to occur."*

[49] Guidelines for Environmental Noise Impact Assessment, Institute of Environmental Management & Assessment, October 2014

7.9.35 **Table 7.22** shows how the primary air noise indicators are interpreted into magnitude of effect. This is based on the information presented in this chapter and professional judgement.

Table 7.22 Summary of magnitude of effect – air noise

Receptor Type	Outdoor noise level, dB	Magnitude of effect				
		Very low	Low	Medium	High	Very High
		Change in noise level, dB(A)				
Residential Day (07:00-23:00)	$51 \leq L_{Aeq,16h} < 63$	0-2	2-3	3-6	6-9	>9
	$L_{Aeq,16h} \geq 63$	0-1	1-2	2-4	4-7	>7
Residential Night (23:00-07:00)	$45 \leq L_{Aeq,8h} < 55$	0-2	2-3	3-6	6-9	>9
	$L_{Aeq,8h} \geq 55$	0-1	1-2	2-4	4-7	>7
Schools	$L_{Aeq,30min} \geq 55$	0-2	2-3	3-6	6-9	>9
Places of worship	$51 \leq L_{Aeq,16h} < 63$	0-2	2-3	3-6	6-9	>9
	$L_{Aeq,16h} \geq 63$	0-1	1-2	2-6	6-9	>9
Amenity Areas	$L_{Aeq,T} \geq 55$	0-2	2-3	3-6	6-9	>9

7.9.36 A potential significant effect (adverse or beneficial) is considered to arise if in **Table 7.22** the magnitude of the effect is rated as medium or higher. Additionally, a change in the number of dwellings exposed to 90 dB(A) 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.

Airborne aircraft vibration

7.9.37 Low frequency noise from airborne aircraft has the potential to cause perceptible vibration levels within dwellings. For this reason, the most appropriate noise metric to assess the likelihood of these effects is the maximum C-weighted noise level, denoted L_{Cmax}. C-weighting gives more weight to low frequency noise rather than the more commonly used A-weighting, which approximates the average human hearing response to different frequencies of noise.

7.9.38 This vibration effect is most obviously characterised by effects such as windows rattling. As discussed in the Historic England report[29], aircraft passbys that produce a maximum noise level above 97 dB L_{Cmax} are likely to produce an audible rattle of windows. While it is appreciated that low frequency noise from aircraft can induce perceptible vibration levels in lightweight structures and loose-fitting components, the levels are below those at which even minor cosmetic damage would be likely to occur.

7.9.39 Vibration effects due to airborne aircraft can vary depending on the specific details of the building, for example, the room dimensions which can cause resonance effects at certain frequencies. Resonances increase the sound level in parts of the room and decrease it in others which can influence the any consequential vibration.

7.9.40 The noise level of 97 dB L_{Cmax} has been taken as a threshold for potential significance of vibration effects due to airborne aircraft events. Whether a significant effect occurs between scenarios will depend on the number of dwellings affects and the frequency of the events.

7.9.41 The other potential effect from airborne aircraft vibration is vortex damage to buildings. This is best explained by an extract from the *Airports and the Environment*[30] report:

"Less of an environmental problem, but one that affects community relations, is that of vortex damage to properties within neighbouring communities. Vortices, which are circulating currents of air created by the passage of aircraft, are generally dispersed by wind and air turbulence before they reach the ground. However, in certain weather conditions they can reach ground level and can dislodge unsecured roofing tiles."

7.9.42 This effect is both rare and unpredictable as specific conditions are required for it to occur. It has been known to occur recently at a property in the vicinity of Bristol Airport. In this case the damage was rectified by Bristol Airport. As the strength of vortices is influenced by the size of aircraft, and the Proposed Development does not affect which aircraft are able to use Bristol Airport, it is not expected that there will be any significant effect on the occurrence of vortex damage.

Ground noise assessment criteria

7.9.43 Ground noise encompasses that produced by aircraft activities on the ground, such as during taxiing, manoeuvring, holding on the runway prior to departure, and running engines on the stand. Noise from engine running for test and maintenance purposes is also considered as ground noise.

7.9.44 The assessment methodology for ground noise is set out in detail in **Appendix 7E**, along with the assumptions used to rate ground noise and the results of the assessment.

7.9.45 There is no definitive agreement on the method of assessment of aircraft ground noise. Various methods have been adopted in the past, and these have led to the assessment of ground noise in terms of the equivalent continuous sound level, $L_{Aeq,T}$, for various time periods. As is convention, consideration is given in this assessment to the $L_{Aeq,16h}$ metric for the daytime period of 07:00 to 23:00 and the $L_{Aeq,8h}$ metric for the night-time period of 23:00 to 07:00.

7.9.46 The ground noise level assessed at various receptors can be compared to the existing ambient environmental noise and published guidelines for the assessment of environmental noise. The WHO have previously recommended a guideline value of 50 dB $L_{Aeq,16h}$ to prevent 'moderate' community annoyance and 55 dB $L_{Aeq,16h}$ for 'serious' community annoyance[19].

7.9.47 To put these guidance criteria into context over half of the population is exposed to levels which exceed the 55 dB L_{Aeq} guideline for 'serious' community annoyance. This was confirmed by the results of the Defra funded 2000/2001 National Noise Incidence Study[50].

7.9.48 The ambient noise levels in the area around Bristol Airport have been measured to lie in the range 50 dB(A) to 60 dB(A) $L_{Aeq,16h}$ during the daytime with an underlying background noise level in the range 35 dB(A) to 50 dB(A) L_{AF90} (refer to **Section 7.5**). During the night-time, ambient noise levels

[50] BRE (2002). The National Noise Incidence Study 2000/2001 (United Kingdom): Volume 1 – Noise Levels, Client report number 206344f, [online]. Available at: http://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwi-t-mQ16jdAhVJUlAKHTMiD-kQFjAAegQIABAC&url=http%3A%2F%2Frandd.defra.gov.uk%2FDocument.aspx%3FDocument%3D10280_NIS1206344f.pdf&usg=AOvVaw2R14Uu8gQF3HgMnuM0z5ui [Checked 7/09/2018].

have been measured to lie in the range 45 dB(A) to 55 dB(A) with underlying background noise levels in the range 35 dB(A) to 45 dB(A) L_{AF90}. The background noise levels better reflect the noise environment in the absence of aircraft noise and other intermittent environmental noise sources.

7.9.49 Based on the standards in BS 8233 for dwellings, the WHO levels would ensure that the recommended indoor noise levels of 35 dB $L_{Aeq,16h}$ within living rooms and 30 dB $L_{Aeq,8h}$ within bedrooms, would be achieved with windows partly open.

7.9.50 If windows are closed, an additional protection of around 10 dB can be expected. If ground noise were to rise above these levels, some form of additional mitigation, such as sound insulation treatment to the dwelling, would be required to protect people inside dwellings from the effects of ground noise.

7.9.51 Sound insulation can only provide so much protection to a dwelling, typically around 35 dB, and once the noise level outside a dwelling rises beyond a certain value, mitigation in itself will not provide sufficient protection.

Residential receptors – absolute levels

7.9.52 The absolute noise values used to assess ground noise at residential receptors are given in **Table 7.23**. These $L_{Aeq,T}$ levels are based on the BS8233 and WHO guidance and professional judgement.

Table 7.23 Ground noise assessment criteria – absolute, daytime and night-time

Action	Effect Level	Daytime external noise level, dB $L_{Aeq,16h}$	Night-time external noise level, dB $L_{Aeq,8h}$
Mitigate and reduce to a minimum	Lowest Observed Adverse Effect Level (LOAEL)	50	45
Avoid	Significant Observed Adverse Effect Level (SOAEL)	60	55
Prevent	Unacceptable Adverse Effect Level (UAEL)	70	65

Non-residential receptors – absolute levels

7.9.53 Absolute noise criteria for non-residential receptors are given in **Table 7.24**.

Table 7.24 Ground noise assessment criteria – non-residential – absolute

Receptor	External noise level threshold
Schools[23]	55 dB $L_{Aeq,30min}$ (daytime)
Places of worship[22]	As per daytime residential – see **Table 7.23**
Amenity areas[22]	55 dB $L_{Aeq,T}$

Relative levels

7.9.54 In addition to the absolute noise level, the relative change in noise level between operational scenarios is used to assess air noise. A potential impact rating for a change in level is given in

Table 7.25. A semantic scale of this type, based on the *Institute of Environmental Management and Assessment noise impact guidelines*[51], has been accepted in various airport Public Inquiries.

Table 7.25 Ground noise impact ratings - change in 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

Magnitude of effect and significance

7.9.55 **Table 7.26** shows how this is interpreted into magnitude of effect. This is based on the IEMA *Guidelines on Environmental Noise Impact Assessment*[25] and professional judgement.

Table 7.26 Summary of magnitude of effect – ground noise

Receptor Type	Outdoor noise level, dB	Magnitude of effect				
		Very low	Low	Medium	High	Very High
		Change in noise level, dB(A)				
Residential Day (07:00-23:00)	$50 \leq L_{Aeq,16h} < 60$	0-2	2-3	3-6	6-9	>9
	$L_{Aeq,16h} \geq 60$	0-1	1-2	2-4	4-7	>7
Residential Night (23:00-07:00)	$45 \leq L_{Aeq,8h} < 55$	0-2	2-3	3-6	6-9	>9
	$L_{Aeq,8h} \geq 55$	0-1	1-2	2-4	4-7	>7
Schools	$L_{Aeq,30min} \geq 55$	0-2	2-3	3-6	6-9	>9
Places of worship	$50 \leq L_{Aeq,16h} < 60$	0-2	2-3	3-6	6-9	>9
	$L_{Aeq,16h} \geq 60$	0-1	1-2	2-6	6-9	>9
Amenity Areas	$L_{Aeq,T} \geq 55$	0-2	2-3	3-6	6-9	>9

[51] Guidelines for Environmental Noise Impact Assessment, Institute of Environmental Management & Assessment, October 2014

7.9.56 A potential significant effect (adverse or beneficial) is considered to arise in the above table if the magnitude of the effect is rated as medium or higher. Whether a significant effect arises will depend on context, such as the number of noise sensitive receptors affected and the how often it occurs.

Road traffic noise assessment criteria

7.9.57 Road traffic noise includes noise from road vehicles accessing Bristol Airport as well as that from other road vehicles, not related to Bristol Airport, using the surrounding roads.

7.9.58 The assessment methodology for road traffic noise is set out in detail in **Appendix 7F**, along with the assumptions used to rate road traffic noise and the results of the assessment.

7.9.59 The criteria used in the road traffic noise assessment considers the noise criteria within the *Noise Insulation Regulations 1975 (as amended 1988)* and the *Design Manual for Roads and Bridges* (DMRB)[32].

7.9.60 Road traffic noise is commonly measured and assessed in the UK in terms of the L_{A10} index over the 18-hour period from 06:00 to 24:00. This index, known as $L_{A10,18h}$, is used to rate the potential impacts of road traffic noise arising for example from a change in a highway. Legislation exists in the form of the Noise Insulation Regulations to offer sound insulation to people who are significantly affected by the introduction of a new highway or changes to a highways scheme where the noise level rises above a certain value as a result of the change in traffic flow. Under this legislation, the trigger level for introducing a noise insulation scheme is expressed as a façade level of 68 dB $L_{A10,18h}$. This can be approximately converted back to an $L_{Aeq,16h}$ index by applying a correction of -3 dB(A) to convert from the façade level to a free-field level, and by applying a further correction of -2 dB(A) to convert from $L_{A10,18h}$ to $L_{Aeq,16h}$ for road traffic noise. The resulting trigger level in this case is 63 dB $L_{Aeq,16h}$. This is 5 dB lower than the equivalent $L_{A10,18h}$ value.

7.9.61 The absolute values for impact assessment, and for establishing the LOAEL, SOAEL and UAEL can therefore be determined based on the same principles as described for ground noise above, using the guideline standards for noise levels within dwellings recommended in BS 8233.

Absolute levels

7.9.62 The absolute noise values used to assess road traffic noise between operational scenarios at all receptors are given in **Table 7.27**.

Table 7.27 Road traffic noise assessment criteria – absolute, daytime and night-time

Action	Effect Level	Daytime facade noise level, dB $L_{A10,18h}$
Mitigate and reduce to a minimum	Lowest Observed Adverse Effect Level (LOAEL)	55
Avoid	Significant Observed Adverse Effect Level (SOAEL)	68
Prevent	Unacceptable Adverse Effect Level (UAEL)	75

Relative levels

7.9.63 The subjective importance of changes in road traffic noise level on people relates to the magnitude of the change and, to some extent, when it occurs. A significance rating for a change in level is taken from the DMRB[32].

7.9.64 DMRB provides objective assessment criteria in terms of changes in noise for both the 'short-term' and the 'long-term'. Evidence suggests that residents are much more likely to perceive very small changes in average daytime noise level (1 to 3 dB(A)) following the opening of a major road infrastructure project. Over time, people become accustomed to the change and respond to any changes in traffic flow and associated change in noise conditions with reduced sensitivity.

7.9.65 The only new roads being built as part of the Proposed Development are within Bristol Airport. The receptors affected by these roads will be affected to a greater extent by road traffic on Downside Road. Therefore, the long-term changes in noise level are the only changes relevant to this assessment. These are indicative as the impact of a relative change in level also depends on the absolute level associated with it and the noise conditions prior to the change.

Magnitude of effect and significance

7.9.66 **Table 7.28** shows how this is interpreted into magnitude of effect. This is based on DMRB.

Table 7.28 Summary of magnitude of effect – road traffic noise

Receptor Type	Outdoor noise level, dB	Magnitude of effect				
		Very low	Low	Medium	High	Very High
		Change in noise level, dB(A)				
Residential	$L_{A10,18h} \geq 55$	0-2	2-3	3-5	5-10	>10

7.9.67 A potential significant effect (adverse or beneficial) is considered to arise in **Table 7.28** if the magnitude of the effect is rated as medium or higher. Whether a significant effect arises will depend on context, such as the number of noise sensitive receptors affected and the how often it occurs.

Construction noise and vibration assessment criteria

7.9.68 Construction noise and vibration relates to that produced by construction traffic accessing and departing from the construction sites as well as that produced by demolition, piling and

construction plant operating at the construction sites during each phase of the construction project. The effects of construction noise and vibration have been assessed taking account of their magnitude and also the likely sequence period and daily duration over which they will occur for the affected receptors.

7.9.69 The assessment methodology for construction noise and vibration is set out in detail in **Appendix 7G**, along with the assumptions used to rate construction noise and vibration and the results of the assessment.

7.9.70 In the UK, BS 5228-1[33] is the current guidance and approved code of practice document for the control of construction noise. This provides guidance on methods of controlling noise and provides methods to predict, measure and assess the impact of construction and demolition noise. The guidance in the document can be considered to present recommendations for best practical means to control noise on site.

7.9.71 An informative Annex is included in BS 5228-1 that provides guidance on objectively assessing the significance of construction noise. It advises that a pragmatic approach needs to be taken when assessing the noise effects of any construction project and suggests the guidance provided in the annex would generally only apply to projects of significant size, and lesser projects might not need to be assessed or might only require general consideration of noise effects and mitigation. For large infrastructure projects for example, it highlights historically the procedure that has developed in the UK based on the use of fixed noise limits and also additionally introduces alternative methods used to rate the potential significance of construction noise, based on prevailing ambient noise conditions.

7.9.72 There are no universally recognised or mandatory UK standards or guidelines that set out limits for construction noise. The historical use of fixed noise limits for projects of significant size is described in BS 5228-1 which sets out a subjective principle as follows:

"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut."

7.9.73 It also goes on to describe external noise limits as:

"Noise levels, between say 07:00 and 19:00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:

- *70 decibels (dBA) in rural, suburban and urban areas away from main road traffic and industrial noise;*
- *75 decibels (dBA) in urban areas near main roads in heavy industrial areas."*

7.9.74 BS 5228-1 also provides details of alternative methods of assessment to determine the potential for a significant noise effect, reproduced in **Table 7.29**, by testing the construction noise level against the prevailing baseline noise level (that is, the noise level in the absence of construction noise). If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect.

Table 7.29 Example threshold of potential significant effect at dwelling

Assessment category and threshold value period	$L_{Aeq,T}$ Threshold value dB(A)		
	Category A[1]	Category B[2]	Category C[3]
Daytime (07:00–19:00) and Saturdays (07:00–13:00)	65	70	75
Night-time (23:00 – 07:00)	45	50	55

1. Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.
2. Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.
3. Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

7.9.75 A further alternative method is available where noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq,T}$ from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in a significant effect.

7.9.76 BS 5228-1 also provides examples of noise thresholds used for the introduction of both sound insulation treatment (or the reasonable costs thereof) and temporary re-location. It is stated in BS 5228-1 that:

"If the contractor has applied best practicable means to the provision of mitigation, i.e. all reasonable measures have been taken to reduce the noise levels, but levels are still such that widespread community disturbance or interference with activities or sleep is likely to occur, there are two further provisions that can be made if the construction activities are likely to continue for a significant period of time either continuously or sporadically."

7.9.77 The first provision is noise insulation. For eligibility for sound insulation the daytime Monday to Friday (08:00-18:00) and Saturday morning (08:00-13:00) threshold is 75 dB $L_{Aeq,10h/5h}$ at 1 metre outside the most exposed window or door of the façade of any eligible dwelling. This level also needs to be exceeded for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any six consecutive months.

7.9.78 The second provision is temporary or permanent re-housing. For eligibility for temporary rehousing the daytime Monday to Friday (08:00-18:00) and Saturday morning (08:00-13:00) threshold is at least 85 dB $L_{Aeq,10h/5h}$. This level also needs to be exceeded for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any six consecutive months.

7.9.79 Typical daytime ambient noise levels around Bristol Airport lie between 50 dB $L_{Aeq,16h}$ and 60 dB $L_{Aeq,16h}$ during the daytime and 45 dB $L_{Aeq,8h}$ and 55 dB $L_{Aeq,8h}$ during the night-time (see **Appendix 7C**). On this basis, based on the ABC method in BS 5228-1, a value of 65 dB $L_{Aeq,12h}$ would be appropriate as a threshold for potentially significant effects to be indicated for the Proposed Development construction works during the daytime and 55 dB $L_{Aeq,8h}$ during the night-time. These criteria should be considered a target not normally to be exceeded at 1m from the façade of any noise sensitive residential or business receptors.

7.9.80 Based on the above and taking account of the ambient noise levels around Bristol Airport, the criteria adopted to assess the impact of construction noise are given in **Table 7.30**.

Table 7.30 Construction noise assessment criteria – absolute

Action	Effect Level	Daytime outdoor noise level, dB $L_{Aeq,12h}$	Night-time outdoor noise level, dB $L_{Aeq,8h}$
Mitigate and reduce to a minimum	Lowest Observed Adverse Effect Level (LOAEL)	55	45
Avoid	Significant Observed Adverse Effect Level (SOAEL)	65	55
Prevent	Unacceptable Adverse Effect Level (UAEL)	85	75

7.9.81 In summary, the threshold for a potentially significant effect from construction noise adopted in this assessment is 65 dB $L_{Aeq,12h}$ for the daytime (07:00-19:00) and 55 dB $L_{Aeq,8h}$ for the night-time (23:00-07:00).

Construction vibration

7.9.82 Vibration levels due to construction works associated with the Proposed Development have been assessed using the significance criteria given in BS5228-2[34] in terms of peak particle velocity (PPV).

7.9.83 Vibration criteria are given for both human and building response, where human response criteria are more stringent. **Table 7.31** contains the assessment criteria used, which are based on the absolute values given in BS 5228-2.

Table 7.31 Vibration limits for human response and building damage

Vibration limit, PPV mms^{-1}	Effect	Effect
< 0.14	Vibration unlikely to be perceptible.	None
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Negligible
0.3	Vibration might be just perceptible in residential environments.	Minor
1.0	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.	Moderate
7.5	Guide value for cosmetic damage of residential buildings where dynamic loading may lead to resonance.	Significant
10.0	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.	Very Significant

7.9.84 On the basis of the above table, the threshold for a potentially significant effect from construction vibration adopted in this assessment is 1.0 mms^{-1} PPV during the daytime (07:00-23:00) and 0.3 mms^{-1} during the night-time.

7.10 Assessment of effects – air noise and vibration

7.10.1 **Section 7D.5** of **Appendix 7D** provides the detailed results of the air noise and vibration assessment. Air noise contours are presented for the primary and secondary or supplementary parameters, along with contour areas, dwelling and population counts within each contour band for residential receptors. Noise exposure values are also presented for noise sensitive non-residential receptors. The likelihood of vibration effects is also assessed. Key results are presented in this section. Note that the significance ratings arising from the effects described here are described in the section titled "Predicted air noise effects and their significance" at the end of **Section 7.10**.

7.10.2 For all tables in this section, areas are rounded to the nearest 0.1km^2. Dwelling and population counts are rounded to the nearest 50 above 100 and to the nearest 10 below 100. Below 10, the actual number is given. Where percentage changes are given, these are based on unrounded values. The counts include all those dwellings or people within a specified contour band and any higher value bands so, for example, any dwellings within a 63 dB contour would also be counted as being within a 63 dB contour as well.

Residential receptors – primary indicators

$L_{Aeq,16h}$ daytime

7.10.3 The dwelling counts within key daytime air noise contours are presented in **Table 7.32.** These contours are presented in **Figure 7D.1** to **Figure 7D.3** and **Figure 7D.26**.

Table 7.32 Air noise dwelling counts, $L_{Aeq,16h}$ average mode summer day

Contour $L_{Aeq,16h}$ dB(A)	**Number of Dwellings**			
	Baseline 2017	**10 mppa 2021**	**12 mppa 2026**	**10 mppa 2026**
51	3,250	3,150	3,100	2,200
63	20	10	10	10

7.10.4 **Table 7.32** shows that in 2017, around 3,250 dwellings are adversely affected by air noise as a result of daytime aircraft operations at Bristol Airport. This total is expected to remain much the same, although marginally reduce going forward to the 10 mppa in 2021 and the 12 mppa scenarios. The sensitivity scenario (first discussed in paragraph 7.1.25) of 10 mppa in 2026 shows a reduction of 30% compared to the 12 mppa scenario. This is due to the conservative assumption that from 2021 onwards, there is no growth in passenger numbers from 10 mppa but fleet replacement occurs as per the 12 mppa 2026 forecast.

7.10.5 Currently and in the future under any scenario, the number of residential receptors experiencing air noise at or above the SOAEL of 63 dB is very small, around 20 now reducing to around 10 in the future.

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

7.10.6 Turning to the night-time effects, **Table 7.33** shows the dwelling counts within key night-time air noise contours. These contours are presented in **Figure 7D.4** to **Figure 7D.6** and **Figure 7D.27**.

Table 7.33 Air noise dwelling counts, $L_{Aeq,8h}$ average mode summer night

Contour $L_{Aeq,8h}$ dB(A)	Number of Dwellings			
	Baseline 2017	10 mppa 2021	12 mppa 2026	10 mppa 2026
45	3,750	5,150	5,050	4,150
55	150	300	350	250

7.10.7 **Table 7.33** shows that in 2017, around 3,750 dwellings are adversely affected by air noise as a result of night-time aircraft operations at Bristol Airport. This total is expected to increase by 38% going forward to the 10 mppa in 2021 scenario. The 12 mppa scenario gives rise to a similar, albeit slightly lower, number of dwellings compared to the 10 mppa in 2021 scenario. The sensitivity scenario of 10 mppa in 2026 shows a reduction of 18% compared to the 12 mppa scenario. This is due to the conservative assumption that from 2021 onwards, there is no growth in passenger numbers from 10 mppa but fleet replacement occurs as per the 12 mppa 2026 forecast.

7.10.8 Currently, there are around 150 properties exposed to the SOAEL of 55 dB $L_{Aeq,8h}$ or more. This is predicted to increase to around 300 under the 10 mppa in 2021 scenario, with a 5% increase to around 350 under the 12 mppa scenario. The sensitivity scenario of 10 mppa in 2026 shows a reduction of 21% compared to the 12 mppa scenario. This is due to the conservative assumption that from 2021 onwards, there is no growth in passenger numbers from 10 mppa but fleet replacement occurs as per the 12 mppa 2026 forecast.

Residential receptors – supplementary indicators

L_{den} and L_{night}

7.10.9 These parameters show broadly similar results to the $L_{Aeq,16h}$ and $L_{Aeq,8h}$ metrics. The results are given in detail in **Appendix 7D**.

Annoyance

7.10.10 **Table 7.34** 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 noise insulation grant scheme.

Table 7.34 Highly annoyed population count, $L_{Aeq,16h}$ average mode summer day

Metric	Baseline 2017	10 mppa 2021	12 mppa 2026	10 mppa 2026
Population Highly Annoyed	750	750	750	550

7.10.11 This shows that in the future, levels of annoyance will remain as now under the 10 mppa 2021 scenario and 12 mppa 2026 scenarios, reducing only under the sensitivity case of 10 mppa 2026.

Sleep Disturbance

7.10.12 **Table 7.35** 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 the noise insulation grant scheme.

Table 7.35 Highly sleep disturbed population count, L_{night} average mode annual night

Metric	Baseline 2017	10 mppa 2021	12 mppa 2026	10 mppa 2026
Population Highly Sleep Disturbed	450	850	800	650

7.10.13 This shows that the number of people highly sleep disturbed will rise by around 90% from 2017 to the 10 mppa in 2021 scenario before reducing slightly, by around 5% under the 12 mppa in 2026 scenario and by around 25% under the 10 mppa in 2026 scenario. Further information on the methodology can be located in **Appendix 7B**, specifically paragraph 7B.1.139, with the detailed results presented in **Appendix 7D**, in Table 7D.28.

N70 and N60

7.10.14 These parameters help to provide context to how the aircraft noise environment might alter between scenarios. People experience aircraft noise as a series of individual events over a day, rather than as a single average noise exposure level. The N70 parameter helps to illustrate how this might change between scenarios. Further explanation on these metrics is given in paragraph 7.1.18. There are no specific criteria for rating the acceptability of N70 or N60 contours.

7.10.15 The number of dwellings exposed to various N70 and N60 contours do not vary in a consistent manner between scenarios, for example comparing the 10 mppa 2021 scenario with 12 mppa 2026 scenario shows that for both N70 and N60 the number of dwellings increase for some contour values and decrease for others. The results and further explanation of these contours are presented in detail in **Appendix 7D**.

SEL and L_{ASmax}

7.10.16 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 7.36** for each scenario.

Table 7.36 Air noise dwelling counts, $L_{Aeq,16h}$ average mode summer day

Contour, dB(A)	Number of Dwellings			
	Baseline 2017	10 mppa 2021	12 mppa 2026	10 mppa 2026
90 SEL	250	600	100	100
80 L_{ASmax}	250	650	100	100

7.10.17 **Table 7.36** demonstrates that from 2017 to the 10 mppa 2021 scenario, the number of dwellings exposed to potentially significant noise levels of individual aircraft at least once per night will increase from around 250 to around 650. Going forward to 2026, under both the 12 mppa scenario and the sensitivity scenario, this will reduce to around 100.

Single mode

7.10.18 Single mode L_{Aeq} noise contours have been produced which show how, under westerly and easterly conditions, noise exposure levels will vary during the day and night between scenarios. These represent a worst-case day for each scenario.

7.10.19 The number of dwellings exposed between scenarios varies in a similar manner to the average mode L_{Aeq} contours. The results are presented in detail in **Appendix 7D**.

Variation in noise level over the day

7.10.20 The air noise received at a receptor over a single day will vary according to the scenario being considered and also the mode of operations at Bristol Airport. In addition, the noise level will vary by the hour as a result of variations in the hourly timetabling of aircraft over a 24-hour period. **Appendix 7D** provides this detailed information, in terms of $L_{Aeq,1h}$ over the day for 14 representative residential receptors. The receptors assessed are shown in **Figure 7.1** and details are given in **Table 7.10**.

7.10.21 This analysis shows how the noise levels at a given receptor are vary over a typical day, and how this might change under the future scenarios. A description of this is given in **Appendix 7D**.

Non-residential receptors

7.10.22 **Appendix 7D** 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 of air noise around Bristol Airport.

Schools

7.10.23 **Appendix 7D** identifies only one school, Winford Primary School, as being exposed to 55 dB $L_{Aeq,16h}$ or more, under all scenarios.

7.10.24 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. 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. Even however allowing for this fact, only this one school is exposed to noise levels above 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 2021 and under the 12 mppa 2026 scenario as well as the sensitivity test.

Places of worship

7.10.25 There are 35 places of worship identified within the zone of influence of air noise around Bristol Airport. Nine of these are currently exposed to air noise at or above 51 dB $L_{Aeq,16h}$. The situation will remain broadly unchanged in both future scenarios, including the sensitivity test. None are currently exposed to a level of 63 dB $L_{Aeq,16h}$, either now or in the future.

Amenity areas

7.10.26 There are 23 amenity areas identified within the ZoI of air noise around Bristol Airport. These vary in nature from playgrounds and parks, to open spaces. Eight of these are currently exposed to a daytime noise exposure level of 50 dB $L_{Aeq,16h}$ or more. Only three amenity areas are exposed to a significant level of 55 dB $L_{Aeq,16h}$ or more currently, these being Cadbury Hill in Yatton, Vee Lane Play Area in Felton, and Felton Common.

7.10.27 This situation will remain broadly the same under the 10 mppa 2021 scenario and also the 12 mppa 2026 scenario. A reduction in the number of those exposed to 50 dB and 55 dB occurs under the sensitivity test, reducing to six and two (Vee Lane Play Area and Felton Common) respectively.

Airborne aircraft vibration

7.10.28 The assessment finds that in 2017, six dwellings which border Felton Common are exposed to maximum noise levels of 97 dB L_{Cmax} or greater. This reduces to two dwellings in all future scenarios due to the introduction of more modern, quieter aircraft types. The maximum noise level instances occur less than once per day on average in all scenarios.

7.10.29 In practice, it is appreciated that there is some variation depending on the specific characteristics of individual dwellings, and therefore it is possible that lower levels of noise may induce perceptible vibration effects. The typical aircraft operations which produce the highest L_{Cmax} noise levels currently at dwellings bordering Felton Common are departures by the Airbus A321 and Boeing 737-800 using runway 09. These two aircraft types combined carried out four runway 09 departures on an average day in 2017. Under the 10 mppa in 2021 scenario, this increases to seven, before reducing to four under the 12 mppa in 2026 scenario and three under the sensitivity scenario of 10 mppa in 2026.

7.10.30 Therefore, vibration due to airborne aircraft is expected to currently affect a small number of dwellings and this is not expected to vary significantly in the future scenarios.

Predicted air noise and vibration effects and their significance

7.10.31 This section sets out the air noise effects arising from operations at Bristol Airport by comparing the following key scenarios:

- Baseline year (2017) vs future (10 mppa in 2021);
- Future (10 mppa in 2021) vs future (12 mppa in 2026) with Proposed Development; and
- Future (10 mppa in 2026) vs future (12 mppa in 2026) with Proposed Development.

7.10.32 This section concentrates primarily on a comparison of the change from without to with the Proposed Development since this is the key comparison required as part of the ES. A subjective account of how noise conditions will change between the baseline year and 2021 has however been included to provide context, should Bristol Airport reaches its permissible capacity and the Proposed Development not proceed.

7.10.33 This section commences by presenting, for key receptors, an account of how noise levels will change under each scenario during the daytime and night-time. It then compares and discusses specific pairs of scenarios separately.

7.10.34 The assessments have all been carried out on the basis of external noise levels, as this is what the main criteria relate to. Therefore, mitigation in the form of improved sound insulation is not accounted for. This will reduce the internal noise levels for dwellings where works have been carried out, and therefore the absolute effects will be lower than assessed for those properties.

Variation in noise levels at representative residential receptors

7.10.35 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 in **Figure 7.1** and details are given in **Table 7.10**.

7.10.36 **Table 7.37** shows the daytime air noise exposure levels for 10 mppa 2021 (in brackets) and the relative change in noise level for the baseline (2017) and the 12 mppa 2026 scenario, at representative residential receptors. The sensitivity scenario of 10 mppa 2026 without the Proposed Development is also included.

Table 7.37 10 mppa in 2021 air noise exposure levels, $L_{Aeq,16h}$ average mode summer day, and relative change

	Residential receptor	Absolute level ($L_{Aeq,16h}$) dB(A) or change re: 10 mppa 2021			
		Baseline 2017	10 mppa 2021	12 mppa 2026	10 mppa 2026
1	Henley Park, Yatton	0	(53)	0	-1
2	Bishops Road, Cleeve	+1	(53)	0	-1
3	Fountain Treeworks, Brockley	0	(62)	-1	-2
4	Cooks Bridle Path, Downside	+1	(60)	0	-1
5	Downside Road, Downside	0	(60)	-1	-2
6	School Lane, Lulsgate Bottom	0	(62)	-1	-2
7	Hillview Gardens, Felton	0	(55)	0	-1
8	Market Place, Winford	0	(59)	+1	0
9	Chew Magna, North Wick	0	(54)	+1	0
10	Church Road, Norton Malreward	0	(50)	0	-1
11	Lye Mead, Winford	-1	(54)	0	-1
12	Red Hill, Redhill	0	(51)	0	-2
13	Wrington Hill, Wrington	+1	(53)	0	-1
14	Southlands Way, Congresbury	0	(53)	0	-2

7.10.37 For all 14 locations, the absolute noise levels for 10 mppa 2021 lie below the SOAEL of 63 dB. This is the case now and will remain the case for 12 mppa in 2026 with the Proposed Development.

7.10.38 The results show that the change in daytime noise level between the baseline (2017) conditions and those likely to arise for the 10 mppa in 2021 scenario is negligible at all locations. Three locations are 1 dB louder in 2017, one location is 1 dB quieter, and 10 locations have the same noise level, when compared to 10 mppa in 2021.

7.10.39 Considering the 12 mppa scenario, there is also a negligible change in noise levels from those expected for the 10 mppa in 2021 scenario. Two locations are 1 dB louder in the 12 mppa scenario, three locations are 1 dB quieter, and nine locations have the same noise level, when compared to 10 mppa in 2021.

7.10.40 For the sensitivity scenario of 10 mppa in 2026, this shows a negligible reduction in noise against 10 mppa in 2021, with 12 locations being 1-2 dB quieter under the 10 mppa in 2026 scenario, and two locations having the same noise level, when compared to 10 mppa in 2021.

7.10.41 The differences in daytime air noise between the 12 mppa 2026 and 10 mppa 2026 scenarios are also small, with increases in the range 0 to 1 dB generally occurring with the Proposed Development.

7.10.42 **Table 7.38** shows the night-time air noise exposure levels for 10 mppa 2021 (in brackets) and the relative change in noise level against the baseline (2017) and the 12 mppa 2026 scenarios, at

representative residential receptors. The sensitivity scenario of 10 mppa 2026 without the Proposed Development is also included.

Table 7.38 10 mppa in 2021 air noise exposure levels, $L_{Aeq,8h}$ average mode summer night, and relative change

	Residential receptor	Absolute level ($L_{Aeq,8h}$) dB(A) or change re: 10 mppa 2021			
		Baseline 2017	10 mppa 2021	12 mppa 2026	10 mppa 2026
1	Henley Park, Yatton	-2	(50)	0	-1
2	Bishops Road, Cleeve	-2	(50)	0	-1
3	Fountain Treeworks, Brockley	-1	(58)	0	-1
4	Cooks Bridle Path, Downside	-1	(57)	0	-1
5	Downside Road, Downside	-2	(56)	0	-1
6	School Lane, Lulsgate Bottom	-1	(58)	0	-1
7	Hillview Gardens, Felton	-2	(52)	0	-1
8	Market Place, Winford	-1	(56)	+1	0
9	Chew Magna, North Wick	-1	(51)	+1	0
10	Church Road, Norton Malreward	-1	(47)	0	0
11	Lye Mead, Winford	-2	(51)	0	-1
12	Red Hill, Redhill	-2	(48)	0	-2
13	Wrington Hill, Wrington	-2	(55)	0	-1
14	Southlands Way, Congresbury	-2	(49)	0	-1

7.10.43 For six of the fourteen locations, the absolute noise levels for 10 mppa 2021 all lie at or just above the SOAEL of 55 dB, with the remainder lying below. This is also the case for the 12 mppa 2026 scenario. This is similar to the case now with four of the fourteen receptors experiencing night noise at or above the SOAEL.

7.10.44 The results show negligible increases in noise of 1 to 2 dB at all locations, from the baseline (2017) conditions during the night and those likely to arise for 10 mppa 2021, as currently permitted.

7.10.45 Noise levels during the night will also see little variation under 12 mppa 2026 from those expected for 10 mppa 2021, with two locations experiencing a negligible increase of 1 dB and 12 locations where the noise level remains the same.

7.10.46 For the sensitivity case, this shows a reduction in noise against 10 mppa 2021, with 11 locations experiencing a negligible decrease in noise level of 1 to 2 dB and three locations where the noise level remains the same.

7.10.47 The differences in night-time air noise between the 12 mppa 2026 and 10 mppa 2026 scenarios are similar, with the majority of locations experiencing a negligible increase of 1 dB in the 12 mppa scenario.

Baseline year (2017) vs Future (10 mppa in 2021)

7.10.48 Bristol Airport is forecast to grow to its permitted passenger limit of 10 mppa by 2021, irrespective of whether the Proposed Development is permitted. This section summarises the noise effects expected (compared to 2017) as a result of this growth to Bristol Airport's permitted passenger throughput of 10 mppa and the resulting effects on the local community.

7.10.49 Annual aircraft movements are forecast to increase from 73,562 in 2017 to 86,973 in 2021. This increase will be accompanied by the replacement of some of the most common aircraft at Bristol Airport with their more modern equivalents.

7.10.50 Under the 10 mppa in 2021 scenario, while aircraft movements will increase, noise exposure levels during the day are predicted to reduce slightly due to the modernisation of the aircraft fleet, leading to a slight reduction in the number of people adversely affected by air noise. For example, the number of dwellings exposed to noise levels at or above the LOAEL reduces slightly from 3,250 to 3,150. The associated change in noise level at these receptors is negligible, with most experiencing a decrease of less than 1 dB, with some experiencing an increase of less than 1 dB. This is considered to be a very low effect. The small number of dwellings exposed to noise levels at or above the SOAEL, around 20 dwellings in 2017 falling to around 10 in 2021, experience similar changes in noise level and therefore also a very low effect.

7.10.51 As air traffic increases in the future at night, the number of dwellings that are exposed to noise levels at or above the LOAEL will rise, from 3,750 in 2017 to 5,150 in 2021. The number of dwellings exposed to noise levels at or above the SOAEL increases from 150 in 2017 to 300 in 2021. Of these dwellings, 15 will experience an increase in noise level of 2 to 3 dB and an absolute level above the SOAEL. This constitutes a moderate adverse effect for these dwellings. The remaining dwellings experience either lower absolute noise levels or lower changes in noise level, which constitutes a low or very low adverse effect.

7.10.52 In summary, the air noise effects during the day are not expected to materially change between the 2017 and 10 mppa in 2021 scenarios. Approximately 150 dwellings are exposed to significant levels of night-time air noise under the 2017 scenario. This number will increase to around 300 by 2021. Most of these dwellings, however, will experience only a low or very low effect due to negligible changes in noise level. 15 dwellings will experience a moderate adverse effect, located in the Lulsgate Bottom area close to the eastern end of the runway. All of the dwellings exposed to significant levels of external air noise, both now and in 2021, are eligible under Bristol Airport's current sound insulation scheme and therefore have the option to improve the sound insulation to reduce the internal noise levels. To date, the number of properties that have been insulated are as follows:

- 2000 – 2001: circa 261 properties;
- 2015: 14 properties;
- 2016: 40 properties;
- 2017: 8 properties; and
- 2018: 5 properties.

7.10.53 The number of dwellings exposed to a significant level of noise due to individual aircraft events at least once per night increases from 250 in 2017 to 650 under the 10 mppa in 2021 scenario. This is a potentially significant adverse effect.

Future (10 mppa in 2021) to Future (12 mppa in 2026) With Development

7.10.54 This section summarises the noise effects expected (compared to those currently permitted) as a result of growth from 10 mppa to 12 mppa by 2026. It describes and compares the effects of the two key scenarios assessed in this ES.

7.10.55 Annual aircraft movements are forecast to increase from the 86,973 in 2021, based on the permitted passenger throughput of 10 mppa, to 97,393 in 2026, relating to 12 mppa. This increase will be accompanied by a further replacement of some of the most common aircraft types at Bristol Airport with their more modern equivalents.

7.10.56 **Table 7.39** and **Table 7.40** summarise for the daytime and night-time how this change will affect residential dwellings based on the absolute levels arising under the 12 mppa in 2026 scenario and the change in noise level from the 10 mppa in 2021 scenario that is experienced. The beneficial change category includes the small number of dwellings experiencing no change in noise level.

7.10.57 Based on the criteria set out in **Table 7.22**, the number of residential and non-residential receptors experiencing a given air noise effect due to the change between the 10 mppa in 2021 and 12 mppa in 2026 scenarios is then set out in **Table 7.41**.

7.10.58 A potential significant effect (adverse or beneficial) is considered to arise in **Table 7.39** if the magnitude of the effect is rated as medium or higher. Whether a significant effect arises will depend on context, such as the number of noise sensitive receptors affected and how often it occurs.

Table 7.39 Dwellings exposed to absolute air noise and change in air noise, 10 mppa 2021 to 12 mppa 2026, daytime

Subjective description of impact	Contour band, dB $L_{Aeq,16h}$	Number of dwellings in band, 12 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Moderate	Substantial	Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Negligible	**51 (LOAEL)**	1,550	Beneficial	1,550	0	0	0	0
		650	Adverse	650	0	0	0	0
Very minor	**54**	250	Beneficial	250	0	0	0	0
		200	Adverse	200	0	0	0	0
Minor	**57**	90	Beneficial	90	0	0	0	0
		250	Adverse	250	0	0	0	0
Minor/ Moderate	**60**	40	Beneficial	40	0	0	0	0
		80	Adverse	80	0	0	0	0
Significant Moderate	**63 (SOAEL)**	0	Beneficial	0	0	0	0	0
		10	Adverse	10	0	0	0	0

Subjective description of impact	Contour band, dB $L_{Aeq,16h}$	Number of dwellings in band, 12 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Moderate	Substantial	Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Significant Substantial	**66**	1	Beneficial	1	0	0	0	0
		0	Adverse	0	0	0	0	0
Significant Very Substantial	**69 (UAEL)**	0	Beneficial	0	0	0	0	0
		0	Adverse	0	0	0	0	0
Total		1,950	Beneficial	1,950	0	0	0	0
		1,150	Adverse	1,150	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

Table 7.40 Dwellings exposed to absolute air noise and change in air noise, 10 mppa 2021 to 12 mppa 2026, night-time

Subjective description of impact	Contour band, dB $L_{Aeq,8h}$	Number of dwellings in band, 12 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Moderate	Substantial	Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Negligible	**45 (LOAEL)**	1,700	Beneficial	1,700	0	0	0	0
		350	Adverse	350	0	0	0	0
Very minor	**48**	600	Beneficial	600	0	0	0	0
		1,500	Adverse	1,500	0	0	0	0
Minor	**51**	200	Beneficial	200	0	0	0	0
		250	Adverse	250	0	0	0	0
Minor/ Moderate	**54**	30	Beneficial	30	0	0	0	0
		90	Adverse	90	0	0	0	0
Significant Moderate	**SOAEL (55)**	80	Beneficial	80	0	0	0	0
		250	Adverse	250	0	0	0	0

Subjective description of impact	Contour band, dB $L_{Aeq,8h}$	Number of dwellings in band, 12 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Moderate	Substantial	Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Significant Substantial	**60**	0	Beneficial	0	0	0	0	0
		10	Adverse	10	0	0	0	0
Significant Very Substantial	**63**	1	Beneficial	1	0	0	0	0
		0	Adverse	0	0	0	0	0
Total		2,600	Beneficial	2,600	0	0	0	0
		2,450	Adverse	2,450	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

Table 7.41 Air noise effect on number of dwellings and non-residential receptors – 10 mppa 2021 to 12 mppa 2026

Receptor Type	12 mppa outdoor noise level, dB	Beneficial[1] or adverse change	Magnitude of effect				
			Very low	Low	Medium	High	Very High
			Change in noise level, dB(A)				
Residential Day (07:00-23:00)	51 ≤ $L_{Aeq,16h}$ < 63	Beneficial	1,950	0	0	0	0
		Adverse	1,150	0	0	0	0
	$L_{Aeq,16h}$ ≥ 63	Beneficial	1	0	0	0	0
		Adverse	10	0	0	0	0
Residential Night (23:00-07:00)	45 ≤ $L_{Aeq,8h}$ < 55	Beneficial	2,500	0	0	0	0
		Adverse	2,200	0	0	0	0
	$L_{Aeq,8h}$ ≥ 55	Beneficial	80	0	0	0	0
		Adverse	250	0	0	0	0
Schools	$L_{Aeq,30min}$ ≥ 55	Beneficial	1	0	0	0	0

Receptor Type	12 mppa outdoor noise level, dB	Beneficial[1] or adverse change	Magnitude of effect				
			Very low	Low	Medium	High	Very High
			Change in noise level, dB(A)				
		Adverse	1	0	0	0	0
Places of worship	$51 \leq L_{Aeq,16h} < 63$	Beneficial	1	0	0	0	0
		Adverse	5	0	0	0	0
	$L_{Aeq,16h} \geq 63$	Beneficial	0	0	0	0	0
		Adverse	0	0	0	0	0
Amenity Areas	$L_{Aeq,T} \geq 55$	Beneficial	0	0	0	0	0
		Adverse	3	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

7.10.59 While aircraft movements will increase under the 12 mppa 2026 scenario, this is largely offset by the predicted modernisation of the aircraft fleet. Therefore, noise exposure levels are predicted to remain broadly the same, leading to no material change in the number of those people adversely affected by air noise.

7.10.60 The number of dwellings exposed to daytime noise levels at or above the LOAEL reduces slightly from 3,150 to 3,100. The associated change in noise level at these receptors is negligible, with most experiencing a decrease of less than 1 dB, and some experiencing an increase of less than 1 dB. This constitutes a very low effect. The small number of dwellings exposed to noise levels at or above the SOAEL, around 10 dwellings in both scenarios, experience similar changes in noise level and therefore also a very low effect.

7.10.61 The number of dwellings that are exposed to night-time noise levels at or above the LOAEL will decrease slightly under the 12 mppa scenario, reducing from 5,150 to 5,050. Around 2,600 will experience either no change or a negligible reduction in night noise exposure of 0 to 1 dB, and around 2,450 will experience a negligible increase of 0 to 2 dB in 2026 as compared to 2021. This constitutes a low or very low effect for these dwellings.

7.10.62 In summary, the air noise effects are not expected to materially change between the 10 mppa in 2021 and 12 mppa in 2026 scenarios. Approximately 300 dwellings are exposed to significant levels of night-time air noise under the 10 mppa 2021 scenario. This number will increase to around 350 under the 12mppa 2026 scenario. All of these dwellings, however, will experience only a low or very low effect due to negligible changes in noise level. All of the dwellings exposed to significant levels of external air noise, both in 2021 and 2026, are eligible under Bristol Airport's current sound insulation scheme and therefore have the option to improve the sound insulation to reduce the internal noise levels. All properties can also benefit from the Enhanced Sound Insulation Scheme as well.

7.10.63 The number of dwellings exposed to a significant level of noise due to individual aircraft events at least once per night decreases from 650 under the 10 mppa in 2021 scenario to 100 under the 12 mppa in 2026 scenario. This is a potentially significant adverse effect.

7.10.64 A summary of these noise effects with an overall significance finding is set out in **Table 7.42**.

Table 7.42 Summary of air noise effects, 10 mppa 2021 to 12 mppa 2026

Receptor type	$L_{Aeq,T}$ noise criterion	No Change/Beneficial or Adverse[1]	Receptor Nos. in $L_{Aeq,T}$[2]	Change in noise level	% Change in Highly Annoyed/ Sleep Disturbed[3]	Change in dwellings SEL/L_{ASmax} (night)	Significance of Effect
Residential – Day					-1% A.		**Negligible beneficial, not significant**
LOAEL	51 dB $L_{Aeq,16h}$	No change/Benef.	1,950	Negligible			
		Adverse	650	Negligible			
SOAEL	63 dB $L_{Aeq,16h}$	No change/Benef.	1	Negligible			
		Adverse	10	Negligible			
Residential – Night					-6% S.D.		**Negligible adverse, not significant**
LOAEL	45 dB $L_{Aeq,8h}$	No change/Benef.	2,500	Negligible		70 SEL/60 L_{ASmax} (min 10 events) +1,200 (+23%)	
		Adverse	2,200	Negligible			
SOAEL	55 dB $L_{Aeq,8h}$	No change/Benef.	80	Negligible		90 SEL/80 L_{ASmax} (min 1 event) -550 (-85%)	
		Adverse	250	Negligible			
Schools	55 dB $L_{Aeq,30m}$	No change/Benef.	1	Negligible			**Negligible adverse, not significant**
		Adverse	1	Negligible			
Places of Worship	As residential, day	No change/Benef.	1	Negligible			**Negligible adverse, not significant**
		Adverse	5	Negligible			
Amenity Areas	55 dB $L_{Aeq,T}$	No change/Benef.	0	Negligible			**Negligible adverse,**

Receptor type	$L_{Aeq,T}$ noise criterion	No Change/Beneficial or Adverse[1]	Receptor Nos. in $L_{Aeq,T}$[2]	Change in noise level	% Change in Highly Annoyed/ Sleep Disturbed[3]	Change in dwellings SEL/L_{ASmax} (night)	Significance of Effect
							not significant
		Adverse	3	Negligible			

1. States whether noise change is zero or a reduction (No change/beneficial) or an increase (adverse) moving from scenario A to scenario B.
2. The receptor numbers for LOAEL are those exposed to a noise level equal to or greater than LOAEL (assessed in terms of $L_{Aeq,16h}$ daytime, $L_{Aeq,8h}$ night-time) but less than SOAEL, following a move from scenario A to scenario B. Those for SOAEL, relate to receptors exposed to a noise level equal to or greater than SOAEL. For non-residential receptors, it shows the change in the number of those exposed to the specified criterion level.
3. Percentage changes based on unrounded data.

Future (10 mppa in 2026) to Future (12 mppa in 2026) With Development

7.10.65 The effect of air noise on residential receptors in 2026 without the Proposed Development has been assessed assuming that Bristol Airport is limited to a throughput of 10 mppa in 2026. This is compared in this section to the 12 mppa 2026 scenario with the Proposed Development.

7.10.66 If the Proposed Development does not proceed, Bristol Airport would be constrained from 2021 onwards to 10 mppa. The number of aircraft movements in the 10 mppa in 2026 scenario is assumed to therefore remain at 86,973, as would occur in the 10 mppa in 2021 scenario. If the Proposed Development does proceed, annual aircraft movements are forecast to increase to 97,393 in the 12 mppa in 2026 scenario.

7.10.67 It has been assumed that the same proportion of the aircraft fleet has been modernised in both 2026 scenarios. In practice it is likely that modernisation would occur at a slower rate if passenger throughput were constrained to 10 mppa. This is because the likelihood that more modern, quieter aircraft will be allocated to Bristol Airport is reduced since no potential of growth for the airline will be present. Airlines are already securing flights to destinations and associated 'slots' at airports as far ahead as summer 2020 at the time of writing. If an airline can be assured growth at another airport it may seek to deliver a competitive advantage to secure capacity now. As airports are coming under increased pressure to reduce noise impacts, securing more modern aircraft fleets coupled with growth is a key way in which this can occur sustainably. Therefore, the 10 mppa 2026 scenario is a worst-case comparison for the 12 mppa scenario as the expectation of aircraft modernisation is similar.

7.10.68 **Table 7.43** and **Table 7.44** summarise for the daytime and night-time how this change will affect residential dwellings based on the absolute levels arising under 12 mppa in 2026 scenario and the change in noise level from the 10 mppa in 2026 scenario that is experienced. The beneficial change category includes those dwellings experiencing no change in noise level.

7.10.69 Based on the criteria set out in **Table 7.22**, the number of residential and non-residential receptors experiencing a given air noise effect due to the change between the 10 mppa in 2026 and 12 mppa in 2026 scenarios is then set out in **Table 7.45**.

7.10.70 A potential significant effect (adverse or beneficial) is considered to arise in **Table 7.43** if the magnitude of the effect is rated as medium or higher. Whether a significant effect arises will depend on context, such as the number of noise sensitive receptors affected and how often it occurs.

Table 7.43 Dwellings exposed to absolute air noise and change in air noise, 10 mppa 2026 to 12 mppa 2026, daytime

Subjective description of impact	Contour band, dB $L_{Aeq,16h}$	Number of dwellings in band, 12 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Moderate	Substantial	Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Negligible	**51 (LOAEL)**	0	Beneficial	0	0	0	0	0
		2,200	Adverse	2,200	0	0	0	0
Very minor	**54**	0	Beneficial	0	0	0	0	0
		400	Adverse	400	0	0	0	0
Minor	**57**	0	Beneficial	0	0	0	0	0
		350	Adverse	350	0	0	0	0
Minor/ Moderate	**60**	0	Beneficial	0	0	0	0	0
		100	Adverse	100	0	0	0	0
Significant Moderate	**63 (SOAEL)**	0	Beneficial	0	0	0	0	0
		10	Adverse	10	0	0	0	0
Significant Substantial	**66**	0	Beneficial	0	0	0	0	0
		1	Adverse	1	0	0	0	0
Significant Very Substantial	**69 (UAEL)**	0	Beneficial	0	0	0	0	0
		0	Adverse	0	0	0	0	0
Total		0	Beneficial	0	0	0	0	0
		3,100	Adverse	3,100	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

Table 7.44 Dwellings exposed to absolute air noise and change in air noise, 10 mppa 2026 to 12 mppa 2026, night-time

Subjective description of impact	Contour band, dB $L_{Aeq,8h}$	Number of dwellings in band, 12 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Moderate	Substantial	Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Negligible	**45 (LOAEL)**	0	Beneficial	0	0	0	0	0
		2,050	Adverse	2,050	0	0	0	0
Very minor	**48**	0	Beneficial	0	0	0	0	0
		2,100	Adverse	2,100	0	0	0	0
Minor	**51**	0	Beneficial	0	0	0	0	0
		450	Adverse	450	0	0	0	0
Minor/ Moderate	**54**	0	Beneficial	0	0	0	0	0
		100	Adverse	100	0	0	0	0
Significant Moderate	**SOAEL (55)**	0	Beneficial	0	0	0	0	0
		300	Adverse	300	0	0	0	0
Significant Substantial	**60**	0	Beneficial	0	0	0	0	0
		10	Adverse	10	0	0	0	0
Significant Very Substantial	**63**	0	Beneficial	0	0	0	0	0
		1	Adverse	1	0	0	0	0
Total		0	Beneficial	0	0	0	0	0
		5,050	Adverse	5,050	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

Table 7.45 Air noise effect on number of dwellings and non-residential receptors – 10 mppa 2026 to 12 mppa 2026

Receptor Type	12 mppa outdoor noise level, dB	Beneficial[1] or adverse change	Magnitude of effect				
			Very low	Low	Medium	High	Very High
			Change in noise level, dB(A)				
Residential Day (07:00-23:00)	51 ≤ $L_{Aeq,16h}$ < 63	Beneficial	0	0	0	0	0
		Adverse	3,100	0	0	0	0
	$L_{Aeq,16h}$ ≥ 63	Beneficial	0	0	0	0	0
		Adverse	10	1	0	0	0
Residential Night (23:00-07:00)	45 ≤ $L_{Aeq,8h}$ < 55	Beneficial	0	0	0	0	0
		Adverse	4,700	0	0	0	0
	$L_{Aeq,8h}$ ≥ 55	Beneficial	0	0	0	0	0
		Adverse	250	70	0	0	0
Schools	$L_{Aeq,30min}$ ≥ 55	Beneficial	0	0	0	0	0
		Adverse	2	0	0	0	0
Places of worship	51 ≤ $L_{Aeq,16h}$ < 63	Beneficial	0	0	0	0	0
		Adverse	6	0	0	0	0
	$L_{Aeq,16h}$ ≥ 63	Beneficial	0	0	0	0	0
		Adverse	0	0	0	0	0
Amenity Areas	$L_{Aeq,T}$ ≥ 55	Beneficial	0	0	0	0	0
		Adverse	3	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

7.10.71 As aircraft movements will increase under the 12 mppa 2026 scenario, as compared to the 10 mppa 2026 scenario, with little difference in fleet mix, noise exposure levels are predicted to rise slightly.

7.10.72 The differences in daytime air noise between the 12 mppa 2026 and 10 mppa 2026 scenarios are small, with increases in the range 0 to 2 dB occurring with the Proposed Development.

7.10.73 The number of dwellings that are exposed to daytime noise levels at or above the LOAEL will rise from 2,200 to 3,100, from 10 mppa to 12 mppa, with these receptors experiencing a negligible increase of generally around 1 dB, a very low effect.

7.10.74 There are very few dwellings exposed to the SOAEL or above during the daytime, around 10 dwellings both under the 10 mppa and 12 mppa scenarios. Under the 12 mppa scenario, these properties, in the Lulsgate Bottom area, would experience a negligible increase in noise exposure level giving rise to a low or very low effect of no significance.

7.10.75 Around 4,150 dwellings are exposed to night-time air noise at or above the LOAEL under 10 mppa in 2026 and this will increase to 5,050 under 12 mppa with the Proposed Development. The change in noise for these receptors under 12 mppa would be negligible, around 1 dB, a very low effect.

7.10.76 Around 250 dwellings are exposed to night-time air noise at or above the SOAEL under 10 mppa in 2026, increasing to around 350 under 12 mppa. Again, the change in noise for these receptors under 12 mppa would be negligible, around 1 dB, a low or very low effect.

7.10.77 In summary, the air noise effects are expected to increase by a low or very low amount under the 12 mppa in 2026 scenario when compared to the 10 mppa in 2026 scenario. Around 10 dwellings are exposed to significant levels of daytime air noise under both scenarios. At night, the number exposed to significant levels of air noise increases from 250 under the 10 mppa in 2026 scenario to 350 under the 12 mppa in 2026 scenario.

7.10.78 A summary of these noise effects with an overall significance finding is set out in **Table 7.46**.

Table 7.46 Summary of air noise effects, 10 mppa 2026 to 12 mppa 2026

Receptor type	$L_{Aeq,T}$ noise criterion	No Change/Beneficial or Adverse[1]	Receptor Nos. in $L_{Aeq,T}$[2]	Change in noise exposure	% Change in Highly Annoyed/ Sleep Disturbed[3]	Change in dwellings SEL/L_{ASmax} (night)	Significance of Effect
Residential – Day					+37% A.		**Negligible adverse, not significant**
LOAEL	51 dB $L_{Aeq,16h}$	No change/Benef.	0	Negligible			
		Adverse	3,100	Negligible			
SOAEL	63 dB $L_{Aeq,16h}$	No change/Benef.	0	Negligible			
		Adverse	10	Negligible			
Residential – Night					+18% S.D.		**Negligible adverse, not significant**
LOAEL	45 dB $L_{Aeq,8h}$	No change/Benef.	0	Negligible		70 SEL/60 L_{ASmax} (min 10 events) +1,950 (+44%)	

Receptor type	$L_{Aeq,T}$ noise criterion	No Change/Beneficial or Adverse[1]	Receptor Nos. in $L_{Aeq,T}$[2]	Change in noise exposure	% Change in Highly Annoyed/ Sleep Disturbed[3]	Change in dwellings SEL/L_{ASmax} (night)	Significance of Effect
		Adverse	4,700	Negligible			
SOAEL	55 dB $L_{Aeq,8h}$	No change/Benef.	0	Negligible		90 SEL/80 L_{ASmax} (min 1 event) No change	
		Adverse	350	Negligible			
Schools	55 dB $L_{Aeq,30m}$	No change/Benef.	0	Negligible			**Negligible adverse, not significant**
		Adverse	2	Negligible			
Places of Worship	As residential, day	No change/Benef.	0	Negligible			**Negligible adverse, not significant**
		Adverse	6	Negligible			
Amenity Areas	55 dB $L_{Aeq,T}$	No change/Benef.	0	Negligible			**Negligible adverse, not significant**
		Adverse	3	Negligible			

1. States whether noise change is zero or a reduction (No change/beneficial) or an increase (adverse) moving from scenario A to scenario B.
2. The receptor numbers for LOAEL are those exposed to a noise level equal to or greater than LOAEL (assessed in terms of $L_{Aeq,16h}$ daytime, $L_{Aeq,8h}$ night-time) but less than SOAEL, following a move from scenario A to scenario B. Those for SOAEL, relate to receptors exposed to a noise level equal to or greater than SOAEL. For non-residential receptors, it shows the change in the number of those exposed to the specified criterion level.
3. Percentage changes based on unrounded data.

7.10.79 In summary, when considering the noise impacts likely to arise as a result of moving from a 10 mppa scenario under 2021 or 2026 to a 12 mppa scenario with the Proposed Development, these are predicted to be low or very low with no significant effects.

7.11 Assessment of effects – ground noise

7.11.1 **Section 7E.5** of **Appendix 7E** provides the detailed results of the ground noise assessment. Ground noise contours are presented, along with contour areas and dwelling counts within each contour band for residential receptors. Noise exposure values are also presented for noise sensitive non-residential receptors. Key results are presented in this section. Note that the significance ratings arising from the effects described here are described in the next section titled "Predicted ground noise effects and their significance". Where percentage changes are given, these are based on unrounded values.

7.11.2 For all tables in this section, areas are rounded to the nearest 0.1km^2. Dwelling and population counts are rounded to the nearest 50 above 100 and to the nearest 10 below 100. Below 10, the

actual number is given. The counts include all those dwellings or people within a specified contour band and any higher value bands so, for example, any dwellings within a 60 dB contour would also be counted as being within a 50 dB contour as well.

Residential receptors

$L_{Aeq,16h}$ daytime

7.11.3 The dwelling counts within key daytime ground noise contours are presented in **Table 7.47**. These contours are presented in **Figure 7E.3** to **Figure 7E.5**.

Table 7.47 Ground noise dwelling counts, $L_{Aeq,16h}$ average summer day

Contour $L_{Aeq,16h}$ dB(A)	Number of Dwellings		
	Baseline 2017	10 mppa 2026	12 mppa 2026
50	70	80	70
60	1	1	1
70	0	0	0

7.11.4 **Table 7.47** shows that in 2017, around 70 dwellings are adversely affected by ground noise as a result of daytime aircraft operations at Bristol Airport. This total is expected to remain much the same, although marginally increase to around 80 in the 10 mppa scenario.

7.11.5 Currently, and in the future under any scenario, only one residential receptor is predicted to experience ground noise above the SOAEL of 65 dB $L_{Aeq,16h}$, which is Core Hill, on Cooks Bridle Path to the north-west of the western stands at Bristol Airport. Core Hill was previously provided a grant of almost £9,000 as part of the 2000-2001 insulation scheme.

7.11.6 No residential receptors are exposed to unacceptable levels of daytime ground noise currently, nor will they be in the future.

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

7.11.7 Turning to the night-time effects, **Table 7.48** show the dwelling counts within key night-time ground noise contours. These contours are presented in **Figure 7E.6** to **Figure 7E.8**.

Table 7.48 Ground noise dwelling counts, $L_{Aeq,8h}$ average summer night

Contour $L_{Aeq,8h}$ dB(A)	Number of Dwellings		
	Baseline 2017	10 mppa 2026	12 mppa 2026
45	70	100	100
55	1	2	3
65	0	0	0

7.11.8 **Table 7.48** shows that in 2017, around 70 dwellings are adversely affected by ground noise as a result of night-time aircraft operations at Bristol Airport. This total is expected to increase to around 100 under both future scenarios.

7.11.9 Currently, only one residential receptor is predicted to experience ground noise above the SOAEL of 60 dB $L_{Aeq,8h}$, which is the same property as is exposed to the SOAEL in the daytime. This is predicted to increase to two dwellings under the 10 mppa scenario and increase to three dwellings under the 12 mppa scenario. The additional dwellings are The Lodge in the 10 mppa scenario and North Hill House in the 12 mppa scenario. Both of these are also on Cooks Bridle Path.

7.11.10 No residential receptors are exposed to unacceptable levels of night-time ground noise currently, nor will they be in the future.

Variation in noise levels at representative residential receptors

7.11.11 To explore by how much noise exposure levels in the day and night periods are expected to change between different scenarios, noise predictions have been undertaken comparing various scenarios and the change expected for all residential receptors, considered in different noise exposure bands. These tables depict, for each noise exposure band, the number of receptors that will experience either no change/a beneficial change in noise or an adverse change in noise. These tables are presented in **Appendix 7E**. To further demonstrate these effects, an assessment of the expected noise change between various scenarios is also provided at a series of representative residential receptors around Bristol Airport. The receptors assessed are shown in **Figure 7.2**.

7.11.12 **Table 7.49** shows the daytime and night-time ground noise exposure levels for 10 mppa 2026 (in brackets) and the relative change in noise level for the baseline (2017) and the 12 mppa 2026 scenario, at representative residential receptors.

Table 7.49 10 mppa 2026 air noise exposure levels, average summer day and night, and relative change

Receptor	Location	Daytime $L_{Aeq,16h}$ (dB)			Night-time $L_{Aeq,8h}$ (dB)		
		2017	10 mppa 2026	12 mppa 2026	2017	10 mppa 2026	12 mppa 2026
A	Cooks Bridle Path, Downside	0	(61)	+2	-3	(59)	+2
B	Downside Road, Lulsgate Bottom	0	(58)	-6	-2	(54)	-7
C	School Lane, Lulsgate Bottom	0	(52)	0	-4	(50)	-1
D	Red Hill (A38), Redhill	0	(45)	+1	-2	(41)	0
E	Winters Lane, Redhill	0	(47)	+1	-2	(44)	0
F	Downside Road, Downside	0	(53)	+1	-1	(50)	+1
G	Downside Road, Downside	0	(50)	-1	-2	(47)	-1
H	Downside Road, Lulsgate Bottom	+2	(56)	-5	-3	(53)	-6
I	Bridgwater Road (A38), Lulsgate Bottom	0	(50)	-1	-3	(47)	-1
J	Red Hill (A38), Redhill	0	(43)	0	-2	(39)	0
K	Winters Lane, Redhill	0	(50)	+1	-2	(46)	+1

7.11.13 In both the daytime and night-time periods for the 10 mppa scenario, one of the 11 locations lies at or above the SOAEL, which is Cooks Bridle Path. This is also the situation both in 2017 and under the 12 mppa scenario.

7.11.14 **Table 7.49** shows that in the daytime period, there is in general little change between the 2017 and 10 mppa scenarios, with no change for 10 of the 11 locations, and a negligible decrease of 2 dB for the 10 mppa scenario at one location. In the night-time period, there are increases from 2017 to the 10 mppa scenario. For eight of these locations this is a negligible increase of 2 dB, but for four locations this is a moderate increase of 3 to 4 dB.

7.11.15 Considering the 12 mppa scenario, in the daytime there are generally negligible changes from the 10 mppa scenario; five locations experience an increase of 1 to 2 dB, two locations experience no change, and two locations experience a decrease of 1 dB. Some locations, in particular those in Lulsgate Bottom, benefit from the additional screening resulting from the Proposed Development being built out and therefore two locations experience moderate reductions in noise level of 5-6 dB under the 12 mppa 2026 scenario. This situation is similar in the night-time period, with one location experiencing a negligible increase of 1 dB, five locations experiencing no change, and three locations experiencing a negligible decrease of 1 dB. The same two locations benefit from the additional screening, experiencing moderate or substantial decreases of 6 or 7 dB under the 12 mppa scenario.

Non-residential receptors

7.11.16 **Appendix 7E** 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

7.11.17 **Appendix 7E** identifies no schools, as being within the ZoI of ground noise around Bristol Airport.

Places of worship

7.11.18 There are two places of worship identified within the ZoI of air 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

7.11.19 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

7.11.20 This section sets out the ground noise effects arising from operations at Bristol Airport by comparing the following key scenarios:

- Baseline year (2017) vs future (10 mppa in 2026); and
- Future (10 mppa in 2026) vs future (12 mppa in 2026) With Proposed Development

7.11.21 Note that in the future, as the modernisation of the fleet will have little influence on the ground noise levels produced by aircraft, it is not necessary to consider a future 10 mppa 2021 scenario as this would be expected to give rise to the same noise effects as those under 10 mppa in 2026.

Baseline year (2017) vs Future (10 mppa in 2026)

7.11.22 Bristol Airport is forecast to grow irrespective of whether the Proposed Development proceeds. This section summarises the noise effects expected (compared to 2017) as a result of this growth to Bristol Airport's permitted passenger throughput of 10 mppa and the resulting effects on the local community.

7.11.23 Annual aircraft movements are forecast to increase from 73,562 in 2017 to 86,973 in the 10 mppa scenario.

7.11.24 Under the 10 mppa scenario, aircraft movements will remain similar in the daytime, increasing by 2% compared to 2017. Additionally, there is a reduction in the proportion of movements by propeller aircraft, which are the loudest aircraft category for ground noise. Therefore, daytime ground noise exposure levels are predicted to remain similar to now.

7.11.25 The number of dwellings exposed to noise levels at or above the LOAEL in the daytime increases slightly from 70 to 80. The associated change in noise level at these 80 receptors is negligible, with around half experiencing an increase of 1 dB or less, and the other half experiencing no change or a decrease of 1 dB or less. This is considered to be a very low effect. The one dwelling exposed to noise levels at or above the SOAEL experiences similar changes in noise level and therefore is also a very low effect.

7.11.26 At night, aircraft movements increase by around 50% compared to 2017, and are primarily made up of medium size jets both now and under the 10 mppa 2026 scenario. This results in around 100 dwellings exposed to the LOAEL or above under the 10 mppa 2026 scenario, compared to around 70 in 2017. Of these dwellings, 25 will experience a moderate increase in noise level of 3 to 4 dB. This constitutes a moderate adverse effect for these dwellings. The remainder experience an increase of 1 to 3 dB, which is considered to be a low or very low effect. One dwelling is exposed to the SOAEL under the 2017 scenario, which is Core Hill, on Cooks Bridle Path. A second dwelling becomes exposed to the SOAEL under the 10 mppa scenario, which is The Lodge, also on Cooks Bridle Path. These dwellings experience a change in noise level of 2 to 4 dB which constitutes a medium effect.

7.11.27 In summary, only one dwelling is currently experiencing significant levels of ground noise, which is expected to increase to two in the 10 mppa scenario. These dwellings also experience a minor or moderate increase in noise level, constituting a medium effect of moving from 2017 to the 10 mppa in 2026 scenario which is rated as probably significant. In practice, these dwellings are eligible under Bristol Airport's current sound insulation scheme (which is based on the air noise effect).

Future (10 mppa in 2026) to Future (12 mppa in 2026) With Development

7.11.28 This section summarises the noise effects expected (compared to that currently permitted) as a result of growth to 12 mppa in 2026. It describes and compares the effects of the two key scenarios assessed in this ES.

7.11.29 Annual aircraft movements are forecast to increase from 86,973 in the 10 mppa scenario to 97,393 in the 12 mppa scenario.

7.11.30 **Table 7.50** and **"Beneficial"** rows include a small number of dwellings with zero change.

7.11.31 **Table 7.51** summarise for the daytime and night-time how this change will affect residential dwellings based on the absolute levels arising under 12 mppa in 2026 scenario and the change in noise level from the 10 mppa in 2026 scenario that is experienced. The beneficial change category includes those dwellings experiencing no change in noise level.

7.11.32 Based on the criteria set out in **Table 7.26**, the number of residential and non-residential receptors experiencing a given air noise effect due to the change between the 10 mppa in 2026 and 12 mppa in 2026 scenarios is set out in **Table 7.52**.

7.11.33 A potential significant effect (adverse or beneficial) is considered to arise in **Table 7.52** if the magnitude of the effect is rated as medium or higher. Whether a significant effect arises will depend on context, such as the number of noise sensitive receptors affected and how often it occurs.

Table 7.50 Dwellings exposed to absolute ground noise and change in ground noise, 10 mppa 2026 to 12 mppa 2026, daytime

Subjective description of impact	Contour band, dB $L_{Aeq,16h}$	Number of dwellings in band, 12 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Significant Moderate	Significant Substantial	Significant Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Negligible	**50 (LOAEL)**	60	Beneficial	20	5	30	4	0
		10	Adverse	10	0	0	0	0
Minor	**55**	0	Beneficial	0	0	0	0	0
		3	Adverse	3	0	0	0	0
Significant Moderate	**60 (SOAEL)**	0	Beneficial	0	0	0	0	0
		1	Adverse	1	0	0	0	0
Significant Substantial	**65**	0	Beneficial	0	0	0	0	0
		0	Adverse	0	0	0	0	0
Significant Very Substantial	**70 (UAEL)**	0	Beneficial	0	0	0	0	0
		0	Adverse	0	0	0	0	0
Total		60	Beneficial	20	5	30	4	0
		10	Adverse	10	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

Table 7.51 Dwellings exposed to absolute ground noise and change in ground noise, 10 mppa 2026 to 12 mppa 2026, night-time

Subjective description of impact	Contour band dB $L_{Aeq,8h}$	Number of dwellings in band, 10 mppa (2026)	Beneficial[1] or adverse change	Change in Noise Level, dB Potential Impact Classification				
				Negligible	Minor	Significant Moderate	Significant Substantial	Significant Very Substantial
				0 – 2 dB	2 – 3 dB	3 – 6 dB	6 – 9 dB	>9 dB
Negligible	**45 (LOAEL)**	80	Beneficial	40	9	30	4	0
		30	Adverse	30	0	0	0	0
Minor	**50**	0	Beneficial	0	0	0	0	0
		2	Adverse	2	0	0	0	0
Significant Moderate	**55 (SOAEL)**	0	Beneficial	0	0	0	0	0
		2	Adverse	2	0	0	0	0
Significant Substantial	**60**	0	Beneficial	0	0	0	0	0
		1	Adverse	1	0	0	0	0
Significant Very Substantial	**65 (UAEL)**	0	Beneficial	0	0	0	0	0
		0	Adverse	0	0	0	0	0
Total		80	Beneficial	40	9	30	4	0
		30	Adverse	30	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

Table 7.52 Ground noise effect on number of dwellings and non-residential receptors – 10 mppa 2026 to 12 mppa 2026

Receptor Type	12 mppa outdoor noise level, dB	Beneficial[1] or adverse change	Magnitude of effect				
			Very low	Low	Medium	High	Very High
			Change in noise level, dB(A)				
Residential Day (07:00-23:00)	50 ≤ $L_{Aeq,16h}$ < 60	Beneficial	20	5	30	4	0
		Adverse	10	0	0	0	0
	$L_{Aeq,16h}$ ≥ 60	Beneficial	0	0	0	0	0

Receptor Type	12 mppa outdoor noise level, dB	Beneficial[1] or adverse change	Magnitude of effect				
			Very low	Low	Medium	High	Very High
			Change in noise level, dB(A)				
		Adverse	0	1	0	0	0
Residential Night (23:00-07:00)	$45 \leq L_{Aeq,8h} < 55$	Beneficial	40	9	30	4	0
		Adverse	30	0	0	0	0
	$L_{Aeq,8h} \geq 55$	Beneficial	0	0	0	0	0
		Adverse	3	0	0	0	0
Schools	$L_{Aeq,30min} \geq 55$	Beneficial	1	0	0	0	0
		Adverse	0	0	0	0	0
Places of worship	$50 \leq L_{Aeq,16h} < 60$	Beneficial	0	0	0	0	0
		Adverse	0	0	0	0	0
	$L_{Aeq,16h} \geq 60$	Beneficial	0	0	0	0	0
		Adverse	0	0	0	0	0
Amenity Areas	$L_{Aeq,T} \geq 55$	Beneficial	0	0	0	0	0
		Adverse	0	0	0	0	0

1. "Beneficial" rows include a small number of dwellings with zero change.

7.11.34 Under the 12 mppa scenario, aircraft movements will increase by 17% in the daytime compared to the 10 mppa scenario. The aircraft mix is forecast to remain broadly similar, with a small shift from small to medium sized jets. Therefore, with no change in infrastructure, the noise levels would be expected to increase by a negligible amount, around 1 dB, at most locations. However, the Proposed Development includes some buildings which will provide additional screening to certain receptors, in particular those in the Lulsgate Bottom area, which leads to decreased ground noise levels.

7.11.35 The number of dwellings exposed to the LOAEL in the daytime decreases slightly from 80 under the 10 mppa scenario to 70 under the 12 mppa scenario. 25 of these dwellings experience a negligible or minor reduction in absolute noise level and 10 experience a negligible increase in noise level, which constitutes a low or very low effect of no significance. 30 dwellings experience a moderate

decrease in noise level, and 4 dwellings experience a substantial decrease in noise level. These constitute medium and high beneficial effects respectively for these dwellings. One dwelling is exposed to the SOAEL under both scenarios, which is Core Hill, on Cooks Bridle Path. This dwelling experiences a negligible increase in noise level.

7.11.36 At night the situation is broadly similar, with aircraft movements increasing by around 15% compared to the 10 mppa scenario and similar small changes in fleet mix. Therefore, negligible increases would be normally expected other than where the additional screening provided by the Proposed Development has a beneficial effect.

7.11.37 The other factor at night is the variation in the restriction of night-time APU usage on stands 38 and 39. This results in slight increases for the dwellings closest to these stands, although the increases are still less than 2 dB and therefore of negligible magnitude.

7.11.38 This results in around 100 dwellings exposed to the LOAEL or above at night under both future scenarios. Of these, around 50 experience a negligible or minor reduction in absolute noise level and 10 experience a negligible increase in noise level, which constitutes a low or very low effect of no significance. 30 dwellings experience a moderate decrease in noise level, and 4 dwellings experience a substantial decrease in noise level. These constitute medium and high beneficial effects respectively for these dwellings. Two dwellings are exposed to the SOAEL under the 10 mppa scenario, which increases to three under the 12 mppa scenario. This additional dwelling is located on Cooks Bridle Path, to the north-west of the western stands at Bristol Airport. These dwellings experience a negligible increase in noise level of 1 to 2 dB and therefore a low effect.

7.11.39 In summary, only one dwelling is exposed to significant levels of ground noise under the 10 mppa scenario in the daytime period, which is expected to remain the case under the 12 mppa scenario. Two dwellings are exposed to significant levels of ground noise in the night-time period, which is expected to increase to three under the 12 mppa scenario. These dwellings experience a negligible increase in noise level of 1 to 2 dB, constituting a low effect of moving from the 10 mppa to the 12 mppa scenario which is rated as not significant. In practice, these three dwellings are all eligible under Bristol Airport's current sound insulation scheme (which is based on the air noise effect).

7.11.40 30 dwellings experience a medium decrease in noise level as a result of moving from the 10 mppa to the 12 mppa scenario which is rated as probably significant (beneficial). 4 dwellings experience a high decrease in noise level as a result of moving from the 10 mppa to the 12 mppa scenario which is rated as significant (beneficial).

7.11.41 A summary of these noise effects is set out in **Table 7.53**.

Table 7.53 Summary of ground noise effects, 10 mppa 2026 to 12 mppa 2026

Receptor type	$L_{Aeq,T}$ noise criterion	No change/Beneficial or Adverse[1]	Receptor Nos. in $L_{Aeq,T}$[2]	Change in noise exposure	Significance of Effect
Residential - Day					**Moderate beneficial, probably significant**
LOAEL	50 dB $L_{Aeq,16h}$	No change/Beneficial	20	Negligible	
			5	Minor	
			30	Moderate	
			4	Substantial	

Receptor type	$L_{Aeq,T}$ noise criterion	No change/Beneficial or Adverse[1]	Receptor Nos. in $L_{Aeq,T}$[2]	Change in noise exposure	Significance of Effect
		Adverse	10	Negligible	
			3	Minor	
SOAEL	60 dB $L_{Aeq,16h}$	No change/Beneficial.	0	N/A	
		Adverse	1	Negligible	
Residential - Night					**Moderate beneficial, probably significant**
LOAEL	45 dB $L_{Aeq,8h}$	No change/Beneficial.	40	Negligible	
			9	Minor	
			30	Moderate	
			4	Substantial	
		Adverse	30	Negligible	
			2	Minor	
SOAEL	55 dB $L_{Aeq,8h}$	No change/Beneficial.	0	N/A	
		Adverse	3	Negligible	
Schools	55 dB $L_{Aeq,30m}$	No change/Beneficial	1	Negligible	**Negligible beneficial, probably significant**
Places of Worship	As residential, day		0	N/A	None
Amenity Areas	55 dB $L_{Aeq,T}$		0	N/A	None

1. States whether noise change is zero or a reduction (No change/beneficial) or an increase (adverse) moving from scenario A to scenario B.

2. The receptor numbers for LOAEL are those exposed to a noise level equal to or greater than LOAEL (assessed in terms of $L_{Aeq,16h}$ daytime, $L_{Aeq,8h}$ night-time) but less than SOAEL, following a move from scenario A to scenario B. Those for SOAEL, relate to receptors exposed to a noise level equal to or greater than SOAEL. For non-residential receptors, it shows the change in the number of those exposed to the specified criterion level.

7.12 Assessment of effects – road traffic noise

7.12.1 **Section 7F.5** of **Appendix 7F** provides the detailed results of the road traffic noise assessment. Noise has been assessed due to road traffic using roads in the vicinity of Bristol Airport, specifically the A38, Downside Road, West Lane, and North Side Road. Road traffic noise contours are presented, along with receptor counts within each contour band. Key results are presented in this section.

7.12.2 For all tables in this section, receptor counts are rounded to the nearest 50 above 100 and to the nearest 10 below 100. Below 10, the actual number is given. Where percentage changes are given, these are based on unrounded values.

7.12.3 **Table 7.54** shows the number of receptors exposed to the LOAEL, SOAEL and UAEL values.

Table 7.54 Number of receptors, $L_{A10,18h}$

Contour $L_{A10,18h}$ dB(A)	Number of Receptors		
	Baseline 2017	10 mppa 2026	12 mppa 2026
55	100	100	100
68	20	30	30
75	2	4	4

7.12.4 **Table 7.54** shows that currently, around 100 of the assessed receptors are adversely affected by road traffic noise in the vicinity of Bristol Airport. This total is expected to remain much the same going forward to 2026 under both scenarios.

7.12.5 Currently, around 20 of the assessed residential receptors are predicted to experience road traffic noise above the SOAEL of 68 dB $L_{A10,18h}$. This is predicted to increase to around 30 in 2026 under both scenarios.

7.12.6 Two of the assessed receptors are currently exposed to road traffic levels above the UAEL. In 2026, four receptors are exposed to this level under both scenarios. These are all located very close to the A38 and are comprised of the Forge Motel and surrounding buildings. The Forge Motel and Hathaway House have unlikely benefitted from previous noise insulation since these are commercial businesses. Other residential properties in the vicinity that have benefitted from the 2000-2001 noise insulation scheme are as follows:

- 1 School Lane, Felton;
- 2 School Lane, Felton;
- 1 Church View, School Lane, Felton;
- 2 Church View, School Lane, Felton;
- Clyde House, School Lane, Felton;
- The Cottage, School Lane, Felton; and
- End House, School Lane, Felton.

Predicted road traffic noise effects and their significance

7.12.7 This section sets out the road traffic noise effects arising from operations at Bristol Airport by comparing the following key scenarios:

- Baseline year (2017) vs future (10 mppa in 2026); and
- Future (10 mppa in 2026) vs future (12 mppa in 2026) With Proposed Development.

Baseline year (2017) vs Future (10 mppa in 2026)

7.12.8 Road traffic on roads in the vicinity of Bristol Airport is forecast to increase by around 30% from the baseline (2017) scenario to the 10 mppa 2026 scenario. This results in a negligible increase in noise exposure for the dwellings affected by road traffic noise of 1 to 2 dB for all assessed dwellings, constituting a very low effect. The number of receptors exposed to the LOAEL is around 100 in 2017

and remains similar under the 10 mppa 2026 scenario. The corresponding number of receptors exposed to the SOAEL increases from around 20 to around 30.

Future (10 mppa in 2026) to Future (12 mppa in 2026) With Development

7.12.9 This section summarises the noise effects expected (compared to those currently permitted) as a result of growth from 10 mppa to 12 mppa and the resulting effects on the local community. It describes and compares the effects of the two key scenarios assessed in this ES.

7.12.10 Road traffic on the roads in the vicinity of Bristol Airport is forecast to increase by around 15% from the baseline (2017) scenario to the 10 mppa 2026 scenario. This results in a negligible increase in noise exposure for the dwellings affected by road traffic noise of less than 1 dB for all assessed dwellings, constituting a very low effect. There are also negligible beneficial changes for a small number of dwellings as a result of infrastructure changes related to the Proposed Development. The number of receptors exposed to the LOAEL, SOAEL, and UAEL are around 100, 30, and 4 respectively under both scenarios.

7.12.11 A summary of these noise effects is set out in **Table 7.55.**

Table 7.55 Summary of road traffic noise effects, 10 mppa 2026 to 12 mppa 2026

Receptor type	$L_{Aeq,T}$ noise criterion	No change/Beneficial or Adverse[1]	Receptor Nos. in $L_{Aeq,T}$[2]	Change in noise exposure	Significance of Effect
Residential - Day					**Negligible adverse, not significant**
LOAEL	55 dB $L_{A10,18h}$	No change/Benef.	4	Negligible	
		Adverse	80	Negligible	
SOAEL	68 dB $L_{A10,18h}$	No change/Benef.	0	N/A	
		Adverse	30	Negligible	
UAEL	75 dB $L_{A10,18h}$	No change/Benef.	0	N/A	
		Adverse	4	Negligible	

1. States whether noise change is zero or a reduction (No change/beneficial) or an increase (adverse) moving from scenario A to scenario B.

2. The receptor numbers for LOAEL are those exposed to a noise level equal to or greater than LOAEL (assessed in terms of $L_{A10,18h}$) but less than SOAEL, following a move from scenario A to scenario B. Those for SOAEL, relate to receptors exposed to a noise level equal to or greater than SOAEL.

7.13 Assessment of Effects – construction noise and vibration

7.13.1 A detailed assessment of construction noise and vibration is presented in **Appendix 7G**. A summary of the key findings is presented here to describe the effects and significance of noise and vibration arising from the Proposed Development.

7.13.2 Construction will take place at different times over a period of up to seven years. Some works will occur in isolation while others will occur in phases, some of which might overlap in time. This raises the possibility of a noise sensitive receptor being affected simultaneously by different types of operations at a given site. In addition, works at multiple sites might take place at the same time. To

assess this risk, consideration has been given to the current programme of works (refer to **Chapter 2: Description of the Proposed Development**). Construction noise levels likely to arise at a series of representative noise sensitive receptors have been determined based on a single phase of works, for overlapping phases of works (where relevant) as well as in conjunction with any works packages programmed to occur at a similar time.

7.13.1 Predictions of construction noise values have been made using the methods described in BS 5228-1. Assumptions used for these calculations are described in **Appendix 7G**.

7.13.2 Noise has been predicted at representative noise sensitive receptors for each construction site of the Proposed Development and for each phase of construction activity. Where phases of construction activity at a site are expected to be concurrent, a worst-case value has been predicted alongside noise estimates for each phase. Worst-case values have also been predicted where work is provisionally scheduled to occur concurrently at different construction sites.

7.13.3 Construction sites where piling and vibratory compaction will take place have been identified. The vibration impact on the identified noise sensitive receptors has been considered with reference to guidance given in BS5228-2.

7.13.4 The Proposed Development includes a number of buildings, structures and surface works, which are summarised in

7.13.5 **Table** 7.56. Most construction works will take place during the daytime during the hours of 07:30 to 18:00 Monday to Friday and Saturday 08:00 to 13:00. There is no planned working on Sundays or Bank Holidays. Some work will need to be undertaken at night, specifically for the east taxiway link and taxiway widening fillets. These works are scheduled to occur between 23:00 and 06:00 over a 6-month period. This is the only night-time construction work scheduled.

Table 7.56 Construction sites of the Proposed Development

Development	Access route	Provisional dates	Notes
New arrivals area	North Side Road	11/2019 – 04/2020	
South terminal extension	North Side Road	11/2019 – 03/2021	
West terminal extension (Phase 2A)	North Side Road	09/2020 – 06/2021	
West terminal extension (Phase 2B)	North Side Road	11/2024 – 03/2026	
New service yard	North Side Road	11/2025 – 03/2026	
Walkway and east pier	North Side Road	09/2025 – 06/2026	
New canopy to front of existing terminal	North Side Road	09/2022 – 05/2023	
Multi-storey car park	North Side Road	09/2024 – 07/2025	
Gyratory road with internal surface car parking	North Side Road	10/2020 – 06/2021	
East taxiway link	North Side Road	01/2024 – 06/2024	Night-time
Silver Zone Car Park Extension (Phase 2	Silver Zone Car Park	04/2019 – 07/2019	
Highway improvements (A38)	A38	10/2025 – 04/2026	
Taxiway widening and fillets	North Side Road	01/2024 – 06/2024	Night-time
Silver Zone Car Park Extension (Phase 1)	Silver Zone Car Park	10/2019 – 11/2019	

7.13.6 Construction noise and vibration impacts likely to arise as a result of the Proposed Development have been assessed having regard to representative sensitive receptors in the vicinity of the proposed works. These 11 receptors, A to K, can be seen in **Figure 7.2** and are described in **Appendix 7G**.

7.13.7 Baseline noise levels for receptors A to D, used in determining the noise assessment criteria, have been taken from the baseline measurements carried out at these locations, as described in **Appendix 7C**. Typical daytime ambient noise levels around Bristol Airport lie between 50 dB $L_{Aeq,12h}$ and 60 dB $L_{Aeq,12h}$ during the daytime (refer to **Appendix 7C**) and 45 dB $L_{Aeq,8h}$ and 55 dB $L_{Aeq,8h}$ during the night-time.

7.13.8 On this basis, based on the ABC method in BS 5288-1, the threshold for a potentially significant effect from construction noise adopted in this assessment is 65 dB $L_{Aeq,12h}$ for the daytime (07:00-19:00) and 55 dB $L_{Aeq,8h}$ for the night-time (23:00-07:00).

7.13.9 The threshold adopted for a potentially significant effect from construction vibration in this assessment is 1.0 mms^{-1} PPV during the daytime (07:00-23:00) and 0.3 mms^{-1} during the night-time (23:00-07:00).

7.13.10 The construction noise levels associated with the Proposed Development have been assessed at each of the eleven representative receptors for each construction site, for each phase of work. These are tabulated in in **Appendix 7G.**

Predicted construction noise and vibration effects and their significance

7.13.11 **Section 7G.6** of **Appendix 7G** provides the detailed results of the construction noise assessment. Construction noise and vibration predictions are presented, along with receptor counts within each relevant noise band. Key results are presented in this section. This section sets out the noise and vibration effects arising due to construction related to the Proposed Development.

Daytime noise

7.13.12 On an individual site and phase basis, no significant effects from daytime construction noise are expected, with one exception.

7.13.13 Noise sensitive receptors adjacent to the A38 are predicted to be exposed to construction noise levels above the adopted daytime SOAEL and threshold for a potentially significant effect from the A38 highway improvements due to their close proximity to the construction site. The predictions indicate that this threshold is likely to be exceeded for all phases of work associated with the A38 highway improvements throughout the six-month duration of these works, with daytime noise levels lying in the range 68 to 72 dB $L_{Aeq,12h}$. As a result, a significant effect is predicted in the absence of any mitigation.

7.13.14 Certain phases of daytime construction activity are scheduled to occur concurrently at the various components of the Proposed Development. For these cases, a worst-case value has been predicted for each site, assuming all construction activities for concurrent phases are to be carried out simultaneously. These are presented **in Appendix 7G**.

7.13.15 On this worst-case basis, residential receptors at the east end of Downside Road are predicted to experience construction noise levels at the daytime threshold level of 65 dB from the construction works on the gyratory road. A potentially significant effect is therefore predicted from concurrent activity on the gyratory road in the absence of any mitigation.

7.13.16 For the case of the A38 highway improvements, residential receptors in the vicinity of the A38 are already expected to be exposed to construction noise levels greater than 65 dB from individual phases of works. These receptors are predicted to experience construction noise levels of up to 75 dB from concurrent activity on the A38 roadworks site.

7.13.17 Consideration has also been given to the cumulative effects of daytime noise from multiple construction sites where the schedule of works is expected to overlap. Worst-case values have been predicted for these periods, where all construction activities for concurrent phases have been assumed to be carried out simultaneously in a given month. These are presented in in **Appendix 7G**. As resulting levels lie below 65 dB $L_{Aeq,12h}$, no significant effects are predicted due to cumulative noise from multiple construction sites, aside from at those receptors already identified to be close to the A38 roadworks and those close to the new gyratory roadworks.

7.13.18 Where significant effects have been identified, mitigation measures are required to be deployed and these are discussed in **Section 7.16**.

Night-time noise

7.13.19 On an individual site and phase basis, no significant effects from night-time construction noise are expected.

7.13.20 Due to the sequential phasing of activity of the runway construction works, no concurrent activity at individual sites is expected during the night. However, work on the east taxiway link and taxiway widening and fillets sites is provisionally scheduled to be concurrent. In this scenario, if the noisiest phase of activity (earthworks) is assumed to take place at both sites simultaneously in a given hour

then construction levels will remain below the threshold above which any potential significant effects could arise. This is shown in in **Appendix 7G**.

Vibration

7.13.21 Vibration from piling would be expected to attenuate below the criteria for a potential significant effect over the distances (≥170m) to the nearest receptors and therefore **no significant effects** are predicted from piling vibration.

7.13.22 In practice, piling is planned to involve use of a rotary bored piling rig along with the insertion of steel casings using a vibratory technique. These methods produce less vibration than that arising from driven piles which have been assessed above.

7.13.23 In **Appendix 7G** at a distance of 20m, the closest distance between site and receptor for this activity (receptor I during the A38 works), a vibration level of 0.4mms^{-1} PPV would be expected with 50% probability of this value being exceeded. This is equivalent to a vibration level of 0.8mms^{-1} PPV with 33% chance of exceedance or 1.6mms^{-1} PPV with 5% chance of exceedance.

7.13.24 Based on the results for vibratory compaction during the daytime, vibration is most likely to remain below the limit for a possible significant effect to be indicated (1mms^{-1} PPV), although there is a slim chance of levels rising to a potential moderate significant effect but remaining below a potential substantial significant effect. Considering the low probability and context that only a few residential receptors could be affected for a short duration and assuming that Best Practicable Means, including forewarning the few receptors that could be affected, are followed it is not expected that a significant effect would occur due to vibratory compaction during the A38 works.

7.13.25 Vibratory compaction during the night-time, during the east taxiway works and taxiway widening and fillets works, will take place at large distances from the nearest noise sensitive residential receptors. As a result, vibration levels at these receptors are predicted to lie well below the threshold at which any potential significant effects might be expected.

7.14 Assessment of Effects – All noise and vibration sources

Predicted effects and their significance

7.14.1 The assessment of the effects of noise considers each type of source in isolation, such as aircraft air and ground noise, road traffic and construction noise, rather than in combination. The reason for this is that the primary research undertaken into community response and noise considers each noise source separately, not in combination. A summary of the results of the assessment of the noise and vibration from various sources is provided in **Table 7.57**. These are taken from the assessment results in **Section 7.10**, **Section 7.11**, **Section 7.12** and **Section 7.13** and relate to the change from Without to With Proposed Development in 2026. In the case of air noise, the table describes noise effects likely to occur accounting for how conditions might change under 10 mppa between 2021 and 2026.

Table 7.57 Summary of significance of adverse effects

Source	Receptor type and assessment period	Magnitude of change[2]	Significance[3]	Summary rationale
Air Noise	Residential – Day	Negligible	Not significant	A small number of dwellings are exposed to a significant air noise level. Changes due to the development are negligible and therefore not significant.
	Residential – Night	Negligible	Not significant	Although some dwellings are exposed to a significant air noise level, changes due to the development are negligible and therefore not significant.
	Schools	Negligible	Not significant	One school is exposed to a significant air noise level. Changes due to the development are negligible and therefore not significant.
	Places of Worship	Negligible	Not significant	A small number of places of worship are exposed to a significant air noise level. Changes due to the development are negligible and therefore not significant.
	Amenity Areas	Negligible	Not significant	A small number of amenity areas are exposed to a significant air noise level. Changes due to the development are negligible and therefore not significant.
Airborne Aircraft Vibration	Residential	Negligible	Not significant	A very small number of dwellings are exposed to a significant vibration level. This is expected to remain similar or reduce due to the development.
Ground Noise	Residential – Day	Negligible + moderate (beneficial)	Not significant	A very small number of dwellings are exposed to a significant ground noise level. Some dwellings experience moderate reductions in noise due to screening by the new development. Overall, changes due to the development are negligible and therefore not significant.
	Residential – Night	Negligible + moderate (beneficial)	Not significant	A very small number of dwellings are exposed to a significant ground noise level. Some dwellings experience moderate reductions in noise due to screening by the new development. Overall, changes due to the development are negligible and therefore not significant.
	Schools	Negligible	Not significant	No schools are exposed to a significant ground noise level.

Source	Receptor type and assessment period	Magnitude of change[2]	Significance[3]	Summary rationale
	Amenity Areas	N/A	Not significant	No amenity areas are exposed to a significant ground noise level.
Road Traffic Noise	Residential	Negligible	Not significant	A small number of dwellings are exposed to a significant road traffic noise level. Changes due to the development are negligible and therefore not significant.
Construction Noise	Residential	N/A	Not significant	A small number of dwellings are exposed to a significant construction noise level.
Construction Vibration	Residential	N/A	Not significant	No dwellings are exposed to significant construction vibration levels.

1. The sensitivity of receptor is defined using the criteria set out in **Section 7.9** above and is defined as low, medium, high and very high.
2. The magnitude of change on a receptor resulting from activities relating to the development is defined using the criteria set out in **Section 7.9** and is defined as negligible, minor, moderate, substantial and very substantial. The change is shown as adverse unless otherwise stated.
3. The significance of the environmental effects is based on the combination of the sensitivity of a receptor and the magnitude of change and is expressed as major (significant), moderate (probably significant) or minor/negligible (not significant), subject to the evaluation methodology outlined in **Section 7.9**.

7.14.2 From **Table 7.57** it can be seen that there are no receptors subject to significant noise and vibration effects due to any noise or vibration source between the Without Development (10 mppa 2021) and With Development (12 mppa 2026) scenarios, with the exception of construction noise, which is predicted to expose a small number of dwellings to significant levels of noise.

7.15 Consideration of optional additional mitigation or compensation

7.15.1 This assessment has shown 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. Therefore, no further mitigation is required to reduce the noise and vibration effects that are identified in this ES. However, some receptors are exposed to significant levels of noise and therefore BAL already have in place a number of mitigation measures, one of which is the noise insulation grant scheme. BAL are proposing to enhance this scheme as part of the Proposed Development.

7.15.2 The assessment has found that, with no mitigation, some receptors are likely to be exposed to significant levels of noise during the construction of the Proposed Development. Therefore, a number of measures are set out in the Outline Construction Environmental Management Plan (CEMP), which forms **Appendix 2B**. These measures, described in paragraphs 7.15.14 and 7.15.15, alongside relevant and implementable embedded measures, are considered to be likely to be effective and deliverable and address the potential significant effects of the construction of the Proposed Development.

Enhanced noise insulation grant scheme

7.15.3 As part of the Proposed Development, Bristol Airport are proposing to offer an enhanced noise insulation grant scheme.

7.15.4 In this proposed scheme, the thresholds for insulation will remain as current (refer to paragraph 7.8.25), i.e. daytime 57 dB $L_{Aeq,16h}$ for the 50% grant and 63 dB $L_{Aeq,16h}$ for the 100% grant. It is noted that in all scenarios the night-time 55 dB $L_{Aeq,8h}$ contour is completely enclosed within the daytime 57 dB $L_{Aeq,16h}$ contour. Therefore, people exposed to significant levels of night-time noise will also benefit from the scheme.

7.15.5 The minimum specification of the ventilators that can be installed as part of the scheme will also be improved. These provide a benefit as with sufficient ventilation, residents are not required to open windows and therefore can experience the full acoustic benefit of the glazing.

7.15.6 The grant amount available will increase by 50%, i.e. up to £7,500 for those properties within the 63 dB $L_{Aeq,16h}$ contour and up to £3,750 for those properties within the 60dB & 57 dB $L_{Aeq,16h}$ contour.

7.15.7 For a limited time, all properties within the 57 dB $L_{Aeq,16h}$ contour for the 12 mppa 2026 scenario will be eligible to use the grant amount towards 100% of the cost of works, rather than 50%. This is intended to incentivise uptake in the short-term in order to encourage implementation of mitigation measures prior to BAL reaching 12 mppa by 2026.

7.15.8 BAL will also contact all properties within the forecast eligibility contour to make them aware of the scheme and the offer being provided. Furthermore, BAL will advertise the scheme in the constituencies where the eligibility contour reaches twice a year in order to encourage uptake.

Construction noise and vibration mitigation

7.15.9 The assessment of construction noise effects has shown that daytime construction works in the north-east area of Bristol Airport, specifically the roadworks required for the new gyratory road with internal surface parking may have a significant effect on residential properties located at the east end of Downside Road.

7.15.10 *BS5228-1* suggests that site hoardings may provide a noise reduction from 5 dB, when plant is just visible over the noise barrier, to 10 dB, when the plant is not visible over the noise barrier. On the assumption that a conventional solid timber site hoarding is installed along the northern edge of the gyratory road site, near Downside Road, with a minimum height of 2.4m, then noise at the most affected receptors is predicted to be mitigated to below the threshold for a potentially significant effect to be indicated. This is shown in **Appendix 7G** and will be secured as part of the CEMP (**Appendix 2B**).

7.15.11 Further roadworks constituting the A38 highway improvements also pose a risk to the amenity of residential properties situated close to the road, with noise levels predicted to reach up to 75 dB in the worst-case, where there is concentrated activity on site.

7.15.12 Using the same assumptions for screening as for the gyratory road, temporary barriers surrounding stationary plant such as hand-held road breakers would be predicted to mitigate noise at affected receptors. Further mitigation would be required for those residences directly adjacent to the road due to their close proximity to the works. Additional temporary solid road-side site hoardings to screen these receptors would be predicted to mitigate noise levels below the threshold for a potentially significant effect for these receptors as well. This is shown in **Appendix 7G** and will be secured as part of the CEMP (**Appendix 2B**).

7.15.13 No significant effects are expected to arise from construction vibration and therefore no vibration mitigation will be required.

Recommendations relating to the Outline Construction Environmental Management Plan

7.15.14 Measures to be considered in implementing Best Practicable Means, adopted as part of the CEMP (**Appendix 2B**) will be consistent with the recommendations in BS 5228-1[33], including:

- Project supervision – the Proposed Development will include the designation of a Project Environmental Manager to supervise the implementation of the works;
- Community Relations – keeping local people informed of progress and treating complaints fairly and expediently;
- Site Personnel Training – informing site personnel about the need to minimise noise and advising on the proper use and maintenance of tools and equipment and the positioning of machinery to reduce noise emission to the neighbourhood;
- Site Location – setting noise emission limits with due regard to the proximity of noise sensitive premises;
- Noise Monitoring – to ensure compliance with noise emission limits applicable to relevant items of plant or around the boundary of a site;
- Programme - Details of operations with an indication of the expected duration of each phase and key dates. Local residents may be willing to accept higher levels of noise if they know that the activity causing the noise will only last for a short time; and
- Type of Plant – consideration will be given to using quiet techniques taking account of practical site constraints and best practicable means. Where reasonably practicable, quiet working

methods will be employed, including use of the most suitable plant, reasonable hours of working for noisy operations, and economy and speed of operations.

7.15.15 Many of the work sites relating to the Proposed Development are located at a reasonable distance from the nearest residential receptor and the effects of construction noise and vibration will therefore be negligible. For some sites however, such as for the highway improvements to the A38, some works will take place in close proximity to dwellings. In such cases, it will be particularly important to establish a procedure by which consultation between the contractor and local residents can take place regularly, to keep them informed of progress and steps being taken to protect them from any significant effects of noise and vibration.

7.16 Conclusions of significance evaluation

Air noise and vibration

7.16.1 The Proposed Development will allow a greater number of passenger movements at Bristol Airport compared to the Without Development scenario (approximately 2 mppa beyond current permission).

7.16.2 The number of dwellings exposed to significant levels of aircraft air noise during the daytime period will generally stay the same as now and as for the Without Development scenarios (either 2021 or 2026). This is primarily due to the change in aircraft utilising Bristol Airport, with more modern, quieter types being introduced in the future.

7.16.3 The number of dwellings exposed to significant levels of air noise during the night will increase compared to the 2017 baseline and will be slightly more for the Proposed Development compared to the Without Development scenarios. This is due to an increase in the numbers of aircraft operating at Bristol Airport during the night in the future, and in the Proposed Development compared to the Without Development scenarios.

7.16.4 The change in air noise levels between the Without Development scenarios and the Proposed Development scenario is **negligible** (0 to 2 dB) for all dwellings in both the day and night periods.

7.16.5 Bristol Airport will continue to implement the various current air noise mitigation measures and will provide an enhanced noise insulation grant scheme, which includes all those dwellings exposed to significant levels of air noise as per the 12 mppa with development scenario.

7.16.6 More people will become affected by aircraft noise at night as Bristol Airport continues to grow within its permitted limits, irrespective of whether the Proposed Development goes ahead or not. The Proposed Development will give rise to a **negligible adverse** effect compared to if the Proposed Development does not go ahead and so will have **no significant effect** on the surrounding noise climate.

7.16.7 The number of people exposed to significant levels of vibration due to airborne aircraft in 2017 is very small. This is expected to remain similar or reduce in the future due to the introduction of more modern, quieter aircraft types. No significant effects are expected due to the Proposed Development.

Ground noise

7.16.8 The principle difference between future ground noise levels under the Proposed Development, as compared to those without the Proposed Development, is the change in the distribution of ground noise around the area and therefore the change in the population that will be exposed to ground noise, resulting in increased ground noise levels for some and decreases for others.

7.16.9 There is a small increase in the number of dwellings exposed to the ground noise during the day and night in the future compared to now for both the Proposed Development and Without Development scenarios. In the future, there is an increase of one in the number of dwellings exposed to the ground noise SOAEL if the Proposed Development occurs compared to if it doesn't, and a slight decrease in the number of dwellings exposed to the LOAEL in the daytime for the Proposed Development compared to the Without Development scenarios. In the future with the Proposed Development, some receptors will benefit from the additional screening provided by infrastructure leading to some significant reductions in ground noise. For all other receptors, any changes in ground noise arising from the Proposed Development as compared to Without Development in the future will experience a **negligible** change in noise level of **no significance**.

7.16.10 More people will become affected by ground noise at night as Bristol Airport continues to grow within its permitted limits, irrespective of whether the Proposed Development goes ahead or not. The Proposed Development will give rise to a **negligible adverse effect** compared to if the Proposed Development does not go ahead and so will have **no significant effect** on the surrounding noise climate.

Road traffic noise

7.16.11 The Proposed Development will change the road traffic noise levels around Bristol Airport. There is a small increase in the number of dwellings exposed to road traffic noise in the future compared to 2017 for both the Proposed Development and Without Development scenarios. There is no change in the number of dwellings exposed to road traffic noise if the Proposed Development occurs or not. The Proposed Development will give rise to a **negligible adverse effect** compared to if the Proposed Development does not go ahead, which is **not significant**.

Construction noise and vibration

7.16.12 The construction noise and vibration assessment has been carried out using predictions to a number of representative noise and vibration sensitive receptors. Accounting for the use of best practicable means and some specific mitigation measures, the construction of the Proposed Development will give rise to a **negligible adverse effect** which is **not significant**.

7.16.13 It has been recommended that the Principal Contractor develop and implement a site-specific Construction Noise and Vibration Management and Mitigation Strategy (refer to **Appendix 2B**) covering demolition and new construction. This will ensure that best practicable means are used to mitigate construction noise effects.

7.17 Implementation of environmental measures

7.17.1 **Table 7.58** describes the environmental measures accompanying the Proposed Development and the means by which they will be implemented. Full details of these are given in **Section 7.8**.

Table 7.58 Summary of environmental measures to be implemented – relating to noise and vibration

Environmental measure	Responsibility for implementation	Compliance mechanism	ES section reference
Fixed 57dB $L_{Aeq,\ 16hr}$ summer Air Noise Contour at 12.42 sq km	Bristol Airport	Planning condition[40]	**n/a**
Noise Control Scheme providing noise violation limits and penalties	Bristol Airport	Section 106 Agreement	**n/a**

Environmental measure	Responsibility for implementation	Compliance mechanism	ES section reference
for Air Noise, specification and adoption of noise and track keeping system and associated community engagement			
Fixed Shoulder Period movement limits	Bristol Airport	Planning condition[40]	**n/a**
Air noise – night noise quota count used to restrict night flying	Bristol Airport	Planning condition[40]	**Section 7.8.**
Air noise – enhanced noise insulation grants	Bristol Airport	Section 106 Agreement	**Section 7.8.**
Ground noise – limits on APU use	Bristol Airport	Planning condition[40]	**Section 7.8.**
Air and ground noise – noise abatement procedures	Bristol Airport	Aeronautical Information Package (AIP) for Bristol Airport[44.]	**Section 7.8.**

£1.8 million fund for noise insulation to accompany airport development

Created: 12th Feb 2019

Nearly £2 million will be available to local residents living near Bristol Airport as part of an enhanced noise insulation scheme accompanying development plans currently being considered by North Somerset Council.

As part of proposals to increase capacity from 10 million to 12 million passengers a year by the mid-2020s, the amount available to households will increase by 50 per cent up to a maximum of £7,500 per property.

In addition, upgraded mechanical ventilation will be included in the scope of the scheme for the first time, enabling residents to keep windows closed in order to experience the full benefit of the high-performance acoustic double-glazing.

The current scheme, which remains open, has granted in excess of £200,000 to 70 local properties, but requires residents in the 'outer' qualifying noise contour to contribute 50 per cent of the costs of installation. Under the new proposals, grants will cover 100 per cent of costs up to £7,500 (in the 63dB LAeq 16hr contour) and £3,750 (in the 60dB and 57db contours). This is intended to encourage take up to ensure as many eligible properties as possible benefit from noise insulation.

James Shearman, Head of Sustainability at Bristol Airport, said:

"These proposals represent Bristol Airport's most comprehensive noise insulation grant scheme to date and will see us supporting local residents with increased funding for a wider range of noise insulation improvements.

"This scheme goes beyond Government policy recommendations and will be amongst the most comprehensive and wide-ranging offered by a UK airport, demonstrating our commitment to reducing and mitigating the impacts of development on our neighbours."

Local resident, Jackie Abbott, said:

"Having our windows replaced has made a real difference, making it much quieter – particularly at night."

North Somerset Council is currently consulting on Bristol Airport's planning application to increase capacity to 12 million passengers a year. This includes several other proposals relating to noise, retaining many of the current limits on night flying, for which the annual limit of 4,000 movements would be retained – although flexibility on the way this is allocated between summer and winter seasons is being sought. The overall Quota Count system, based on noise ratings for different aircraft types, will remain in place in order to incentivise the use of quieter, modern aircraft.

Bristol Airport is the ninth busiest airport in the UK and the fifth busiest outside London. More than £160m has been invested in facilities and infrastructure since 2010, contributing to Bristol being named 'Best Airport' in the 5-10 million passengers category at the ACI Europe Awards in June (ACI Europe represents over 500 airports in 45 countries across the continent).

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- **Noise management**

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YOUR LONDON AIRPORT
Gatwick

Gatwick Airport Ltd

Environmental Noise Directive

Noise Action Plan 2019 – 2024

AIRPORT
EXPANSION
CONSULTATION

NOISE INSULATION POLICY

JUNE 2019

Heathrow

AIRPORT EXPANSION CONSULTATION (JUNE 2019)

Heathrow is consulting on proposals for an expanded airport.

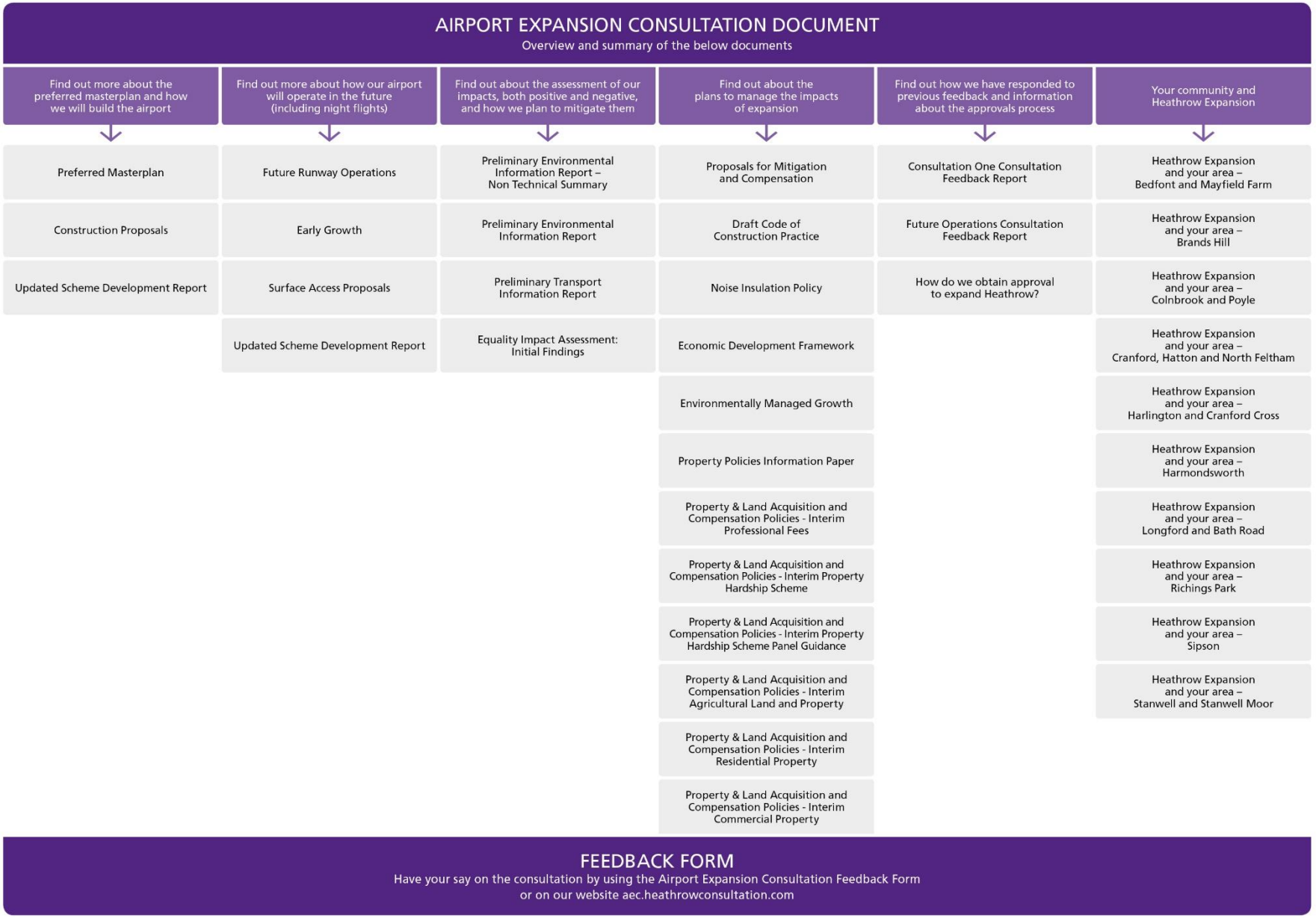
The Airport Expansion Consultation is our statutory consultation and we will be seeking your view on four key areas:

- Heathrow's preferred masterplan for expansion: our proposals for the future layout of the airport including the runway and other airport infrastructure such as terminals and road access. The masterplan will also reveal the airport's growth in phases – from runway opening in around 2026, to the end masterplan in approximately 2050;
- Plans to operate the future airport: how the future three runway airport will be operated, including important elements such as night flights, as well as how potential additional flights before the new runway opens could be operated on our existing two runways;
- Assessment of impacts of the airport's growth: our preliminary assessment of the likely impacts of expansion on the environment and local communities;
- Plans to manage the impacts of expansion: we will set out the airport's plans for mitigating the effects of expansion, including property compensation, our Noise Insulation Policy, a Community Fund, and measures to mitigate against air pollution, carbon, and other environmental effects.

We are grateful for feedback provided at previous consultations and have considered these responses in developing our proposals. We now ask for your views on our preferred proposals, so that we can further improve our project before we apply for development consent next year. You can provide feedback:

- online using the feedback form on our website aec.heathrowconsultation.com
- complete a feedback form, available at events or on request calling 0800 307 7996
- email us at feedback@heathrowconsultation.com
- write to us at Freepost LHR AIRPORT EXPANSION CONSULTATION

We have set out our proposals in a number of documents covering different topics and different levels of detail. All of these are available on our website, at Document Inspection Locations and at consultation events.


AIRPORT EXPANSION CONSULTATION DOCUMENT
Overview and summary of the below documents
Find out more about the preferred masterplan and how we will build the airport
Find out more about how our airport will operate in the future (including night flights)
Find out about the assessment of our impacts, both positive and negative, and how we plan to mitigate them
Find out about the plans to manage the impacts of expansion
Find out how we have responded to previous feedback and information about the approvals process
Your community and Heathrow Expansion
Preferred Masterplan
Construction Proposals
Updated Scheme Development Report
Future Runway Operations
Early Growth
Surface Access Proposals
Updated Scheme Development Report
Preliminary Environmental Information Report – Non Technical Summary
Preliminary Environmental Information Report
Preliminary Transport Information Report
Equality Impact Assessment: Initial Findings
Proposals for Mitigation and Compensation
Draft Code of Construction Practice
Noise Insulation Policy
Economic Development Framework
Environmentally Managed Growth
Property Policies Information Paper
Property & Land Acquisition and Compensation Policies - Interim Professional Fees
Property & Land Acquisition and Compensation Policies - Interim Property Hardship Scheme
Property & Land Acquisition and Compensation Policies - Interim Property Hardship Scheme Panel Guidance
Property & Land Acquisition and Compensation Policies - Interim Agricultural Land and Property
Property & Land Acquisition and Compensation Policies - Interim Residential Property
Property & Land Acquisition and Compensation Policies - Interim Commercial Property
Consultation One Consultation Feedback Report
Future Operations Consultation Feedback Report
How do we obtain approval to expand Heathrow?
Heathrow Expansion and your area – Bedfont and Mayfield Farm
Heathrow Expansion and your area – Brands Hill
Heathrow Expansion and your area – Colnbrook and Poyle
Heathrow Expansion and your area – Cranford, Hatton and North Feltham
Heathrow Expansion and your area – Harlington and Cranford Cross
Heathrow Expansion and your area – Harmondsworth
Heathrow Expansion and your area – Longford and Bath Road
Heathrow Expansion and your area – Richings Park
Heathrow Expansion and your area – Sipson
Heathrow Expansion and your area – Stanwell and Stanwell Moor
FEEDBACK FORM
Have your say on the consultation by using the Airport Expansion Consultation Feedback Form
or on our website aec.heathrowconsultation.com

NOISE INSULATION POLICY (DRAFT FOR CONSULTATION)

Non-Technical Summary

This document sets out the Noise Insulation Policy for the Heathrow Expansion Programme (the Project) to address the requirements of the Government policy - "*Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England*" 2018 (Airports NPS).

This policy will address noise from aircraft movements in the air and on the ground, road, rail and construction noise associated with the Project.

The Noise Insulation Policy forms part of the extensive noise control measures included in the expansion Project to meet the aims of Government noise policy. The control measures on the aircraft fleet and operations first mitigate and minimise potential adverse noise effects arising from expansion and reduce existing noise from the airport. In a complementary manner, noise insulation provides compensatory control measures that aim to avoid residual significant adverse effects on health and quality of life from existing and predicted noise. This approach meets the aims of Government noise policy as stated in the Airports NPS.

For home owners, three levels of scheme will be offered, depending on the existing or predicted noise exposure level, as indicated by the relevant noise contour, source of noise and if confirmed through third-party assessment:

Scheme 1	Full cost of noise insulation fitout, potentially including new acoustic double glazing or secondary glazing, loft or ceiling insulation, ceiling over-boarding, external door upgrades and ventilation for aircraft noise.
Scheme 2	A package of noise insulation to exposed facades, potentially including acoustic double glazing or secondary glazing to windows, external door upgrades and attenuated ventilation for road, rail and construction noise exposure.
Scheme 3	A fixed £3,000 contribution to approved noise insulation works.

Eligibility for schemes will be based on published noise contours of the defined Action Levels, or thresholds, as set out in the government Airports NPS for aircraft noise, extended to include road, rail and construction noise.

Noise Insulation Schemes will be made available before defined Action Levels are expected to occur as a result of the expansion project.

In the lead up to Development Consent Order (DCO) approval, we plan to insulate homes that will be exposed to the highest noise from the Project and that are already exposed to similar noise from existing Heathrow operations. This will be via a replacement of our existing noise insulation schemes expanded in the light of changing Government policy. Homes expected to be exposed to early construction noise from the Project as well as existing high levels of aircraft noise will also be prioritised. This will help develop and test our systems and suppliers, also avoid long waiting times between applications and fit outs. Once the DCO is approved we will prioritise those forecast to be newly affected by construction, road and rail traffic and aircraft noise. We will ensure that the insulation is offered and, if accepted, installed before the new noise occurs.

Home and community building owners identified as being within the eligibility contours will be contacted and invited to apply for the schemes. We will use a seven-stage awareness process to ensure property owners are aware of their eligibility and are encouraged to apply.

Once we have received an application, an assessment will be conducted to confirm eligibility. Approved contractors will deliver a standard package of noise insulation measures, within a quality management scheme including sample completion testing.

For the very few properties that will be newly exposed to very high noise levels, where an application is not received or an offer accepted, we may need to obtain compulsory rights to provide treatments to prevent unacceptable noise exposure levels.

A dedicated support team will be provided to assist applicants throughout the process, including investigation of complaints during and after completion. Applicants will also be able to appeal to an Independent Panel.

The schemes will remain open until they cease to be relevant (for example, at the end of the construction period for the construction noise insulation), or the scheme is updated (for example if noise mitigation means that a property is no longer within a relevant contour).

These schemes will replace the existing noise insulation schemes currently offered by Heathrow including the Quieter Homes Scheme, the Day Scheme and the Night Scheme. Before existing schemes are closed, properties in those areas will be informed and advised of the scheme closure and possible eligibility for the replacement schemes. The contact period, of at least 12 months, will allow time for applications under the existing schemes before they close.

Heathrow's Community Buildings Noise Insulation Scheme will be extended to include the impacts of Expansion.

In addition to the noise insulation schemes in this draft Noise Insulation Policy, Heathrow has two other existing noise and vortex related schemes that will be refreshed. These are the Home Relocation Assistance Scheme which offers financial help to eligible homeowners living in the noisiest areas around Heathrow to move away from the area if they wish; and the Vortex Protection Scheme which is designed to protect and repair homes from around the airport damaged by wind currents from aircraft wings.

Heathrow will also introduce a Temporary Home Relocation Scheme for those most impacted by short term construction noise.

These schemes are summarised at the end of the draft Noise Insulation Policy for reference.

PREFACE: DEVELOPMENT OF THE NOISE INSULATION POLICY

1. The remainder of this document sets out the draft policy relating to noise insulation schemes to be provided in connection with the development and operation of a new north-west runway and associated infrastructure to expand Heathrow Airport. This draft policy is subject to consultation.

2. Once finalised taking into account feedback from consultation and draft policy would form the basis for the implementation of our Noise Insulation programme, if development consent is granted and we proceed with construction,

3. If the DCO application is granted, this document would become the basis for the implementation of our Noise Insulation programme. It was thought helpful, therefore, to provide a working draft of the document for this consultation in order that stakeholders could understand the terms on which Heathrow proposes to commit and comment on them whilst they remain in draft.

4. Within the document itself, there are passages which represent explanatory text for the purposes of this consultation and which will be deleted from the version published before and submitted with the DCO application. Those passages are highlighted in grey.

5. With the benefit of this explanation, hopefully this draft document is clear in its purpose and we would be pleased to receive feedback on its content and approach.

CONTENTS

1. INTRODUCTION

1.1 The Noise Insulation Policy for Heathrow Expansion Programme

1.1.1 This document sets out the Noise Insulation Policy for the Heathrow Expansion Programme (the Project) to address the requirements of the *Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England 2018* (Airports NPS).

1.1.2 The Noise Insulation Policy forms part of the extensive noise control measures included in the Project, to meet the aims of Government noise policy, as laid out in the Airports NPS at paragraph 5.68 (see below). Firstly, there are the mitigation control measures which cover actions ranging from aircraft fleet development, operational procedures, airport layout, airspace design, and night flight management, to managed respite through runway and airspace alternation. These control measures mitigate and minimise potential new adverse noise effects arising from expansion and, for many areas, reduce existing noise from the airport, within the context of Government policy on sustainable development. This Noise Insulation Policy provides compensatory control measures, which in combination with the mitigation controls, sets out to achieve the following:

- Firstly: to meet the Government noise policy to avoid significant adverse effects on health and quality of life that would otherwise newly arise from the expansion proposals, including preventing unacceptable adverse noise effects;
- Secondly: to avoid significant adverse effects on health and quality of life that would otherwise occur after expansion, but would also have occurred if Heathrow did not expand; and
- Thirdly: to more widely compensate for the adverse effects of aircraft noise both newly arising from expansion and that would have occurred if Heathrow did not expand, in line with Heathrow's committed community compensation scheme as set out in the Airports NPS (paragraph 5.245).

1.1.3 The objectives of this Noise Insulation Policy are to achieve the following:

- Set out the basis for Heathrow's noise insulation strategy and the definition and delivery of the Noise Insulation Schemes.
- Address noise from:
    - aircraft movements in the air and activity on the ground,
    - changes to road traffic associated with the airport expansion,
    - changes to rail traffic associated with the airport expansion, and,

- construction noise associated with the expansion programme.

- Describe how the package of Noise Insulation Schemes addresses the requirements of the Airports NPS and specifically the aim set out in paragraph 5.68 to avoid significant adverse effects on health and quality of life.

1.1.4 This document is structured to cover the following:

- the national, international and local policy, standards and guidance background,
- the assessment metrics and action levels that will be used to identify properties eligible for noise insulation,
- the Noise Insulation Schemes, and
- the staged delivery of these Schemes.

1.1.5 This document also includes outlines of the related, non-insulation programmes with respect to the Project – the Construction Temporary Rehousing Scheme, the Home Relocation Assistance Scheme (HRAS), and the Vortex Protection Scheme.

1.2 Heathrow's Noise Insulation Strategy

1.2.1 This Noise Insulation Policy for the Project can be viewed as a part of Heathrow's long-term noise insulation strategy which has three major policy components.

1. Development of our existing noise insulation schemes designed to address our current operations and changing Government policy.
2. Processes are now underway for certain non-expansion (two-runway) airspace changes such as Independent Parallel Approaches (IPA), easterly alternation and redesigning of the Compton departure route.
3. The Noise Insulation Policy for the Heathrow Expansion Programme (the Project) which includes the development of a new third runway and insulation mitigation options required by the Airports NPS.

1.2.2 The same Noise Insulation Schemes and processes will be used to deliver each of these policy components.

2. CONTEXT: POLICY, STANDARDS AND GUIDANCE

2.1 Airports National Policy Statement

2.1.1 The Government designated the "Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England" (Airports NPS) in June 2018.

2.1.2 The Airports NPS addresses a range of issues including Heathrow airport expansion and noise insulation. For noise impacts Airports NPS says:

"5.47 The Government wants to strike a fair balance between the negative impacts of noise (on health, amenity, quality of life and productivity) and the positive impacts of flights…

"5.48 The International Civil Aviation Organisation introduced the concept of a 'Balanced Approach' to noise management (resolution A33/7). This is given legal effect in the UK through EU Regulation 598/2014.

…

"5.68 Development consent should not be granted unless the Secretary of State is satisfied that the proposals will meet the following aims for the effective management and control of noise, within the context of Government policy on sustainable development:
- Avoid significant adverse impacts on health and quality of life from noise;
- Mitigate and minimise adverse impacts on health and quality of life from noise; and
- Where possible, contribute to improvements to health and quality of life.

…

"5.244 People are entitled to know what steps will be taken to help protect them against aircraft noise and, where appropriate, to help them to move house.

"5.245 In addition to statutory requirements, Heathrow Airport has publicly committed to a community compensation package comprising a number of more generous offers:

- *…*
- *Following a third-party assessment, to provide full acoustic insulation for residential property within the full single mode easterly and westerly 60dB $L_{Aeq,16hr}$ noise contour of an expanded airport;*
- *Following a third-party assessment, to provide a contribution of up to £3,000 for acoustic insulation for residential properties within the full single mode easterly*

and westerly 57dB $L_{Aeq,16hr}$ or the full 55dB L_{den} noise contours of an expanded airport, whichever is the bigger; and

- *To deliver a programme of noise insulation and ventilation for schools and community buildings within the 60dB $L_{Aeq,16hr}$ contour."*

2.2 Aviation Policy Framework

2.2.1 The Government published the Aviation Policy Framework (APF) in March 2013 which included the statement:

"3.17 We will continue to treat the 57dB $L_{Aeq,16\ hr}$ contour as the average level of daytime aircraft noise marking the approximate onset of significant community annoyance. However, this does not mean that all people within this contour will experience significant adverse effects from aircraft noise. Nor does it mean that no-one outside of this contour will consider themselves annoyed by aircraft noise."

2.2.2 The Draft UK Airspace policy published by the Department for Transport (DfT) in February 2017 and the consultation response that the DfT published in October 2017 has modified the APF.

"Consistent with the Noise Policy Statement for England, our objectives in implementing this policy are to: … limit and, where possible, reduce the number of people in the UK significantly affected by the adverse impacts from aircraft noise." (para 2.69 Oct 2017)

"The government acknowledges the evidence from recent research which shows that sensitivity to aircraft noise has increased, with the same percentage of people reporting to be highly annoyed at a level of 54dB $L_{Aeq,16hr}$ as occurred at 57dB $L_{Aeq,16hr}$ in the past. The research also showed that some adverse effects of annoyance can be seen to occur down to 51dB $L_{Aeq,16hr}$." (para 2.70 Oct 2017)

"We will set a LOAEL at 51dB $L_{Aeq,16hr}$ for daytime and based on feedback and further discussion with CAA we are making one minor change to the LOAEL night metric to be 45dB $L_{Aeq,8hr}$ rather than L_{night} to be consistent with the daytime metric." (para 2.72 Oct 2017).

2.2.3 The Consultation Response also states that the Government:

- *"expects airport operators to offer acoustic insulation to noise sensitive buildings, such as schools and hospitals, exposed to levels of noise of 63dB $L_{Aeq,16hr}$ or more*
- *expects airport operators to offer financial assistance towards acoustic insulation to residential properties exposed to levels of noise of 63dB $L_{Aeq,16hr}$ or more."*

2.2.4 However, the government published the Aviation 2050 consultation in December 2018 which proposes the following noise insulation measures:

- *"to extend the noise insulation policy threshold beyond the current $L_{Aeq,16hr}$ 63dB contour to $L_{Aeq,16hr}$ 60dB.*
- *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 ICCAN to issue new guidance to airports on best practice for noise insulation schemes, to improve consistency*
- *for airspace changes which lead to significantly increased overflight, to set a new minimum threshold of an increase of L_{AeqT} 3dB, which leaves a household in the $L_{Aeq,16hr}$ 54dB contour or above as a new eligibility criterion for assistance with noise insulation."*

2.2.5 These proposals have not yet been adopted by government but may need to be considered in the final Noise Insulation Policy submitted with the DCO if they would increase the area of eligibility. The progression of these Government policies (and draft policies) is summarised in Appendix B.

2.3 Noise Policy Statement for England

2.3.1 The Government published the Noise Policy Statement for England (NPSE) in March 2010 and refers to it in the Airports NPS. The NPSE policy aims, that are repeated in the Airports NPS at paragraph 5.68, are:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.*"

2.3.2 The NPSE explanatory notes provide guidance on significant and adverse impacts:

"2.20 LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

2.22 It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

2.3.3 In addition to the above, Planning Practice Guidance-Noise (2014) includes the concept of Unacceptable Adverse Effect Level (UAEL). This is a level of noise exposure that would be perceived as "*intrusive and very disruptive*" and that "*at the highest extreme, noise exposure would cause extensive and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of activity causing noise, this situation should be prevented from occurring*."

2.3.4 The LOAEL, SOAEL and UAEL values being applied to the Project are provided in Chapter 17 of the Preliminary Environmental Information Report (PEIR) and will be adopted in this document when published. They are also summarised in Appendix B of this document.

2.3.5 We consider that this Noise Insulation Policy is one aspect of "avoiding" significant adverse noise effects on health and quality of life and "preventing" unacceptable noise effects.

2.4 World Health Organisation Guidelines for Community Noise (1999)

2.4.1 In 1999, the World Health Organisation (WHO) released Guidelines for Community Noise (GCN). These guidelines have informed a wide range of UK standards and guidelines, and contain recommended values for internal noise for specific environments and maximum night time noise levels that remain current.

2.4.2 WHO has also published:

- Night Noise Guidelines 2009 (NNG) which recommend a LOAEL and refer to GCN guideline text as remaining valid, and

- Environmental Noise Guidelines for the European Region 2018 (ENG) which recommend Noise Guideline values which are defined for L_{den} (which includes penalty for evening and night period) and L_{night}.

2.4.3 The WHO publications are guidance only and do not take precedence over Government legislation or policy.

2.5 Noise Insulation Regulations (1975)

2.5.1 The Noise Insulation Regulations provide a schedule of noise insulation measures to be provided if noise levels from a highway or road development are predicted to exceed action levels predicted using the Government method, Calculation of Road Traffic Noise (CRTN). CRTN is a historic calculation method which uses a different metric to those normally used for aircraft noise, $L_{A10,18hr}$, but this metric can be converted to $L_{Aeq,T}$ for normal highway noise and this conversion is described in the PEIR.

2.6 The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996

2.6.1 The Noise Insulation (Railways etc) Regulations provide a schedule of noise insulation measures to be provided if noise levels for a rail or similar development are predicted to exceed action levels predicted using the Government method, Calculation of Rail Noise (CRN).

2.7 Guidance on sound insulation and noise reduction for buildings: BS8233:2014

2.7.1 British Standard BS8233 provides guidance on the control of sound in and around new buildings, including noise from aircraft, roads and construction sites.

2.7.2 For residential buildings guideline internal noise levels are provided as annual average levels. BS8233 recognises that it may be desirable to build houses or flats above the guideline values for other reasons, such as access to transport, shopping etc, and that a relaxation of the guidance values may provide reasonable living conditions.

2.7.3 For non-residential buildings, BS8233 refers to a number of sector guidelines, including Building Bulleting BB93 for schools and Health Technical Memorandum HTM 08-01 for hospitals and recommends that a suitably qualified acoustician is retained for specialist uses, such as theatres, concert halls and cinemas.

2.8 Code of practice for noise and vibration control on construction and open sites. Noise BS5228-1:2009 and A1:2014

2.8.1 British Standard BS5228-1 provides guidance on the calculation and control of noise at construction sites and is widely used on minor and major development sites. Annex E of the Code addresses significance of effects with Example 1 being the "A-B-C" method that produces a table of threshold levels at various times of the day and night.

2.9 Airports NPS Tests

2.9.1 This Noise Insulation Policy has been designed so that the DCO will meet the first aim of the Airports NPS 5.68 (and NPSE), which is "*within the context of Government policy on sustainable development: to avoid significant adverse impacts on health and quality of life from noise*."

2.9.2 The Airports NPS refers to the "Noise Mitigation – Noise Control Hierarchy" and this is discussed in more detail in the PEIR associated with this Airport Expansion Consultation. Within the control hierarchy, noise insulation will be relied upon where other higher priority mitigation is not practical or sustainable. To avoid significant adverse noise impacts, the Noise Insulation Policy will prioritise those properties and populations which will be newly exposed to noise levels above the SOAEL, including any properties which will be newly exposed to noise levels above UAEL.

2.9.3 The SOAEL values for aircraft noise, as identified in the PEIR, are daytime 63dB $L_{Aeq,16hr}$ and night-time 55dB $L_{Aeq,8hr}$ or one additional awakening. The daytime UAEL is 71dB $L_{Aeq,16hr}$ and the night-time UAEL is 66dB $L_{Aeq,8hr}$. All these values are 92-day summer averages. See Appendix A for a glossary of terms and Appendix B for references to night time aircraft noise and other noise sources.

2.9.4 As quoted above, Airports NPS (paragraph 5.245) explicitly reiterates public commitments for noise insulation made by Heathrow which are a key part of the strategy to avoid significant noise impacts for areas newly above the SOAEL.

2.9.5 This Noise Insulation Policy will meet or exceed the minimum requirements of the first aim of Airports NPS 5.68 for the following reasons:

- Homes that will be newly exposed above any SOAEL value in the opening year, will have insulation offered (and installed, if accepted) in advance of the new runway opening.
- As the number of aircraft movements increases after the opening year to a point when the airport's noise impact is forecast to be highest, homes that will

be newly exposed above the SOAEL values will have insulation offered (and installed, if accepted) in advance of the SOAEL value being exceeded.

- Heathrow will extend the offer of noise insulation to homes that are already exposed to levels above the SOAEL values and will continue to be exposed above the SOAEL values after the new runway opens and as the air traffic to and from the expanded airport increases.
- After opening of the new runway, full insulation (Scheme 1) will be progressively offered to homes out to the Action Level of 60dB $L_{Aeq,16hr}$. As this is lower than the 63dB SOAEL for aircraft, this means more people and properties will be eligible for insulation.
- We have also made a commitment to use a combined contour based on both full, single mode contours, namely the easterly and westerly mode contours. This will produce a noise contour area larger than the area for the actual averaged east-west operations and effectively will treat areas impacted by one mode as if it occurred for the entire year.
- As use of the new runway grows after its 2026 opening, further areas for insulation will be sequenced to treat homes in advance of any air traffic growth and any associated noise forecast to newly exceed SOAEL.

2.9.6 As described in the PEIR, the other two aims of para 5.68 will be addressed by other mitigations, compensations and outcomes.

2.9.7 The second aim to mitigate and minimise adverse impacts on health and quality of life from noise will be addressed by a whole spectrum of noise mitigation measures. These range from promoting the aircraft fleet at Heathrow as the newest and quietest aircraft possible, and operational procedures including runway and airspace alternation to minimise noise levels and maximise predictable respite for communities.

2.9.8 The third aim is to, where possible, contribute to improvements to health and quality of life will be best addressed by our commitment that the expansion programme will achieve fewer people impacted by significant noise than “today” (i.e., 2013, the noise ‘policy baseline’ set by the Airports NPS).

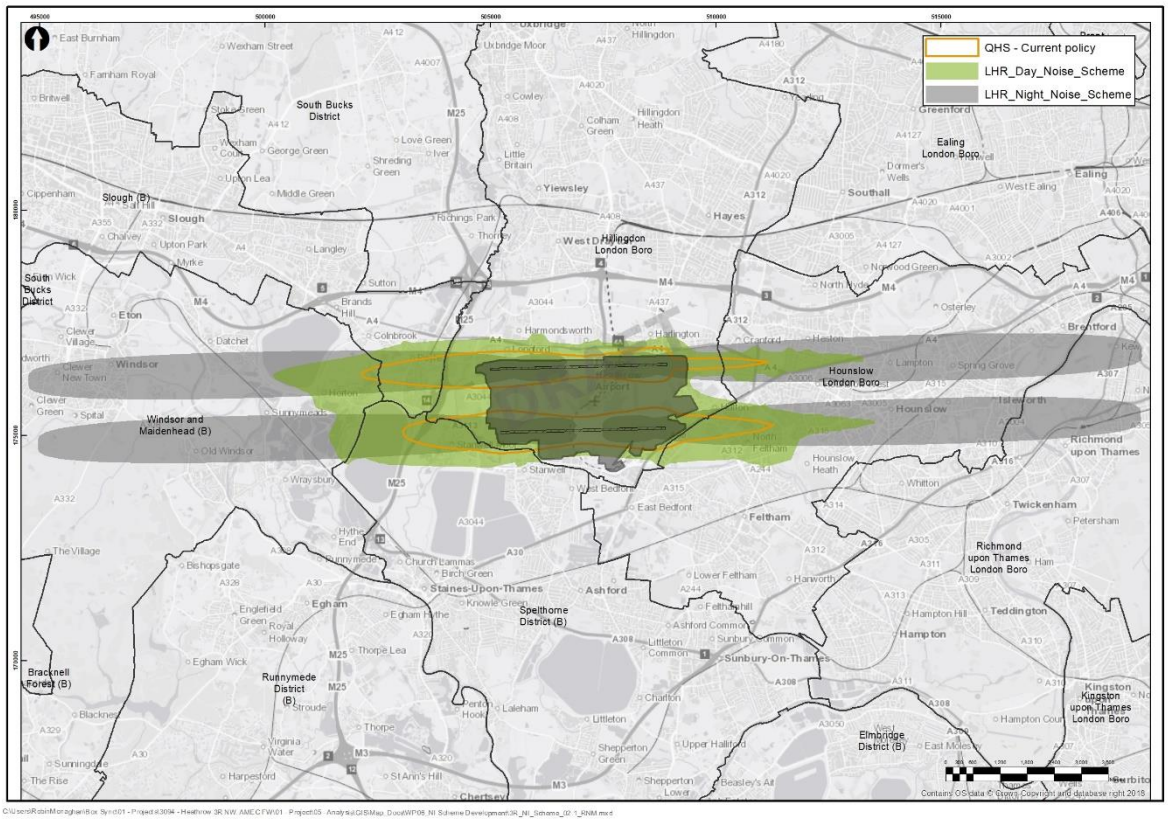
3. OUR NOISE INSULATION SCHEMES

3.1 Existing Noise Insulation Schemes

3.1.1 The new Noise Insulation Schemes associated with the Project will replace the existing noise home insulation schemes including the Quieter Homes Scheme, the Day Scheme and the Night Scheme. The existing scheme boundaries are shown in Figure 3.1 below.

- The Quieter Homes Scheme (QHS) applies to homes based on the 2011 69dB $L_{Aeq,16hr}$ contour. It covers the full cost of carrying out the work which can include loft and ceiling insulation, double-glazing or external door replacements and loft and ceiling over-boarding. (This is practically the same as the new Scheme 1.)
- The (Residential) Day Noise Insulation Scheme (or Day Scheme) is based on the 1994 69dB $L_{Aeq,18hr}$ contour and is designed to protect those homes exposed to the aircraft noise in the day, including in the early morning arrival period before 06:00. These properties are eligible to receive 50% of the cost of replacement windows and external doors, or free secondary-glazing, and free loft insulation and ventilation.
- The Night Noise Insulation Scheme (or Night Scheme) is designed to address the impact of night flights on local residents. The scheme boundary is based on the footprint of the noisiest aircraft regularly operating between 23:30 and 06:00. These properties are eligible to receive 50% of the cost of replacement bedroom or bedsitting room windows, or free secondary-glazing of bedroom or bedsitting room windows, and free loft insulation and ventilation.

Figure 3.1 Boundaries for Existing Noise Insulation Schemes



3.1.2 The Community Buildings Noise Insulation Scheme applies to noise-sensitive buildings around Heathrow that are exposed to a medium to high level of noise (within the 2002 63dB $L_{Aeq,16hr}$ noise contour). This includes hospitals, schools and colleges, nurseries attached to schools and hospices, nursing homes, registered nurseries, libraries and community halls. The scheme pays for buildings to make noise-insulating modifications such as double-glazing, replacement windows and ventilation. Eligible buildings are those in widespread use within the community, where people spend long periods of time, or where they are vulnerable.

3.1.3 Heathrow has two other schemes to assist home owners that are not directly related to noise insulation. The Home Relocation Assistance Scheme which offers financial help to eligible homeowners living in the noisiest areas around Heathrow to move away from the area if they wish. The Vortex Protection Scheme is designed to protect and repair homes around the airport damaged by wind currents from aircraft wing. These are discussed in more detail in Section 6.

3.2 Proposed New Residential Noise Insulation Schemes

3.2.1 The Noise Insulation Schemes are designed to ensure a suitable internal acoustic amenity for habitable rooms as summarised in the table below.

Table 3.1 New Residential Noise Insulation Schemes

Scheme	Noise Source	Description
Scheme 1	Aircraft noise	This includes a full package of noise insulation to habitable rooms, including bedrooms, living rooms, and dining rooms. This may include kitchens, toilets, bathrooms, but does not including porches, conservatories, out buildings and rooms solely for leisure activities. Windows may be upgraded to acoustic double glazing or by the addition of secondary glazing or both. External doors to habitable rooms may be upgraded. Ceilings or lofts may be over-boarded with additional lining. Acoustic thermal insulation batts (or equivalent) may be installed above ceilings in lofts. Suitable ventilation may be provided so that windows can be kept closed in warm weather. The scheme will be prioritised in the following order to: a) prevent exposure above UAEL due to the Project, b) avoid exposure newly above SOAEL due to the project, c) avoid exposure above SOAEL due to the project or existing operations, and d) deliver Heathrow's wider noise insulation commitments
Scheme 2	Road, rail and construction noise	Existing windows may be upgraded with replacement acoustic double-glazed units with "acoustic ventilation" or by the addition of secondary glazing, and external doors to habitable rooms may be replaced with doors that comply with the requirements of the Noise Insulation Regulations. Works are usually only to the façade (side) of the house that is closest to (or has line of sight of) the road or construction site.
Scheme 3	Aircraft noise	This is a £3000 contribution to a package of noise insulation treatment. For example, an owner might choose to replace certain windows or external doors, or install ventilation.

3.2.2 The Noise Insulation Schemes will provide additional noise insulation within properties that are exposed, or likely to be exposed, above the Action Levels set out below in Section 4.2.

3.2.3 Insulation aims to improve the internal acoustic amenity of the property in accordance with NPSE and the Airports NPS. The scheme is not intended to improve the noise environment outside of the property or building e.g. gardens.

3.2.4 To ensure the schemes are sustainable and will provide lasting benefit for people and properties, Heathrow will provide work packages from agreed suppliers with

suitable quality management procedures and aim to meet or exceed the minimum requirements of Airports NPS as set out above.

3.2.5 The schemes will provide “like for like” replacement of existing windows, doors etc, where reasonably practicable. This means that existing PVC windows will be replaced with PVC, aluminium with aluminium, and white with white. Approved contractors may be able to offer upgrades (e.g. timber effect or painted frames) as an extra cost option to the applicant. Cat flaps cannot normally be fitted to acoustic doors and windows but may be moved to doors or walls of non-habitable rooms.

3.2.6 The schemes will not be provided to properties that currently meet or exceed the benefit of the eligible package to avoid disruption without benefit, or even degradation, of existing properties.

3.2.7 Roofs are not replaced in the Noise Insulation Schemes and due to complications associated with existing roof conditions, it is not practical to replace roof windows or skylights. Generally, roof windows are replaced when a vortex protection roof is installed under the Vortex Protection Scheme. (See Section 6).

3.2.8 For practical reasons, ceiling over-boarding is usually undertaken by the home owner or their contractor with guidance provided and costs covered by the Noise Insulation Scheme.

3.3 Community Buildings Noise Insulation Scheme

3.3.1 The current community buildings scheme will be extended to cover community buildings impacted by expanded activity at Heathrow.

3.3.2 Community buildings include schools and colleges, hospitals, hospices and nursing homes, libraries and other public buildings where a large number of people will spend long periods of time or where the use is considered to be noise sensitive.

3.3.3 The scheme will identify potentially eligible community buildings within the contour whose owners will be invited to apply. Unsolicited applications will also be considered.

3.3.4 As per Airports NPS (5.245), the Action Level for schools will reduce to 60dB $L_{Aeq,16hr}$ (for a future operational scenario) compared to the current scheme based on the 2002 63dB $L_{Aeq,16hr}$.

3.3.5 A desktop or drive-by initial assessment may be used to determine if a site inspection is needed. Each eligible community building will receive an assessment to identify a suitable package of measures which will be carried out by an approved installer.

3.3.6 The scheme may include the provision of replacement acoustic double glazing or secondary glazing, external doors and ventilation. Eligible schools will also be invited to apply for grants for adobe buildings which provide outdoor noise-reducing shelter.

3.3.7 Insulation will only be offered if the building is not already insulated to an equivalent level to that of our scheme.

3.4 Impact on Existing Schemes

3.4.1 All residents entitled to claim for the existing schemes will be notified of the scheme closure with a period of at least 12 months during which claims may be lodged before closure.

3.4.2 The Quieter Homes Scheme (QHS) will be expanded to reflect any changes in Government policy before DCO is granted. If the DCO is granted and there is a decision to proceed with construction, then Scheme 1 will replace QHS. The Action Level for Scheme 1 will be lower than the existing QHS, so there will be expanded eligibility. This means homes eligible for the current QHS will be eligible for Scheme 1.

3.4.3 The Day and Night Schemes will be closed down if the DCO is granted and there is a decision to proceed with construction. Property owners in the areas of the schemes will be notified prior to the scheme closure and will also be advised if they are likely to be eligible for the new schemes. They will have the option to apply for the existing scheme before closure or apply for the new schemes when they open. Some areas of both schemes will become eligible for Scheme 1 which is a more complete treatment of the house but may not be delivered until after opening of the new runway. In some areas currently in the Night Scheme, furthest from the airport, night-time noise levels have decreased, and some homes may become eligible for Scheme 3 after the opening of the new runway.

3.4.4 The Community Buildings Noise Insulation Scheme (CBNIS) will be extended and no currently eligible building will lose eligibility.

3.4.5 The Home Relocation Assistance Scheme and the Vortex Protection Scheme will be refreshed to take the Project into account. See Section 6 of this document.

4. DEFINING ACTION LEVELS

4.1 Outline

4.1.1 Action Levels are the noise levels which can trigger the actions in the Noise Insulation Schemes. They are the threshold levels of eligibility for the Project's different schemes and noise sources. The Action Levels will be presented geographically as "contour lines" identifying the boundary of land where the Action Levels are exceeded.

4.1.2 In addition to aircraft noise, the Project will generate construction noise and noise from new or altered roads and railways that may cause potential adverse effects on communities. The Noise Insulation Schemes for each source vary and are described in more detail in Section 3.2.

4.2 Action Levels

4.2.1 The Action Levels for air, road, rail and construction noise, are provided below, based on metrics described in more detail in Appendix B and the PEIR.

Table 4.1: Action Levels for Aircraft, Road, Rail and Construction Noise

Noise Source	Action Level	Noise Insulation Scheme	Requirement Reference
Aircraft Noise	Unacceptable Adverse Effect Level (UAEL) Day time: 71dB $L_{Aeq,16hr}$ Night time: 66dB $L_{Aeq,8hr}$	Scheme 1 (with bespoke insulation package)	PEIR
	Initially, SOAEL values of 63dB $L_{Aeq,16hr}$ day, 55dB $L_{Aeq,8hr}$ night and one additional awakening per night (92-day summer averages). Then the full single mode easterly and westerly 60dB $L_{Aeq,16hr}$ noise contour of an expanded airport	Scheme 1	PEIR/ Airports NPS
	The full single mode easterly and westerly 57dB $L_{Aeq,16hr}$ or the full 55dB L_{den} noise contours of an expanded airport, whichever is the bigger	Scheme 3	Airports NPS
Road Noise	Day time: 63dB $L_{Aeq,16hr}$ Night time: 55dB $L_{Aeq,8hr}$ (and a change of at least 1dB from before expansion)	Scheme 2	PEIR
Rail Noise	Day time: 65dB $L_{Aeq,16hr}$ Night time: 55dB $L_{Aeq,8hr}$ >20 passbys per night: 80dB L_{Amax} <20 passbys per night: 85dB L_{Amax}	Scheme 2	PEIR

Noise Source	Action Level	Noise Insulation Scheme	Requirement Reference
	(and a change of at least 1dB from before expansion)		
Construction Noise	Refer to section 11 of the Draft Code of Construction Practice or Appendix B of this policy.	Scheme 2	CoCP and BS5228

4.3 Combined noise sources

4.3.1 The cumulative effect of different noise sources on health and quality of life is difficult to evaluate, especially where different noise metrics are used.

4.3.2 As a starting point, the noise level for each source (aircraft, road, rail, or construction) will be assessed separately using the relevant Action Level. Where a resident is affected by more than one noise source (for example construction noise and aircraft noise) a cumulative assessment will be undertaken that, as appropriate, will take account of when insulation may be triggered for the different sources and combined effects. Details of the assessment methodology will be defined in the Environmental Statement supporting the DCO application and this document will be updated.

4.3.3 Noise from natural sources, such as wind and rain, is not included in the NPSE definition of environmental noise. Furthermore, other noise sources that are not associated with the airport activity such as existing roads and railways are also excluded from this Noise Insulation Policy. When assessing a house site for noise insulation, any noise measurements or calculations will be undertaken or adjusted to exclude noise sources that are not caused by airport operations or expansion.

5. DELIVERY

5.1 Phasing and Transition from existing schemes

5.1.1 The new noise insulation schemes will replace the existing noise insulation schemes as described above. The stages of the Noise Insulation Policy are shown below in Table 5.1 below.

5.1.2 We will also consider options to assess the effectiveness of the new Noise Insulation Schemes, and to demonstrate our ability to deliver our schemes for subsequent stages.

5.1.3 The staged roll out of programmes may overlap and will ensure all properties likely to be significantly exposed to adverse noise effects will be offered noise insulation before the source of the noise effect is introduced. This staging will also help to avoid long waiting times between applications and fit outs.

Table 5.1 – The Staged Roll-out of Noise Insulation Schemes.

Stage	Period	Homes for Noise Insulation	Scheme
Stage 1	From late 2019 (subject to CAA approval) until DCO application is granted	Homes that are exposed to the highest noise with existing operations, in line with latest Government policy, and this includes homes that would also be exposed to the highest noise with the Project. Also homes potentially exposed to early construction noise as well as existing high aircraft noise. Homes will also be selected in this stage to develop and test our systems and suppliers. (Figure 5.1)	Scheme 1
Stage 2	Between DCO application granted and start of major construction phases	Homes identified as potentially impacted by construction noise, but outside forecast aircraft noise impacted areas. (Figure 5.2 shows the indicative construction noise study areas.)	Scheme 2
Stage 3	Between DCO application granted and new runway opening	Homes forecast to be newly exposed to high, or very high, noise levels from aircraft or the new or altered roads or rail, in stages as the Project progresses.	Scheme 1 and Scheme 2
Stage 4	New Runway opening onwards	Insulation provided in advance for homes forecast to exceed SOAEL for aircraft (i.e. 63dB $L_{Aeq,16hr}$ day and 55dB $L_{Aeq,8hr}$ night) as traffic using the expanded airport grows to a point where the airport's noise impact is forecast to be highest (the peak year as defined in the Environmental Statement). There will also be progressive roll-out of offers to homes at aircraft noise levels from SOAEL down to the 60dB Action Level as airport movements grow.	Scheme 1

Stage	Period	Homes for Noise Insulation	Scheme
		Figure 5.3 has the current estimate of the predicted noise contour for 2027, but revised noise contour forecasts will be published every 5 years. (This is referred to as the Inner Area in the PEIR. We expect this stage to be completed by 2040).	
Stage 5	New Runway opening onwards	There will be progressive roll-out of offers to homes at noise levels down to the 57dB $L_{Aeq,16hr}$ and 55dB L_{den} Action Levels as airport movements grow. Revised noise contour forecasts will be published every 5 years. (This is referred to as the Outer Area in the PEIR.)	Scheme 3

5.2 Identification of eligible buildings

5.2.1 At each stage, the relevant existing or predicted noise contour will be used to identify the properties that may be eligible for the Noise Insulation Schemes. Noise contours will be calculated based on expected air, road, rail and construction traffic movements and the modelling of construction plant noise.

5.2.2 For this consultation, preliminary noise contours are available below and in Chapter 17 of the PEIR. The aircraft noise contours have been developed based on indicative flight paths. These contours are presented to provide an indication of the scope of the Noise Insulation Schemes.

5.2.3 For the DCO application in 2020, updated noise contours will be provided in the Environmental Statement.

5.2.4 The predicted aircraft noise contours will also be updated as part of the statutory airspace flight path options consultation for an expanded Heathrow, currently planned for 2022, and further again in 2023 when the final flights paths are defined.

5.2.5 This will mean that the aircraft noise contours are expected to evolve and be updated as the Expansion scheme design and airspace change process continues to evolve and develop. This may result in some changes to the predicted future contours so that some homes indicated as being within a certain noise contour may later fall outside that contour and vice versa. The aim at each stage will be to reduce the noise impact, in line with the Airports NPS and the ICAO “balanced approach”, which would also reduce or change the homes within the contours, as far as reasonably practicable.

5.2.6 Subsequently, the current noise contours will be published every year (for the previous year), and projected noise contours will be updated every 5 years in conjunction with developments of the Noise Envelope.

5.2.7 This will mean that future eligibility for noise insulation schemes will be continually reviewed and residents will be informed if they are likely to be eligible within 5 years. Where a 5-year review identifies that a contour may reduce and properties may not be eligible in future, the scheme will remain open for at least 12 months after the property ceases to be within a relevant contour.

5.2.8 In densely developed areas such as those with terraced homes, there are likely to be adjacent properties exposed to similar noise levels with one property inside the contour whilst its neighbour outside. For this policy any residential property with any part of its curtilage within the contour will be assessed to be within the contour.

Figure 5.1 – Stage 1 – Prior to DCO Grant

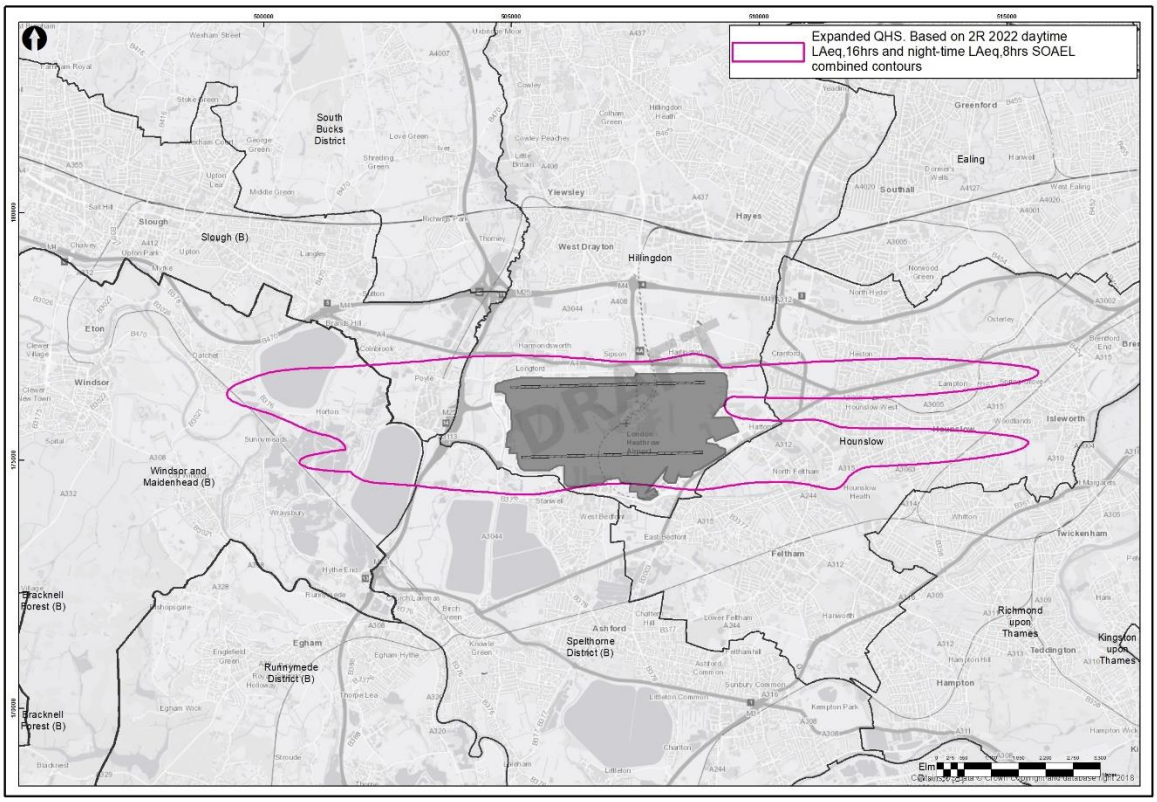


Figure 5.2 – Stage 2 – Indicative Construction Noise Study Area

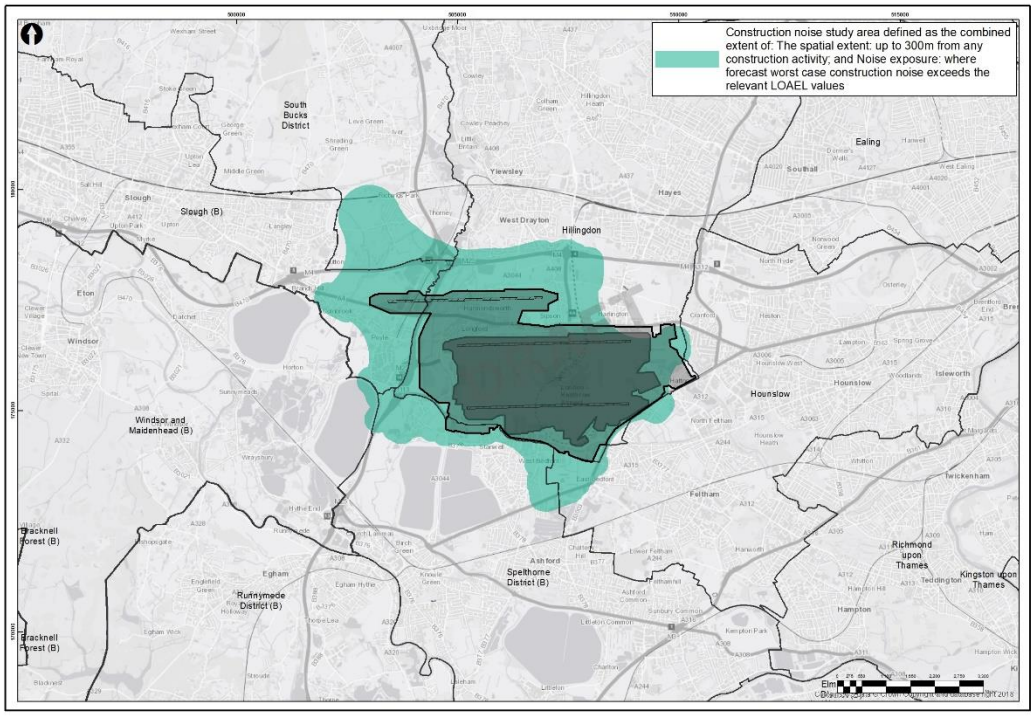
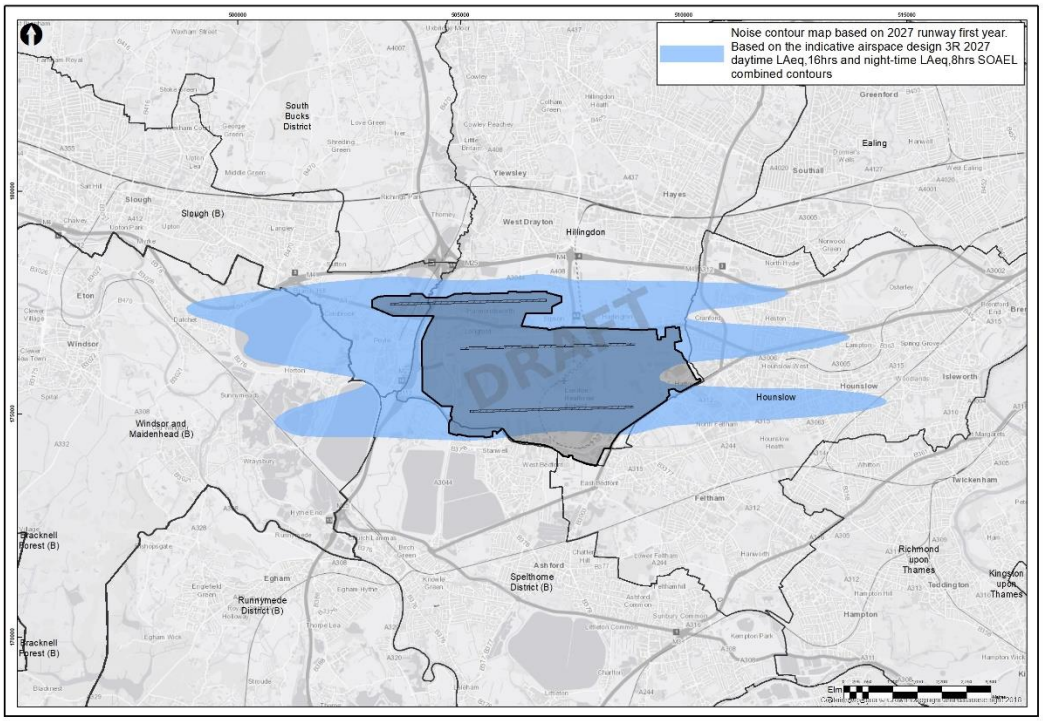


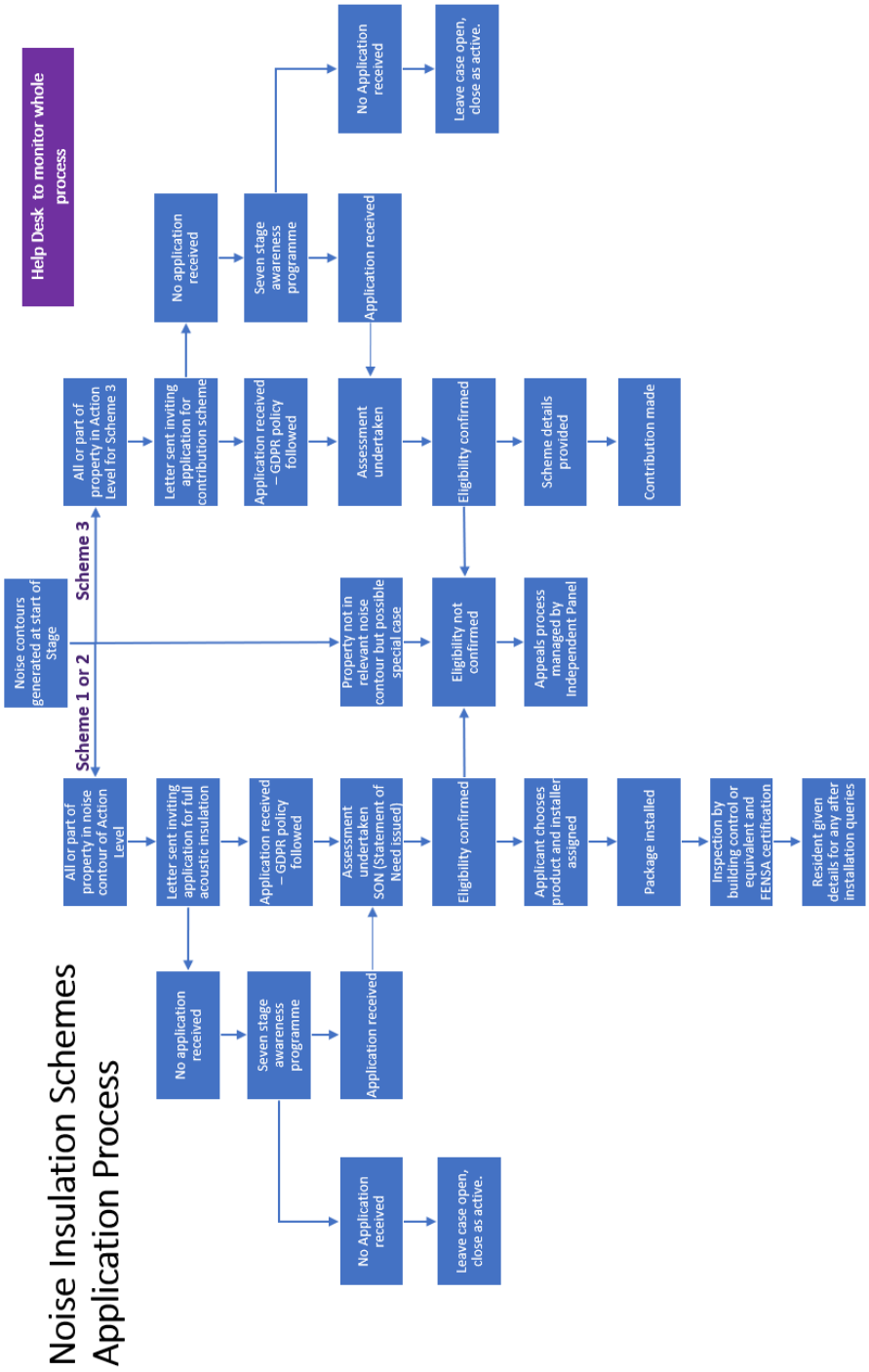
Figure 5.3 – Stage 3 – Indicative Noise contour map based on 2027 runway opening year



5.3 Application Process

5.3.1 The process for delivering the Noise Insulation Schemes is summarised in a flow chart in Figure 5.4.

Figure 5.4 – Application Process Flow Chart



5.3.2 At each stage, or at intervals within a stage, the owners of properties identified as within the relevant noise contour will be contacted by post and advised that they are eligible to apply for the scheme.

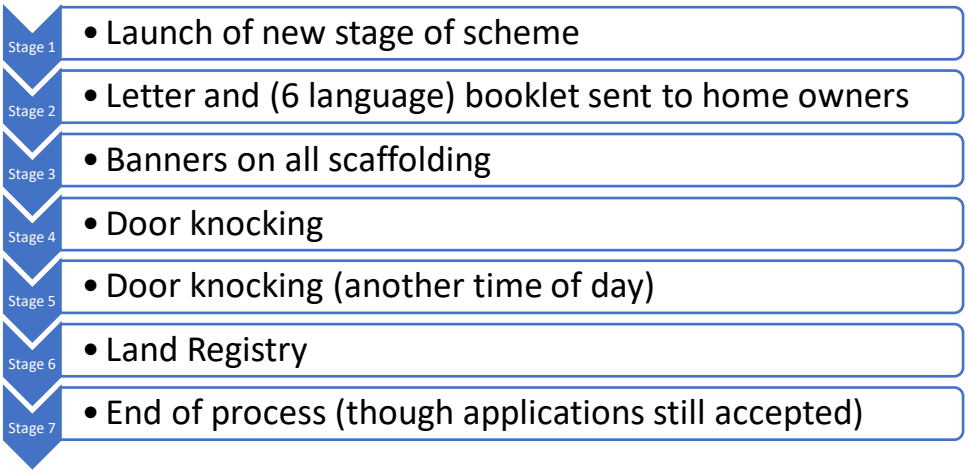
5.3.3 Where a property is rented, the tenant must obtain the permission of the property owner to apply for the scheme. This is for legal reasons.

5.3.4 Although Heathrow will seek to identify all eligible people and invite them to apply, a helpdesk will be available for people to check if they are eligible to apply.

5.3.5 The invitation to property owners will be supported by a seven-stage programme that is designed to promote awareness of the scheme and encourage applications. The seven-stages are outlined in a flow chart in Figure 5.5 and Appendix C.

5.3.6 If the homeowner does not respond during this seven-stage process, the application will be marked as dormant unless the property is within the UAEL contour. The homeowner may apply at a later date (if still eligible) but we cannot then guarantee that the insulation will be installed before the noisy activity starts.

Figure 5.5 Seven-stage awareness programme



5.3.7 Once an application has been received and a property owner has registered for the scheme, an assessment of the property will be carried out by the Assessor, a third-party organisation appointed by Heathrow. An initial desktop or drive-by assessment may be used to identify if a detailed inspection is required.

5.3.8 The initial assessment will address the following questions:

- Is the applicant entitled to apply for the property (the homeowner or appointed agent)?
- Is the property within a relevant noise contour?
- What is the relevant scheme and is there a priority for delivery?

- Has the property benefited from a previous scheme? What is the condition of the property?
- What works or options would be offered under the relevant scheme?
- Are any consents required for the works?
- Are there any special considerations?

5.3.9 Once the Assessor confirms eligibility, the property owner will be provided with scheme details and a list of approved installers or processes to enable work to take place. For Scheme 1 this will normally be summarised in a Statement of Need (SON) based on the house construction external noise levels, and priority.

5.3.10 Records will be made of all properties contacted as eligible, persons making applications under the scheme, the outcome of the assessment, and the satisfactory completion of the package, if provided.

5.3.11 Heathrow will seek to provide information to home owners, house purchasers or their agents and tenants, on request, concerning the eligibility of properties for noise insulation schemes, subject to data protection and confidentiality requirements. It is for this reason the database of information is managed by an address rather than the owner's or resident's name.

5.3.12 Properties eligible for the Scheme 3 contribution to noise insulation will be required to use a supplier approved by Heathrow to ensure suitable quality management.

5.3.13 After the completion of works, auditing will be conducted to demonstrate compliance. This will include performance inspection or tests of a sample range of properties.

5.3.14 A dedicated support team will be provided to assist applicants throughout the process, including people needing special assistance, and to investigate any complaints during and after completion. Applicants will also be able to appeal to the Independent Panel. (See Section 5.4.)

5.3.15 Reasonable time needs to be allowed for applicants to be identified, for applicants to consider and apply for the scheme, to receive applications and determine eligibility, and to carry out the works. Therefore, the Noise Insulation Schemes will open in advance of the relevant expected noise change. It is also possible that applicants may defer, perhaps hoping that they will find the noise acceptable and avoid the disruption of the works. The schemes will therefore remain open for at least a year after the relevant expected noise change occurs.

5.3.16 Where consents are required for the installations proposed by the Noise Insulation Schemes, for example, planning, listed building or conservation area consents, and building control, the appointed contractor and the Heathrow support team will

assist the applicant in obtaining the necessary consents[1]. It is normally the responsibility of the homeowner to obtain these consents, but in some circumstances support with consent applications could be provided.

5.4 Appeals and Exceptions

Applications from non-eligible properties

5.4.1 Although Heathrow will seek to identify all eligible home owners and invite them to apply, a help desk will support other people who wish to check eligibility to apply. These may be people who are not in the current stage, or who are outside the contours, or who have a special case for consideration.

Appeals

5.4.2 An independent appeal process will be available to applicants who do not accept an eligibility or Statement of Need (SON) decision. After the initial response by the Assessor, an appeal may be made to an Independent Panel who will carry out an initial review, consider if further action is appropriate and advise the complainant of their decision.

5.4.3 Heathrow will set up and fund the Independent Panel in consultation with other community and local authority stakeholders, modelled on that set up for the Thames Tideway project.

Exceptions

5.4.4 The policy and schemes described above meet or exceed the minimum requirements of the Airports NPS and NPSE, and provide sustainable and practical schemes for the majority of people and properties. However, there may be exceptional cases where a bespoke alternative performance standard to meet the requirements could be considered. Examples may be:

- a person with a specific health or disability issue associated with noise,
- a property which is not suitable for the standard schemes, such as some listed or historic buildings,
- a property exposed to very high noise levels above the UAEL of 71/66dB $L_{Aeq,16/8hr}$ for aircraft noise.

5.4.5 Bespoke assessments and schemes are inherently costly and can be disproportionate in the effort and funds required for assessment and design compared to delivery and therefore may not be considered practicable or

[1] Normally the property owner or resident will apply for the consent and retain the benefit of any permissions granted.

sustainable but can be appropriate in exceptional circumstances. The Independent Panel would review cases where bespoke assessments may be justified and recommend the most appropriate treatment options. Where substantial works are required, temporary relocation may be offered on a similar basis to that offered for construction noise.

5.4.6 For the very few properties that will be newly exposed above the UAEL, where an application is not received or an offer accepted, we may need to obtain compulsory rights to provide bespoke treatments to prevent exposure above UAEL. Such treatments may also need to include temporary rehousing to allow the work to be done to those homes. This will be addressed in the DCO application.

6. OTHER SCHEMES BEYOND THE NOISE INSULATION POLICY

In addition to the noise insulation schemes in this draft Noise Insulation Policy, Heathrow has two other existing noise and vortex related schemes that will be refreshed. These are the Home Relocation Assistance Scheme which offers financial help to eligible homeowners living in the noisiest areas around Heathrow to move away from the area if they wish; and the Vortex Protection Scheme which is designed to protect and repair homes from around the airport damaged by wind currents from aircraft wings.

Heathrow will also introduce a Temporary Rehousing Scheme for those most impacted by short term construction noise. These schemes are summarised in this section for reference.

6.1 Proposed Temporary Home Relocation Scheme

6.1.1 This section sets out a draft proposal for a Temporary Home Relocation Scheme for those most impacted by short term construction noise.

6.1.2 Where, after applying best practical means mitigation, construction noise at any residential receptor is predicted to exceed the construction noise insulation Action Levels for a temporary period, Heathrow would offer an option of temporary re-housing for the duration of the works. The Action Level will be based on the UAEL for construction noise of around 75 to 85dB $L_{Aeq,T}$, as detailed in Appendix B.

6.1.3 Heathrow will contact the owners or occupiers of properties affected before the works are due to start to allow residents to find alternative property and move before the noisy works begin. Temporary re-housing could be a similar rental property or a hotel.

6.1.4 Heathrow will provide a help desk and work with local property agents to identify suitable temporary accommodation and support applicants who choose to find their own temporary housing. Applications will be assessed for:

- Property location and eligibility
- Ownership/occupancy
- Accommodation requirements including any special needs or adaptations

6.1.5 Eligible applicants will receive a Statement of Need (SON) setting out what range of temporary accommodation will be provided within the scheme, details of local letting agents, removal and storage companies, and the Heathrow helpdesk support.

6.1.6 Subject to eligibility, Heathrow would pay the reasonable costs of:

- Equivalent temporary accommodation based on reasonable market rates,
- Packing and removal costs, and storage of personal goods if required
- Kennel/cattery or equivalent housing for pets,
- Works to secure the vacated property when empty, including disconnection and re-connection of services, and
- Additional insurance for temporary accommodation and vacated property.

6.1.7 Applicants will be able to make their own arrangements, but payments will be audited and claimants must receive approval from Heathrow of the supplier and of the costs before using suppliers not previously audited by the scheme.

6.1.8 Heathrow will usually seek to support temporary accommodation as close as practical to the vacated property, but sufficiently distant to avoid significant noise impacts. Where temporary accommodation is a significant distance from the permanent location, assistance with travel costs (e.g. workplace or school) may be provided.

6.2 Home Relocation Assistance Scheme (HRAS)

6.2.1 Since 2002, Heathrow has offered the Home Relocation Assistance Scheme to offer financial help to eligible homeowners living in the noisiest areas around Heathrow to move away from the area if they wish. It was developed in consultation with local residents, businesses, campaign groups and local authorities. People who meet the criteria can get financial assistance with the costs of moving.

6.2.2 This current HRAS scheme applies to residential properties around Heathrow that are exposed to a high level of noise defined for this scheme as lying within the 2002 69dB $L_{Aeq,16hr}$ noise contour.

6.2.3 The criteria for eligibility including the following:

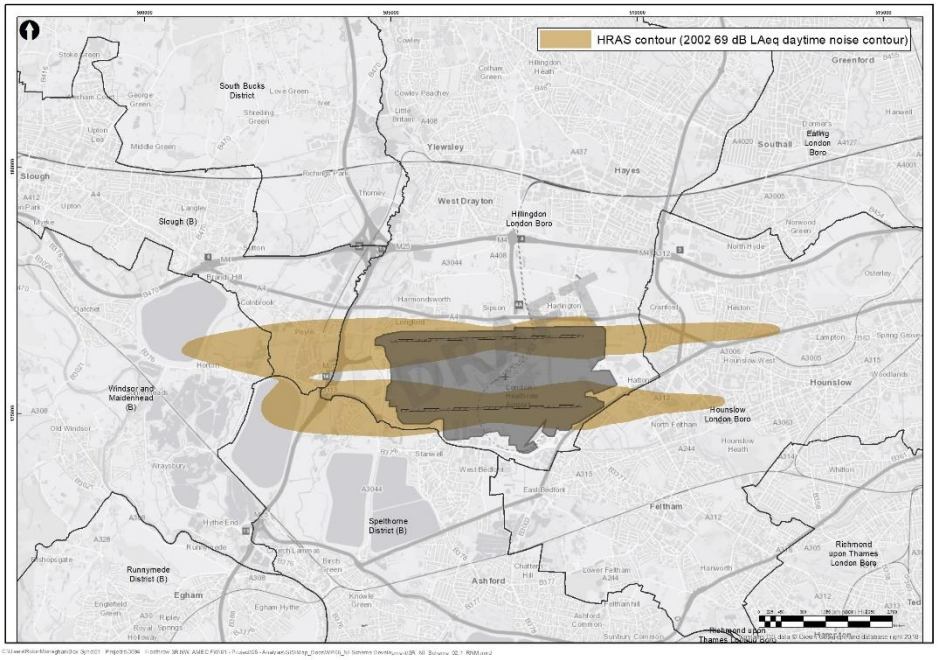
- The applicant must own the property when applying. (If the applicant lives elsewhere, it must be the only property in the UK that is owned by the applicant.)
- The applicant must be planning to move to a quieter area outside the boundaries of the scheme.
- The applicant must not retain a beneficial interest in, or right of occupation to, the property after moving.

- Residents must have owned or be living in the property prior to February 2005.
- Long-term tenants (with at least three years remaining on their lease) may also be eligible for assistance if the property they are renting is being sold. However, short-term tenants are not eligible for the scheme.

6.2.4 Homeowners receive a lump sum of £5,000, plus 1.5% of the sale price of the property (up to a maximum of £12,500). There is only one payment per property. No other assistance is provided and the property is no longer eligible for a Noise Insulation Scheme[2]. The property is sold in the open market by the owner.

6.2.5 More information on this current scheme and its eligibility criteria are provided by a Noise Helpdesk (0800 344844) or email communityschemes@heathrow.com

Figure 6.1 – Boundary for Existing HRAS



6.2.6 Heathrow is taking the opportunity to enhance the Home Relocation Assistance Scheme. The eligibility criteria will remain the same.

6.2.7 The compensation values are under review. Under the refreshed HRAS, eligible homeowners would receive the same lump sum of £5,000 and an additional 5% of the sale price of the property, up to a new higher maximum cap. There is only one payment per property.

[2] Under the "agent of change" and "caveat emptor" principles, the open market buyer of a property should consider any noise insulation requirements within their purchase price offer. For houses purchased by Heathrow, any noise insulation scheme would normally be provided before the property is returned to the market.

6.2.8 HRAS will apply to the areas to east, west and possibly south of the existing two runways based on the $L_{Aeq,16hr}$ 69dB noise contour. (See below for discussion of the year of the applicable contour.)

6.2.9 As with the Noise Insulation Schemes, HRAS eligibility will require that some part of a property lies within the relevant, calculated noise contour.

6.2.10 More information about a refreshed HRAS will be available later this year. Eligibility for HRAS will continue to be based on the 69dB $L_{Aeq,16hr}$ contour from 2002. It can be noted that since 2002, the annual noise contour at Heathrow has continually decreased is size, which means that some houses that qualified for HRAS in the past, now lie outside the current 69dB contour.

6.2.11 In 2021, if the DCO is granted and there is a decision to proceed with construction, HRAS will be based on the 69dB $L_{Aeq,16hr}$ contour for 2020 (because the 2021 contour will not be available). With expansion, however, there may be years when the noise contour could be different to the previous year. Therefore, the intention is that HRAS will be based on the noise contour for 2020 or the projected contours for 2025, whichever is larger. Subsequently, from 2026, HRAS will be based on noise contour for 2025 and the projected contours for 2030, whichever is larger.

6.2.12 In this manner, a homeowner will be able to make a decision on selling and claiming the HRAS scheme, based on the highest noise levels expected for five years.

6.2.13 If with the publication of a new HRAS contour, a property newly falls outside, previous eligibility for the scheme will be considered for 12 months.

6.3 Vortex Protection Scheme

Existing Vortex Protection Scheme

6.3.1 A vortex is a circulating current of air generated by the wings of an aircraft. It can sometimes strike and damage the roofs of houses located under a flight path. Pitched roofs with loose-laid tiles are prone to vortex damage. For many years, Heathrow has had a Vortex Protection Scheme to both repair and protect homes around the airport.

Damage Repair

6.3.2 If a home has been damaged by a vortex strike, Heathrow operates a 24-hour emergency service and will repair it. Although legal liability for vortex damage rests with the airlines, Heathrow voluntarily funds this scheme as part of its commitment to its local communities.

6.3.3 Every house, school, church or hospital affected by a vortex strike is eligible for the Vortex Protection Scheme. This includes home situated above commercial properties. However, the scheme does not cover damage to other property, such as cars, from roof tiles dislodged by a vortex.

6.3.4 An assessor will inspect a roof reported as damaged. The damage caused by vortex strikes is very specific and the assessor will quickly be able to confirm whether one has occurred. Once approved, remedial repairs to the roof are carried out at no cost to the home owner.

Vortex Protection

6.3.5 If a roof is repaired under the Vortex Protection Scheme, the property is eligible for permanent protection. This involves strengthening the roof by fixing down tiles with metal clips that have passed stringent wind tunnel tests – this has proven to be the most effective way to protect roofs from vortex damage. This work will be completed as soon as possible and free of charge.

6.3.6 Because the majority of vortex strikes are concentrated in small areas near the end of runways, Heathrow offers blanket vortex protection for homes in these high-risk areas. This currently includes streets where 50% of the homes on a given road have been struck, where all of the homes are invited to register under a blanket scheme.

6.3.7 To date, no further vortex damage has been recorded at any home that has had its roof strengthened under the Vortex Protection Scheme.

6.4 Expanded Vortex Protection Scheme

6.4.1 For the Project, a new blanket area based on the new runway layout has been defined that identifies homes where vortex damage may occur. After granting of the DCO and a decision to proceed, Heathrow will undertake vortex protection of all of the roofs in the defined area that are eligible within a blanket roll out.

6.4.2 After opening of the new runway expected in 2026, the Vortex Protection Scheme will continue as it does today. We will respond to reports of vortex damage, and areas with many confirmed reports of damage will be considered for blanket protective treatments.

APPENDIX A: GLOSSARY

Term	Definition
Airports NPS (or ANPS)	Airports Noise Policy Statement (2018)
APF	Airports Policy Framework
BS 5228	British Standard 5228 (2014): Code of practice for noise and vibration control on construction and open sites Part 1: Noise.
BS8233	British Standard 8233 (2014): Guidance on sound insulation and noise reduction for buildings
CAA	Civil Aviation Authority
CoCP	The Draft Code of Construction Practice included in the current consultation documents.
CRTN	Calculation of Road Traffic Noise – a guidance document for road noise referred to in the Noise Insulation Regulations
CRN	Calculation of Railway Noise – a guidance document for rail noise referred to in the Noise Insulation Regulations
dB (or dBA)	Decibel (usually A-weighted to approximate the response of the human ear.) is used to measure noise level on logarithmic scale (relative to a standard reference.)
DCO	Development Consent Order
DfT	Department for Transport
Double glazing	This is a window pane with two sheets of glass giving better noise insulation (and thermal insulation) performance than a pane of single glazing. The double glass units are factory sealed and installation will usually require the removal of the existing windows and frames. Acoustic double glazing, for example using laminated glass, can provide better noise reduction than standard thermal double glazing.
ENG	Environmental Noise Guidelines for the European Region (2018)
GCN	Guidelines for Community Noise (WHO 1999)
The Project	Heathrow Expansion Programme
HRAS	Home Relocation Assistance Scheme
ICCAN	Independent Commission on Civil Aviation Noise
L_{A10} or L_{10}	The noise level exceeded for 10% of a measurement period. This is traditionally used to measure road traffic noise.
$L_{Aeq,16hr}$	The noise level averaged over the 16-hour day period (07:00-23:00) and over the 92-day summer period. This day time aircraft noise metric has been used in the UK since the 1980's.
$L_{Aeq,8hr}$	The noise level averaged over the 8-hour night period (23:00-07:00) and over the 92-day summer period. This night time aircraft noise metric has been used in the UK since the 1980's.
$L_{Aeq,T}$ or $L_{eq,T}$	The energy equivalent noise level over a specified period, T, and A-weighted to approximate the response of the human ear.
L_{den}	The annual average energy equivalent noise level, A weighted to approximate the frequency response of the human ear and time weighted for day, evening and night time periods. This annual aircraft noise metric was adopted as the standard noise metric in the EU in 2002.

L_{Amax} or L_{max}	The maximum noise level occurring during a measurement period, A weighted to approximate the frequency response of the human ear.
L_{night}	The A-weighted noise level averaged over the 8-hour night period (23:00-07:00) and over the calendar year.
LOAEL	Lowest Observable Adverse Effect Level
NNG	Night Noise Guidelines (WHO 2009)
Noise Insulation Policy	The policy set out in this document to address the Airports NPS requirements for the Heathrow Expansion Programme, The Project.
Noise Insulation Regulations	Noise Insulation Regulations (1974) as amended by Noise Insulation Regulations (Amended) 1988 and The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996
Noise Insulation Schemes	The 3 schemes or levels of acoustic treatment for aircraft, road, rail and construction noise set out in this Policy.
Noise Insulation Strategy	Heathrow's wider and long-term approach to the insulation of homes and community buildings for existing activities, airspace changes and the Expansion Project.
NPPF	National Planning Policy Framework (2019)
NPSE	Noise Policy Statement for England
PPG or PPGN	Planning Practice Guidance-Noise (2014)
The Project	The Heathrow Expansion Programme
Secondary glazing	This is an upgrade of the acoustic performance of an existing window, by the installation an addition glazing pane in its own frame on the existing sill of the window.
SOAEL	Significant Observable Adverse Effect Level
SON	Statement of Need
UAEL	Unacceptable Adverse Effect Level
WHO	World Health Organisation

APPENDIX B: NOISE METRICS AND ACTION LEVELS

Aircraft Noise [92-day summer average levels unless noted otherwise]				
Level	Daytime dB $L_{Aeq,16\ hr}$	Night time dB $L_{Aeq,8\ hr}$	Event dB L_{Amax}	Policy Source
"*approximate onset of significant community annoyance*"	54			APF (2013) as amended by Consultation Response on UK Airspace Policy (2017)
LOAEL	51	45		Air Navigation Guidance (2017) and PEIR
Financial assistance toward insulating homes and schools	63			Consultation Response on UK Airspace Policy (2017)
SOAEL	63	55	One additional awakening per person, per night	PEIR
Proposed new expectation for financial assistance toward insulating homes and schools	60			Draft Aviation Strategy 2018
UAEL	71	66		PEIR
Action Level for Scheme 1	The full single mode easterly and westerly 60dB $L_{Aeq,16hr}$ noise contour of an expanded airport		One additional awakening per night	
Action Levels for Scheme 3	The full single mode easterly and westerly 57dB $L_{Aeq\ 16hr}$ or the full 55dB L_{den} noise contours of an expanded airport, whichever is the bigger		One Additional awakening per night	Airports NPS (5.245)
Proposed Govt new expectation for financial assistance toward insulating homes	An increase of 3dB compared to before expansion which leaves a household in the 54dB $L_{Aeq,16hr}$ contour			Draft Aviation Strategy 2018

Road Noise				
Level	Daytime $L_{Aeq,16\ hr}$	Night time $L_{Aeq,8\ hr}$	Event	Source
LOAEL	50	40		PEIR
SOAEL	63	55		PEIR
UAEL	71	66		PEIR
Action Levels for Scheme 2	63/55dB $L_{Aeq\ 16/8\ hr}$ (and a change of at least 1dB from before expansion)			PEIR and Noise Insulation Regulations
Rail Noise				
Level	Daytime $L_{Aeq,16\ hr}$	Night time $L_{Aeq,8\ hr}$	Event L_{Amax}	Source
LOAEL	50	40	60	PEIR
SOAEL	65	55	80 (>20 events) or 85 (<20 events)	PEIR
UAEL	71	66		PEIR
Action Levels for Scheme 2	65/55dB $L_{Aeq\ 16/8\ hr}$ (and a change of at least 1dB from before expansion)			PEIR and Noise Insulation Regulations

Construction Noise

In line with Section 11 of the draft CoCP, to be eligible the dwelling must be one in which the predicted or actual noise exceeds any of the relevant thresholds in CoCP Table 11.1 for:

- A period of 10 or more days of working in any 15 consecutive days during construction, or
- A total of 40 days or more in any 6 consecutive months during construction

The noise thresholds for both construction and noise insulation are set out in the Table below:

Day	Time (hours)	Averaging Period, T	Noise Insulation Action Level $L_{Aeq,T}$ (dB)*	Construction Temporary Rehousing Action Level $L_{Aeq,T}$ (dB) *
Monday to Friday	0700 – 0800	1 hour	70	80
	0800 – 1800	10 hours	75	85
	1800 – 1900	1 hour	70	80
	1900 – 2200	1 hour	65	75
Saturday	0700 – 0800	1 hour	70	80
	0800 – 1300	5 hours	75	85
	1300 – 1400	1 hour	70	80
	1400 – 2200	1 hour	65	75
Sunday & Public Holiday	0700 – 2200	1 hour	65	75
Any night	2200 – 0700	1 hour	55	65

* DCO Project construction noise only. Trigger levels are defined as 1m in front of the closest façade of a habitable room. Where measurements are used, they will be taken either at the façade or in free-field. A façade correction will be applied to any free-field measurements to establish the façade level.

* Where the current ambient noise level is greater than the noise insulation trigger level:

    1. the ambient noise level will be used as the noise insulation trigger level
    2. the temporary rehousing trigger level will be the ambient noise level +10dB.

APPENDIX C: SEVEN-STAGE AWARENESS PROGRAMME TO INFORM AND ENCOURAGE APPLICANTS

Stage 1: Launch of New Stage

Public awareness of the launch of a new stage of noise insulation will be driven through notices posted at the following – Community Centres, Churches, Local MP's and Schools.

Stage 2: How individual residents are made aware of Heathrow's Noise Insulation Scheme

All property owners that qualify for Heathrow's current stage are individually written to explaining the scheme in detail. A comprehensive booklet written in six languages will be sent to all homes identified within the relevant contour – English, Arabic, Hindi, Polish, Punjabi and Urdu.

Every effort is made to ensure that qualifying residents are able to understand the booklets that outline the scheme, key facts, explain proposed works and most importantly who to contact should further information be required to clarify what is in the booklet and answer any questions.

Stage 3: Banners on all scaffolding

During works on a property, scaffolding set up at a home being fitted out will include a banner displaying. Neighbouring properties will be able to that it is a Heathrow related scheme and neighbours will be encouraged to phone up, investigate their eligibility and register for the scheme.

Stage 4: Door knocking

Staff 'door knock' resident's properties that are eligible for the scheme to speak directly with them and hand over another booklet that explains the scheme in detail. This will give the residents the opportunity to ask any questions that they may have as a result of the scheme being discussed. In the event that there is nobody home at the time of the visit, another booklet will be posted to drive awareness of the Noise Insulation Scheme.

Stage 5: Door knocking

Stage 4 is repeated at a different time of day. If, for example, a property was originally visited in the morning then the second visit would be in the afternoon to make every effort to speak with the resident.

Stage 6: Land Registry

Heathrow contact the Land Registry with a view to contacting landlords whose homes qualify for NIS. A comprehensive booklet will be posted to further drive awareness of NIS to help drive registrations.

Stage 7: End of process

Make a record that all awareness processes have been completed. The residents/ landlords still have the opportunity to come forward as long as they are still within the specified noise contour. The purpose of documenting is to demonstrate that all seven stages have been processed.

There are lots of ways you can contact us or find out more

Find all the consultation information on our website aec.heathrowconsultation.com

Email any questions about the consultation to info@heathrowconsultation.com

Follow @LHRconsultation to stay up to date on event details

Call our freephone number 0800 307 7996 (open Monday to Friday, 9am-6pm)

If you would like a large text or alternative format of this document, please contact 0800 307 7996 or email info@heathrowconsultation.com

AIRPORT EXPANSION CONSULTATION

Heathrow

GATWICK AIRPORT ENVIRONMENTAL NOISE DIRECTIVE NOISE ACTION PLAN 2019 – 2024

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SECTION 1 - FOREWORD

By Stewart Wingate, Chief Executive Officer

As Gatwick has grown significantly over the past decade and today welcomes more passengers than ever before; over 45 million passengers in 2017 and a record number of air traffic movements. The airport, as part of the UK aviation network, plays a vital role in supporting the local as well as national economy. As one of the largest companies in our region, Gatwick helps businesses to prosper and tourism to flourish, as well as generating employment for 24,000 people on the airport and a further 13,000 in the local economy.

We continue to sustain air passenger growth in line with the government's challenge for airports to optimise the use of existing infrastructure. However, in supporting aviation growth and creating a range of economic and social benefits, we also recognise our responsibility to ensure we deliver a sustainable and considerate airport operation.

The Independent Review of Arrivals, initiated in August 2015, heralded a significant shift in our approach to tackling community concern regarding airspace and aviation noise. A series of recommendations were put to the airport, all of which were accepted.

The establishment of the Noise Management Board as a result of the Review - the membership of which includes a spectrum of industry stakeholders and community representatives - has created a highly effective means of engaging on noise issues relating to aircraft arrivals, departures as well as on the ground. This robust structure of industry stakeholder collaboration, strongly influenced through a process of community engagement, has allowed the evolution of the noise management process to help identify noise issues and develop solutions which are now managed through a more dynamic Noise Management Board Work Plan.

Under the Environmental Noise (England) Regulations 2006, Gatwick Airport Ltd is required to produce a Noise Action Plan, designed to manage noise issues and effects arising from aircraft departing from and arriving at the airport. This is the third version of the END Noise Action Plan containing 58 Action Plan Actions and it continues to align with the S106 Legal Agreement with West Sussex County Council and Crawley Borough Council, the work plan of the Noise Management Board and our Decade of Change Sustainability Strategy.

We continue to deliver on our commitments and obligations relating to sustainable growth, captured in the S106 Legal Agreement, Noise Management Board Work Plan, Decade of Change strategy and this END Noise Action Plan. We remain committed to publicly reporting our performance against these and the effectiveness of our actions to address community concerns.

Gatwick is a national success story and we are proud that we have become a vital part of the country's national infrastructure as we have grown. And we recognise the important part we have to play in the future not only of our local communities but the UK as a whole.

[redacted]

STEWART WINGATE

SECTION 2 - PURPOSE AND SCOPE

The purpose of this Noise Action Plan is to comply with the requirements of the European Union (EU) Environmental Noise Directive 2002/49/EC (END) and associated UK Government Regulations.

The airport operator is deemed the competent authority for drawing up the Action Plan which for Gatwick Airport, is Gatwick Airport Ltd. The final adoption and approval of the noise action plan is undertaken by the Secretary of State for the Department of Food and Rural Affairs (DEFRA).

Government guidance states that noise action plans are designed to manage noise issues and effects arising from aircraft departing from and arriving at the airport, including noise reduction if necessary.

Gatwick Airport Ltd is committed to reducing noise at or around the airport and has significantly increased the level of focus in addressing the challenges arising from aircraft noise over recent years however it continues to remain an area of concern for local communities. While we can't eliminate aircraft noise completely, our goal is to reduce it as much as possible and this document sets out how Gatwick Airport Ltd plans to manage and where possible reduce the impact of aircraft noise.

Responsibilities within the management of noise do not always fall to the airport operator and where responsibility falls to the Department for Transport, air navigation service providers or the Civil Aviation Authority then the airport can seek to recommend or influence changes. The Noise Management Board at Gatwick is an excellent example of where a wide range of key industry experts and stakeholders are gathered with the purpose of reducing the impact of noise on the local community.

Gatwick Airport's first Environmental Noise Directive Noise Action Plan was published in June 2010 and covered the period 2010 - 2015. This action plan was subsequently updated to cover the period 2013 - 2018. This is the third revision to the action plan and has been devised in line with the latest guidance provided to airport operators by DEFRA.

In revising this action plan, the following bodies have been consulted:

- The Gatwick Airport Consultative Committee
- The Noise and Track Monitoring Advisory Group
- West Sussex County Council
- Crawley Borough Council

In addition, the Noise Management Board has been advised of this process. Details of feedback received is included in Annex 9.

SCOPE

Directive 2002/49/EC relates to the assessment and management of environmental noise and is referred to as the Environmental Noise Directive or END. The Environmental Noise (England) Regulations 2006, as amended, transpose this Directive into English law.

The Regulations require that strategic noise maps be produced for the main sources of environmental noise (major roads, major railways, and major airports) and for agglomerations in

England. Strategic noise mapping for Gatwick Airport, in scope of the Regulations was produced by the Environment Research Consultancy Department (ERCD) division of the CAA and completed in 2017, showing the situation in 2016 utilising the L_{den} measurement.

The contours are shown in Annex 3.

Through the action plan actions set out in this plan, we seek to manage aircraft noise from Gatwick's operation. It is important to note that this document only includes actions related to developments for which the airport has been granted planning permission at the time of publication. For the avoidance of doubt, the scope of this noise action plan does not include a mitigation strategy or specific actions to deal with any new infrastructure or significant airspace change. Nor does it deal with any actions or mitigation schemes in the event Gatwick Airport constructs a second runway.

In the event of any changes or proposals that impact this action plan we will review our noise action plan with the bodies referred earlier in this section, and if appropriate, consult on any proposed amendments publicly.

The legal requirement is for Gatwick Airport Ltd to consider noise issues within the 55dB L_{den} and 50dB L_{night} noise contours. These contours take into account aircraft noise during take-off, landing and ground roll stages of flight.

In revising this Noise Action Plan, we continue to give consideration to actions that seek to address the impacts of aircraft noise in areas beyond the specified contours as well as noise created by taxiing aircraft and engine testing carried out within the airport perimeter.

The 2015 Section 106 Legal Agreement with West Sussex County Council and Crawley Borough Council sets a limit of 250 high powered engine tests per six month rolling period before Gatwick Airport Ltd is required to undertake further prescribed actions. The proposed Boeing Hangar, scheduled for operational use in 2019 is not anticipated to result in a significant increase in engine testing due to the nature if the maintenance work to be undertaken, and high powered engine tests are not expected to occur more than once a month, and probably less than that.

This Noise Action Plan also aligns with Gatwick's Sustainability Strategy, the Decade of Change and the Section 106 Legal Agreement with Crawley Borough Council and West Sussex County Council.

Our strategic approach to noise is described later in this document with more details regarding our Decade of Change and S106 Legal Agreements available on our website in the sustainability section at www.gatwickairport.com

The action plan does not include noise from airport construction activities or noise from road and rail traffic associated with the airport.

Action plans for noise associated with major road and rail routes are dealt with separately under government legislation and do not fall within the responsibility of airport operators.

SECTION 3 - INTRODUCTION

Airports bring positive economic and social benefits, as well as environmental impacts. They are important to the economy, providing jobs, encouraging inward investment and boosting local tourism. However airports can also have an impact for those communities that exist around them. Noise remains a significant issue for people living or working close to airports or under flight paths.

Our environmental policy continues to encourage the use of quieter aircraft and to restrict noisier aircraft. As the airport grows, and the frequency and number of flights increase, we know that we must make sure that our policies on controlling noise continue to evolve so they remain appropriate and effective. The Noise Management Board at Gatwick continues to identify innovative new solutions, in partnership with key industry stakeholders and local community groups to control aircraft noise.

At Gatwick Airport, we have a dedicated team whose focus is to continually monitor aircraft operations to ensure compliance with the noise abatement requirements applicable to the airport. Departing aircraft must follow set routes designed, where possible, to avoid flying over densely populated areas. We monitor the noise levels generated by each aircraft as it takes off from the airport. If any aircraft goes over strict noise limits when taking off, the airline must pay a surcharge. We donate these surcharges to the Gatwick Airport Community Trust Fund. Although the average level of noise from departing aircraft is falling over time, the frequency of aircraft movements has increased, we will therefore continue to work closely with airlines and air traffic control to explore opportunities to improve performance even more.

Until recently, noise from aircraft landing has not received the same attention as that from aircraft taking off; the Independent Review of Arrivals commissioned in 2015 has changed this. We have worked with airlines to enhance landing procedures such as the increase in measurement of continuous descent operations from 6,000ft to 7,000ft to control noise as much as possible. We are also looking into ways to distribute aircraft in a fair and equitable manner as they fly towards the final approach in order to provide benefits for the communities around the airport.

The Department for Transport night flying restrictions continues to place tight controls on aircraft noise at night. It limits the total number of flights during the night, and noisiest types of aircraft cannot be used. The most recent night flying restrictions were announced in early 2017 and came into effect for the winter season 2017/2018 and will remain in place until 2022.

Mitigation schemes play an important role in limiting the disturbance caused by aircraft noise. We have offered a noise insulation scheme for many years and between 2014 and 2017, Gatwick Airport Ltd has spent over £3m providing acoustic insulation to homes within our extended scheme boundary.

We continue to provide schemes where we will offer to purchase properties that may be suffering from either a very high level of noise or a large increase in noise. The Home Owner Support Scheme aims to provide financial reassurance for those property owners whose home may be impacted by the construction of a second runway and we also offer a Property Relocation Scheme, which covers the costs of moving house to help residents in the noisiest areas to move to a quieter area. Full details of these schemes are included later in this document within Section 15.

We are committed to developing the ways we share information relating to aircraft noise with others. We continue to make information from our Noise and Track Keeping System available

online through the 'Casper Noise Lab'. We continue to regularly publish our performance against a set of performance indicators and will report on the noise complaints we receive and how we handled them. We regularly report our performance on our website, through the Gatwick Airport Consultative Committee, and by engaging with airlines, pilots and air traffic control through the Flight Operations Performance and Safety Committee, along with local authority representatives through the Noise and Track Monitoring Advisory Group.

Our community noise monitoring programme continues to be well used with noise data from a wide range of areas being analysed by local Environmental Health Officers through the Gatwick Noise Monitoring Group and detailed reports shared with the Noise and Track Monitoring Advisory Group and uploaded to the airport website.

As a designated airport operator, the Department for Transport (DfT) has direct control over noise policy at Gatwick Airport and has established over many years a range of operational controls and statutory objectives to manage and where possible reduce noise. Limiting and, where possible, reducing the impact of noise is a long-standing commitment of Gatwick Airport and is critical to maintaining the airport's licence to operate and grow.

Gatwick Airport has had in place for a number of years a detailed noise strategy and a comprehensive and effective approach to aircraft noise management. This is further supported by our Decade of Change strategy as well as our S106 Legal Agreement with West Sussex County Council and Crawley Borough Council which lays the foundations of our Noise Action Plan.

Gatwick Airport is, as defined by the Environmental Noise (England) Regulations 2006, as amended, a major airport and consequently must produce noise maps and publish a Noise Action Plan every five years. These five yearly cycles of noise mapping are referred to as 'Rounds' and this Noise Action Plan is produced in response to the latest 'Round 3' noise mapping exercise.

Noise Action Plans are designed with the aim of 'preventing and reducing environmental noise where necessary', and the Department for Environment, Food and Rural Affairs (DEFRA) has issued guidance to help airport operators prepare their plans.

Under the regulations we must assess, and provide information on, how effectively we are controlling the effect of noise arising from aircraft landing and taking off. We must provide information on our performance in noise maps, together with the numbers of people and homes exposed to a range of noise levels

The Environmental Noise (England) Regulations 2006 align with the Government's aim – as set out in the Aviation Policy Framework – to adopt a balanced approach to securing the benefits of aviation. This is underpinned by two core principles:

- Collaboration: By working together with industry, regulators, experts, local communities and others at all levels, the industry will be better able to identify workable solutions to the challenges and share the benefits of aviation in a fairer way than in the past.
- Transparency: To facilitate improved collaboration, it is crucial to have clear and independent information and processes in place. Those involved in and affected by aviation need to have a clearer understanding of the facts and the confidence that proportionate action will be taken at the international, national or local level.

Government policy is to strike a fair balance between the negative impacts of noise (on health, amenity (quality of life) and productivity) and the positive economic impacts of flights. As a general principle, the Government therefore expects that future growth in aviation should ensure that

benefits are shared between the aviation industry and local communities. This means that the industry must continue to reduce and mitigate noise as airport capacity grows. As noise levels fall with technology improvements the aviation industry should be expected to share the benefits from these improvements.

In July 2017, the Department for Environment, Food & Rural Affairs (DEFRA) provided amended guidance to airport operators in respect of the production of noise action plans under the terms of the Environmental Noise (England) Regulations. Existing action plans are to be revised taking into account the updated noise mapping, airport specific operational changes, new actions that may influence aircraft noise and progress against actions within the current action plan.

The guidance states that the airport operator will present their revised action plan to the airport consultative committee and any other appropriate organisation for comment after which the airport operator will reflect on them and include them in the revised plan together with a response to the issues raised.

This document aims to:

- Demonstrate our continuing commitment to managing aircraft noise impacts associated with Gatwick Airport's operations. We have identified this issue as one of our key sustainability priorities
- Allow us to engage with communities affected by aircraft noise and better understand their concerns and priorities, so that we can ensure our airport noise strategies and action plans are well informed
- Enable us to make progress towards our long-term statutory and voluntary aircraft noise objectives
- Enable us, in our role as the competent authority for Gatwick Airport, to meet the requirements of the Environmental Noise Directive 2002/49/EC and The Environmental Noise (England) Regulations 2006.

Over the following paragraphs we have set out the key aspects of sections 3–19 of this Noise Action Plan. There are also a series of Annexes contained within this document including a glossary of terms (Annex 1).

Section 2 sets out the purpose and scope of the noise action plan. The scope extends beyond the areas identified by the strategic noise mapping to include ground noise issues and actions that impact on areas outside the contours. The section also points out that responsibilities for noise management do not always fall to the airport operator and often fall to the Department for Transport, NATS and/or the Civil Aviation Authority. In such cases the airport operator can only recommend any proposed changes.

Section 4 provides a description of Gatwick Airport and comments briefly on future development of the airport.

Section 5 introduces the issue of aircraft noise and acknowledges that noise contours are not the only way to describe the community impacts of aircraft noise. This section details the Attitude to Noise from Aviation Sources in England (ANASE) study conducted on behalf of the DfT; Survey of Noise Attitudes (SoNA) 2014 commissioned by the UK Government.

These studies, some of the early feedback we received during our initial pre-consultation stakeholder meetings and analysis of our complaints data has shown that the frequency of overflight, night flying and our role in influencing associated stakeholders are all key local concerns for community stakeholders.

The interdependencies between noise and air emissions to ensure compatibility between action plans are also briefly discussed. The legal context within which Gatwick Airport operates is complex. The International Civil Aviation Organisation (ICAO) sets international noise certification standards and recommended practices and procedures in relation to aircraft noise. Reference is also made to the requirement for member states to adopt a 'balanced approach' to noise management.

Section 6 provides a detailed overview of aviation policy and what it means for Gatwick. This includes International, European and Domestic policy.

At the European level some detail is provided on key European Union Directives which relate to aircraft noise including the phasing out of older Chapter 2 aircraft in 2002. At a national level a number of significant Acts of Parliament and regulations are set out. These include the Civil Aviation Acts 1982 and 2006 which grant the government powers to introduce noise control measures at designated airports (Gatwick is a designated airport). This section also introduces the UK Aeronautical Information Package (UK AIP) which contains a range of noise controls relating directly to aircraft operations.

Section 7 outlines our strategic approach to aircraft noise management framed around our long-term objective 'to gain the trust of our stakeholders, that we are using best practicable means to minimise aircraft noise impacts'.

This noise action plan sets out the themes to our noise work programme which are:

1. Reducing noise impacts wherever practicable. This includes:

- **a. Quietest fleet practicable**
- **b. Quietest practicable aircraft operations, balanced against NO_X and CO_2 emissions**
- **c. Effective and credible noise mitigation schemes**

2. Engaging with communities affected by noise impacts to better understand their concerns and priorities, reflecting them as far as possible in airport noise strategies and communication plans

3. Influencing planning policy to minimise the number of noise sensitive properties around our airport

4. Organising ourselves to continue to manage noise efficiently and effectively

5. Continuing to build our understanding of aircraft noise to further inform our priorities, strategies and targets.

We also describe the current measures in place to manage noise at Gatwick Airport. In headline terms these include:

- Noise and track keeping monitoring arrangements
- Operating restrictions
- Runway use
- Night flight restrictions
- Operational procedures
- Departure procedures
- Noise Preferential Routes (NPRs)
- 1,000ft rule
- Arrival procedures
- Continuous Descent Operations (CDO or otherwise known as Continuous Descent Approach (CDA))
- Instrument Landing System (ILS) joining point rules
- Reverse thrust
- Noise limits
- Ground noise controls
- Aeronautical charging
- Noise mitigation and compensation schemes
- Stakeholder engagement.

Section 8 details the Independent Review of Arrivals and the establishment of the Noise Management Board, itself a step change in noise management at Gatwick since the last iteration of this Noise Action Plan.

Sections 9 and 10 cover the Control Measures in place at Gatwick and our Environmental Risk Management strategy respectively. Whilst Section 12 provides an overview of the various committees that are in existence relating to aircraft noise management, this has been included in this version of the Noise Action Plan to provide more transparency as to 'who does what' given the frequency certain committees are referenced in this document.

Section 14 explains the need for airspace modernisation. While this is a contentious issue in certain communities, the fact remains the present airspace structures are ageing and inefficient. Optimisation of the airspace will provide capacity, resilience and environmental benefits due to aircraft being able to operate more efficiently.

Section 17 summarises the results of the 2016 noise mapping and is supported by the maps in Annex 3. Although the mapping introduces a relatively new metric to describe the noise impact, Gatwick Airport's strong history of noise management controls and frequent contour analysis means it does not highlight any new geographical areas of concern with regard to noise impacts.

Section 18 is the list of actions. There are 58 actions detailed within this Noise Action Plan.

Performance against our Action Plan Actions will be reported quarterly to the Noise and Track Monitoring Advisory Group, annually to the Gatwick Airport Consultative Committee as well as referenced in our Flight Performance, Section 106 and Decade of Change report.

SECTION 4 - ABOUT GATWICK AIRPORT

Gatwick became an aerodrome in the 1930s, but the airport today opened in 1958 with just 186,000 passengers passing through the airport in our first year of operation. Today, it's a different story. Gatwick Airport is open 24 hours a day, 365 days a year, and we now help take more than 45 million passengers to 228 destinations in 74 countries around the world every year.

The airport is located approximately 28 miles south of London and about 2 miles north of Crawley. Aside from the nearby towns of Crawley and Horley, it is situated in mostly lightly populated countryside. The airport has one main runway, designated 08R/26L, which is 3,316 metres long. The Runway 26L threshold is displaced by 424 metres, and the Runway 08R threshold is displaced by 393 metres. There is also one standby runway (08L/26R) that can be used if the main runway is out of operation.

Gatwick operates the world's most efficient single runway and is the second largest airport in the UK. Uniquely, it is home to a mix of airline operators from scheduled to low-cost and charter airlines. Fifty-three airlines currently operate (as of December 2016) regularly from the airport including easyJet, British Airways, Norwegian, Virgin Atlantic, Emirates, Cathay Pacific, Thomas Cook, Thomson, Turkish Airlines, Air Transat, Vueling, Iberia Express, Ryanair, Air Lingus, Aurigny, Air Canada Rouge and WestJet.

The Airport is the biggest base for easyJet, one of Europe's most successful airlines, and it's also home to key charter operations such as Thomson and Thomas Cook. It is also the airport with most connections to and from other UK regions, with significant numbers of passengers travelling on easyJet, British Airways, Flybe, and Aurigny.

In addition to the major long haul leisure operations of British Airways and Virgin, Gatwick is now seeing the emergence of long haul services to the Far East, with the arrival of Turkish Airlines, Cathay Pacific and Tianjin Airways. These complement the existing long haul services provided by airlines such as Emirates, WestJet, and Norwegian.

The consortium that ultimately owns the Airport currently comprises the following parties:

Global Infrastructure Partners, LP ("GIP 1") 41.95%
The Abu Dhabi Investment Authority ("ADIA") 15.90%
The California Public Employees' Retirement System ("CalPERS") 12.78%
National Pension Service of Korea ("NPS") 12.14%
Future Fund Board of Guardians ("Future Fund") 17.23%

The strategy for the Airport is to transform the passenger experience and improve efficiency for the airlines and the Airport itself, thereby improving its competitiveness in the London airport market. A key element of Gatwick's strategy is to build and maintain strong relationships with its airline customers, regulators and other stakeholders.

Gatwick has set out its ambition – compete to grow and become London's airport of choice, and has established six strategic priorities to which its activities are aligned.

The strategic priorities and the approach Gatwick is taking to achieve them have been outlined below:

- Deliver the best passenger experience: by listening to its passengers and delivering the kind of service that will make them choose to fly from Gatwick;
- Help its airlines grow: by understanding airlines' goals and developing commercial partnerships;
- Increase value and efficiency: by maximising income, lowering its operating costs and driving capital efficiency;
- Protect and enhance its reputation: by building strong and constructive relationships with its stakeholders based on openness and trust;
- Build a strong environment, health and safety ("EH&S") culture: by maintaining a relentless focus on achieving zero incidents; and
- Develop the best people, processes and technology: by investing in high-performing people, continuous improvement and deploying the right systems.

2017 – 2022 CAPITAL INVESTMENT PLAN

Whilst the airport continues to expand, Gatwick recognises that to improve continually the quality of service which passengers have come to expect requires ambitious investment plans keep pace with rising demand. The 2017 Capital Investment Programme sets out Gatwick's plans to invest £1.15 billion over the next five years through to 2022, with £240 million planned for 2017/18 alone. The airport has continued to invest to improve facilities since it changed ownership in December 2009, and has invested £1.5 billion to date.

One area where the airport is putting more emphasis are projects to enhance the efficiency of the airfield, by optimising infrastructure, to help its airlines operate on time. Gatwick also plans to commence the resurfacing of the main runway during this five year period to protect its most valuable asset. Other projects that are being accelerated to meet the airport's growing demands are the expansion to the North Terminal Border facilities and a suite of IT projects supporting core airport functions. Gatwick continues to develop its plans for expanding the International Departures Lounges in both terminals, for providing additional car parking capacity, and for improving the roads in the vicinity of the airport.

Over the last three years, passengers have benefited from Gatwick's North Terminal Development Programme which has vastly improved the terminal's landside areas; providing check-in and bag drop automation, more efficient security processing and a much more welcoming arrivals concourse. Automation was a key component of this programme, and the airport plans to build on the success it has seen in North Terminal by extending the roll-out of self-service bag drop to South Terminal. Gatwick will also start a programme to automate boarding in gaterooms to make the embarkation process more efficient for passengers and airlines.

As always, Gatwick is committed to maintaining its existing assets, as well as continuing its programme of resilience measures, to ensure passengers consistently receive the best experience possible during their journey through the airport.

One of Gatwick's biggest achievements has been the successful consolidation of easyJet's operations into the North Terminal in late January 2017, simplifying the journey for millions of its passengers. As part of this consolidation British Airways moved to the South Terminal, whilst Virgin Atlantic Airways moved to the North Terminal. It took several years of planning to make this happen, and a wide ranging suite of infrastructure changes; not only the more obvious front-of-house switches of check-in areas, passenger lounges, baggage reclaim and security facilities, but also changes to the behind-the-scenes facilities that are so critical to a successful airport operation

such as airlines' crew and engineering facilities. In the process of making these changes, many improvements to passenger-facing facilities have also been undertaken.

On 1 June 2016 Gatwick opened the new Pier 1, which provided five new aircraft stands with light, bright, modern gaterooms. The building is also home to a brand new departures baggage facility, serving the whole South Terminal, which provides airlines and passengers with greater check-in and baggage processing capacity and flexibility, including allowing passengers to check-in earlier than before.

BOEING HANGAR

Planning permission was granted in October 2017 for the construction of the £88 million Boeing Hangar at Gatwick. Boeing expects construction to start at the facility in late 2017, for an early 2019 opening. Building the facility is expected to support 475 jobs and contribute around £80m of gross value added to the local economy around the airport. Over the first two decades of operation the hangar's activities will generate a further £135m in GVA in the Gatwick area. This development will build on the long term partnership between Boeing and the UK Government, announced at the Farnborough International Airshow in July 2016 and the ground breaking for Boeing's first factory in Europe, to be built outside Sheffield, South Yorkshire and twinned with a facility in Portland, Oregon.

TRANSPORT FACTS

- Gatwick was the world's first airport to have a direct mainline train link with a dedicated railway station
- Gatwick is already the UK's best connected airport by rail and directly connects to more stations than any other European airport
- Number of direct rail connections: more than 129
- Time by rail to central London: 30 mins

FACILITIES

- Number of runways: 1
- Runway length: 3,316m long by 45m wide
- Number of terminals: 2 - South (opened in 1958) and North (opened in 1988)
- South Terminal is 160,000 square metres of which 14,768 square metres is retail facilities
- North Terminal is 98,000 square metres of which 12,530 square metres is retail facilities
- There are 143 stands in total at Gatwick Airport:
- 71 pier served stands split roughly 50:50 between each terminal
- 72 remote stands serviced by coaches
- 346 check-in desks. 187 in South Terminal and 159 in North Terminal. In addition, there are 69 self-service kiosks

WORKFORCE AND ECONOMY

- Around 24,000 staff work on the Gatwick campus across 252 different companies, the airport also creates a further 12,000 jobs indirectly and directly generates £1.6 billion for the UK economy
- Gatwick Airport itself employs around 2,800 people directly of which 1,800 are security staff
- 25% of all staff working at the airport are cabin crew

SECTION 5 - AVIATION NOISE

Aviation noise is unwanted sound generated by aircraft, and it is a serious and growing problem in the UK. As airports expand and air services increase, more and more homes are exposed for large parts of the day to a persistent background noise from aircraft.

Noise from aircraft is subject to an entirely different regulatory regime to other noise pollution. The Civil Aviation Act 1982 (updated in 2006) provides that no action for trespass or nuisance can be taken as long as an aircraft observes the rules of the Air and Air Traffic Control Regulations, which also cover ground movements.

The UK's main measure of aviation noise is Equivalent Continuous Sound Level (L_{eq} dB(A)). This averages the sound energy monitored from all aircraft noise events in a certain area over a 16 hour period each day (0700 and 2300). The UK government defines three community annoyance thresholds of low annoyance at 57 L_{eq}, medium annoyance at 63 L_{eq} and high annoyance at 69 L_{eq}.

The government published their Response to their Airspace Consultation in 2017 and acknowledged the evidence from the SoNA study, which showed that sensitivity to aircraft noise has increased, with the same percentage of people reporting to be highly annoyed at a level of 54 dB $L_{Aeq, 16hr}$ as occurred at 57 dB $L_{Aeq, 16hr}$ in the past.

BACKGROUND

The Air Navigation Act 1920 provided the basis of the UK's aviation noise regulation regime, by exempting aviation from nuisance sanctions, in order to stimulate the nascent industry.

This principle was reaffirmed in the Civil Aviation Act 1982, which nonetheless set out a number of provisions for controlling noise at larger airports through a process of "designation", which has only been applied to date to Heathrow, Gatwick and Stansted. By their Section 78 designation, the Transport Secretary is responsible for regulating take-off and landing noise at these airports.

In practice, noise restrictions at designated airports have been implemented through restrictions on departing aircraft noise, controls on night flying and (at Heathrow and Gatwick, under Section 79) housing noise insulation schemes.

At other airports, the successive governments have continued to favour local resolution. Councils' main instrument in this regard is the Section 106 Obligation, a condition that can be placed on planning permission.

Aviation is necessarily an international business, making unilateral domestic regulation difficult. However, successive agreements of the International Civil Aviation Organisation (ICAO) have sought to impose controls on aircraft design in order to minimise noise pollution.

Since the 1960s, jet engines have become four times quieter. A process of driving up noise pollution standards has been pursued by the ICAO, and by the European Civil Aviation Conference.

In 2001, the ICAO Assembly agreed that a balance of at-source restrictions, planning controls, operating restrictions and noise abatement practices by pilots and air traffic controllers would form the appropriate methods to address aviation noise.

In 2002, "Chapter 2" aircraft were outlawed from the EU, and the new "Chapter 4" came into force in January 2006, which improved upon the current "Chapter 3" standard by a cumulative 10 dB(A). The majority of aircraft in service today already meet the Chapter 4 requirements with an ever increasing number qualifying for Chapter 14 status[1]. This was agreed in 2013 and represents the latest requirements for all aircraft certified on, or after 31st December 2017 or 31st December 2017 for aircraft under 55 tonnes.

Night flights are a particularly controversial aspect of aviation noise. Studies have shown that sleep can be disturbed at a relatively low L_{eq} level of just 30. The first restrictions on night flights were imposed at Heathrow in 1962. Reviews have taken place since then in 1988, 1993 and 1998 and ten airports are now subject to night noise controls under the Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003.

The Government undertook to consult on a new night noise regime in 2004, and decided that the existing limits on night flights should remain until 2012. This was extended again until 2017 with a new regime coming into effect thereafter following a consultation process.

AIRCRAFT NOISE

For the large majority of commercial jets, the primary noise source is the engines. The secondary one originates in the airflow around the aircraft (aerodynamic source).

ENGINE NOISE - JET

The jet noise is linked to the intense exhaustion of the burnt gases at high temperature. Downstream of the aeroplane wings, the jet generates strong turbulence as it enters a still area (relatively to the jet speed).

The main characteristics of this noise are the following:

- The generation area is located rear of the engines, at a distance equivalent to a few nozzle diameters.
- The noise directivity is strong, heading for the back of the aircraft.
- The noise generated does not contain remarkable tones, and its frequency band is quite wide.

ENGINE NOISE - FAN

The noise produced by the fan results of the superimposition of a wide-band noise (as for the jet) and noise with harmonics.

- The wide band noise is due to the boundary layer developing on the fan blades, and more generally to the airflow around them.
- The harmonics are originating in the intrinsic cycling character of the fan motion (spinning motion). The most remarkable frequency is the fundamental, the value of which is the number of blades times the fan rotation speed. The harmonics are multiples of this fundamental.
- When the engine rating is high (during take-off for instance), the airflow around the fan blades transitions to supersonic and these multiple pure tones are at the origin of the so-called “buzz saw noise”.

[1] In 2017, 39% of aircraft movements at Gatwick were billed at the Chapter 14 noise standard. Of these, 63% were in the quietest noise categories, Chapter 14 Base and Chapter 14 Minus

ENGINE NOISE - COMPRESSOR

It is of the same kind than the fan noise, but the harmonics are less emergent due to interaction phenomena.

AIRFRAME NOISE

The airframe noise would be the noise produced by the aircraft, if all engines were made inoperative. It is generated by the airflow surrounding the moving plane. The main sources are the discontinuities of the aircraft structure, such as high-lift devices (flaps and slats), landing gear wheels (when extended), trailing edges where there is a speed shearing (aircraft speed versus still air).

It was empirically determined that the noise emissions are dependent on the sixth power of the aircraft's true airspeed. This noise produced from aerodynamic phenomena is most sensitive during approach, when engine power is the lowest.

AIRCRAFT NOISE AROUND AIRPORTS

The community noise does not only include the aircraft emissions but also other sources, such as road traffic. Actually the airport-side residents are also exposed to these other sources, the noise of which may be higher than the one produced by the aircraft, at least in terms of equivalent acoustic energy.

The noise produced by aeroplanes was not really a major issue before the early 1960's, when the traffic of jet-planes started to grow. Nowadays, it can be considered as the most obvious kind of pollution due to aircraft operations. Nonetheless, one must acknowledge that the noise perception (and especially for aircraft) is very subjective and depends on the sensitivity to noise of each person. This is the reason why even though the global amount of aircraft noise energy has decreased, in the meanwhile the feeling of disturbance has increased.

Aircraft manufactured today are much quieter than they were 20 years ago and these will be replaced by even quieter aircraft in the future. But, even though each individual aircraft is quieter, there are more aircraft flying now than previously. This means that the average level of noise is lower than before, but the frequency of aircraft movements and hence noise 'events' has increased.

AIRCRAFT NOISE MEASUREMENT

In the UK, daytime aircraft noise is measured by calculating the average noise level in decibels (dB) over 16 hours, to give a single daily figure. The UK Government calls this average decibel measurement 'L_{Aeq}' (which is often shortened to L_{eq}). It means 'equivalent continuous noise level' and is the most common international measure of aircraft noise. The UK Government says that communities become significantly annoyed by aircraft noise above 57dB L_{Aeq}. They use this as the starting point when setting policy on aircraft noise.

In the last 15 years, the number of people affected by noise within Gatwick's 57dB(A) 16 hour L_{eq} daytime noise contour has fallen from 14,500 people in 1996 to 3,650 in 2012. This has been achieved despite a significant growth in air traffic movements per annum from around 220,000 in 2006 to 240,000 flights in 2012. In 2016, the number of people in this contour increased to 4,150. However, looking holistically over the same period the total number of people in this contour has fallen by 70% since 1996 whilst the airport has grown to serve a total of 281,000 aircraft movements and 44.1 million passengers in 2016.

INTERDEPENDENCIES - NOISE AND EMISSIONS TO AIR

There are interdependencies between the emissions of local air pollutants and carbon dioxide (CO_2) from aircraft engines, which affect aircraft noise management strategies. Most of the technological advances in aircraft design in the last 20 years have led to both a reduction in noise and CO_2 emissions, but in some cases have resulted in an increase in emissions of local air pollutants such as oxides of nitrogen (NO_x). The challenge for the aviation industry is to address these three issues simultaneously.

Operational controls also need to be balanced. For example, the adoption of a reduced thrust setting for an aircraft during take-off can reduce NO_x emissions by up to 30% or more compared to a full thrust setting. Many airlines already employ 'reduced thrust' as their standard operating procedure. While this is beneficial in the immediate vicinity of the airport, there can be a small increase in the noise experienced by those further away under the departure flight path as the aircraft decreases its angle of ascent.

Gatwick Airport has long been aware of the interdependencies between noise, local air quality and CO_2 emissions and has undertaken a number of studies to help quantify the exact balance that needs to be struck for specific situations. The level of understanding of this interdependency external to the aviation community is not complete, and Gatwick Airport aims to promote further engagement.

EFFECTS OF NOISE

There are many different effects and sources of noise, and individuals experience each of them to different degrees. The effects can include general distraction, speech interference and sleep disturbance. Sometimes these effects can lead to annoyance and complaints. Research into the potential health effects of noise produces varying outcomes. More recently research published in the British Medical Journal in October 2013 states that the exact role that noise exposure may play in ill health is not well established. However, it is plausible that it might be contributing - for example, by raising blood pressure or by disturbing people's sleep. There's a 'startle reaction' to loud noise - if you're suddenly exposed to it, the heart rate and blood pressure increase. And aircraft noise can be annoying for some people, which can also affect their blood pressure, leading to illness. (Dr A Hansell, Imperial College London).

The possibility that severe annoyance might induce stress cannot be ignored. The Government's Aviation Policy Framework aims is to limit and where possible reduce the number of people in the UK significantly affected by aircraft noise as part of a policy of sharing benefits of noise reduction with industry. This is consistent with the Government's Noise Policy, as set out in the Noise Policy Statement for England (NPSE) 93 which aims to avoid significant adverse impacts on health and quality of life.

ANNOYANCE

Extracted from the Civil Aviation Authority publication 'CAP 1588 - Aircraft Noise and Annoyance: Recent findings'.

The ever-increasing demand for regular and convenient road, rail and aircraft transportation consequently brings with it an increase in environmental noise and subsequent effects.

The most widespread and well documented subjective response to noise is annoyance; which can be defined as a feeling of resentment, displeasure, discomfort, dissatisfaction or offence which occurs when noise interferes with thoughts, feelings or activities. The annoyance of populations exposed to aircraft noise varies not only with the acoustical characteristics of the noise, but also with a range of non-acoustical factors of social, psychological or economic nature.

Transportation noise, amongst other noise sources such as that from construction, was brought to people's attention in 1963, via a report entitled "*Noise*", written by the Committee on the Problem of Noise, and commonly referred to as the "Wilson Report" after Sir Alan Wilson, Chairman of the committee. The Wilson Report stated that solving "noise problems must involve people and their feelings, and its assessment is a matter rather of human values and environments than of precise physical measurement". The issues raised in the Wilson Report are still, if not more, relevant today with an increasing demand for travel, 24-hour society and requirements for transport links.

Annoyance is considered to be a detriment to quality of life, well-being and ultimately, health. The Word Health Organisation's (WHO) definition of health is: *"Health is a state of complete physical, mental and social well-being, and not merely an absence of disease and infirmity."* Annoyance from any source therefore represents a diminished state of well-being.

In order to provide public protection from aircraft noise, an 'annoyance threshold' currently exists within UK policy. The time period for noise exposure used is an average summer day, from June 16th to September 15th and from 7am to 11pm. The Wilson report originally recommended the use of summer days (7am – 7pm) due to the increased likelihood of more people being outdoors and having windows open, and also because aviation levels are at their highest during summer months. The 1982 *Aircraft Noise Index Study (ANIS)*, the outcomes of which were adopted in policy in 1990, extended the reference day period from 7am to 11pm to reflect that there is a difference in terms of daytime and night-time noise exposure and consequently, annoyance reactions, resulting in the need for distinctive daytime and night-time noise exposure metrics. The noise exposure metric $L_{Aeq,\ 16h}$, was adopted in 1990 on the basis of the ANIS findings. The UK government defined three thresholds for policy consideration: 57, 63 and 69 dB $L_{Aeq,\ 16h}$, representing low, moderate, and high annoyance levels.

The 2003 Air Transport White Paper subsequently defined 57dB $L_{Aeq,\ 16h}$ as marking the approximate onset of significant community annoyance, and this was reaffirmed in the Government's 2013 Aviation Policy Framework. Critics argue that attitudes have changed since the 1982 survey. This could be because of general shifts in attitudes to annoyance, changes in the pattern of aircraft noise experienced, and/or because of changes to lifestyle that are affected by aircraft noise. This ultimately led to the UK government commissioning the *Survey of Noise Attitudes (SoNA) 2014: Aircraft stud*y.

The government published their Response to their Airspace Consultation in 2017 and acknowledged the evidence from the SoNA study, which showed that sensitivity to aircraft noise has increased, with the same percentage of people reporting to be highly annoyed at a level of 54 dB $L_{Aeq,\ 16hr}$ as occurred at 57 dB $L_{Aeq,\ 16hr}$ in the past.

Taking account of this and other evidence on the link between exposure to noise from all sources and chronic health outcomes, the government decided to adopt the risk based approach proposed in their consultation, so that airspace decisions are made in line with the latest evidence and consistent with current guidance from the World Heath Organisation (WHO).

In 2010 the Department for Environment, Food and Rural Affairs (DEFRA) released the *Noise Policy Statement for England (*NPSE), which aimed to provide clarity on noise and set out the government's long-term vision of noise policy for all noise sources. The noise policy vision was to "promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."

The NPSE aims, through the effective management and control of environmental, neighbour and neighbourhood noise within the context of government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.

The phrases "Significant adverse" and "adverse" refer to the two established concepts that are applied to noise impacts worldwide, namely:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected. Extending these concepts for the purpose of the NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur. It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. SOAEL is therefore not specifically defined in the NPSE, for flexibility purposes in the future, with the addition of more research findings.

Annoyance from aircraft noise is a global issue, not just confined to the UK. In 2011, the WHO Europe and the Joint Research Centre published the report: *Burden of Disease from Environmental Noise.* The aim of this report was to provide technical support to policymakers in the form of quantitative risk assessment of environmental noise, using the evidence available in Europe.

For each noise-induced outcome, the report estimated the number of life years that are affected by noise, defined as Disability Adjusted Life Years (DALYs). DALYs are the sum of the potential years of life lost due to premature death and the equivalent years of "healthy" life lost by virtue of being in states of poor health or disability. The outcomes included were ischemic heart disease, cognitive impairment of children, sleep disturbance, tinnitus and annoyance. It was estimated that 654,000 years were lost annually due to annoyance in the EU Member States, and other western European countries (from combined noise sources, but predominantly road traffic noise). This was only exceeded by those lost due to sleep disturbance annually, which were calculated as 903,000 years.

All transportation noise sources result in a degree of annoyance, and this remains a growing concern, particularly with the possible links to other health endpoints. This report will focus on aircraft noise-induced annoyance. Annoyance from aircraft noise and other transportation sources is often studied as part of complex pathways which may exist between acute and chronic health effects such as cardiovascular disease, disturbed sleep patterns with subsequent next-day effects, and even the cognitive performance and learning aspects in children, as detailed in the Burden of Disease Report.

The much anticipated update to the 1999 WHO Community Noise Guidelines is currently being developed, and it is expected that this document will be published in 2018.

CIVIL AVIATION AUTHORITY LITERATURE REVIEW

The United Kingdom Civil Aviation Authority (CAA), at the request of the Department for Transport has undertaken a literature review on the effects of night time aircraft noise on local residents. The CAA's review concluded that:

- It is possible to estimate the proportion of the population who are likely to self-report being highly sleep disturbed for a given noise exposure. Chronic sleep disturbance is regarded as a health effect in its own right with a measurable impact on quality of life, which can be expressed as Years Lost due to Disability (YLD).
- For impacts on cardiovascular health, there is evidence that noise exposure above 55 dB L_{night} results in increased risk of myocardial infarctions (heart attacks).
- There is evidence for a correlation between noise exposure and hypertension and there is sufficient evidence in order to value the impacts in terms of hypertension leading to a stroke or dementia.
- For stress and mental health effects, the evidence is inconclusive or limited, showing a possible correlation between noise exposure and mental health symptoms (e.g. depression, anxiety) but not problems such as clinically defined psychiatric disorder.
- For next day effects, there is some evidence to suggest that environmental (night) noise has scientific evidence of chronic objective effects on stress hormone levels, immune system or performance the next day.
- In relation to the impact on children, the evidence is inconclusive. There is a growing amount of research that noise exposure has effects on cognitive development (particularly on reading) and chronic noise may affect children's stress levels, blood pressure and mental health. There is evidence to suggest that aircraft noise may be associated with poorer reading comprehension and recognition memory. However, it is unclear whether the effects are attributable to daytime or night time noise, and there is no evidence for long-term persistent effects on cognitive development.

Following their literature review, the CAA developed a methodology paper, which proposes how the following health impacts associated with aircraft night noise may be quantified and monetised as part of an appraisal:

- Sleep disturbance;
- The increased risk of myocardial infarctions (heart attacks); and
- The increased incidence of hypertension (including secondary effects of stroke and dementia).

The CAA have recently published a new paper, 'Aircraft noise and health effects: Recent findings' which examines evidence on the relationship between aircraft noise and health that has been published since 2009. The report concludes that with regards to night noise and sleep disturbance, there is growing recognition that average indicators, such as L_{night}, are insufficient to fully predict sleep disturbance and sleep quality.

AIRCRAFT NOISE EFFECTS ON HEALTH

As part of the Airports Commission, specific research on aircraft noise was prepared by Dr Charlotte Clarke of the Queen Mary University of London. The study investigated the health effects of environmental noise on cardiovascular health, sleep disturbance, annoyance, psychological well-being, and effects on children's cognition and learning. Although the study was not an exhaustive review it summarised the strength of the evidence for aircraft noise effects as well as briefly discussing guidelines for environment noise exposure.

ANASE (ATTITUDES TO NOISE FROM AVIATION SOURCES IN ENGLAND)

ANASE was a social study commissioned by the Department for Transport in 2002 aimed at reassessing people's attitudes to aircraft noise, reassessing L_{Aeq} as a measure of annoyance and determining the financial value of noise. The final report was published in 2007, together with the comments of peer reviewers.

The expert peer reviewers advised the DfT that reliance on the detailed outcome of the ANASE study would be misplaced and specifically counselled against using the detailed results and conclusions in the development of Government policy. As a result, the Government stated that they did not propose to use the detailed results from ANASE in the development of policy.

Gatwick Airport continues to support the Government's view of ANASE being an important step forward in understanding people's attitudes towards aviation noise. The report findings will continue to be reflected on and considered by Gatwick Airport when formulating noise strategies, objectives and plans.

SURVEY OF NOISE ATTITUDES (SONA) 2014: AIRCRAFT

Airports aim to satisfy the demands of travellers and provide jobs: but they can cause adverse effects on the environment and people living nearby. A major form of adverse effect is that from aircraft noise. Airport planning and development planning must take account of the aircraft noise exposure to residents; airport operators and interested government departments have to view aircraft operations in the context of the related airport noise. These assessments are usually carried out in the UK, and in most countries of the world, by using noise exposure indices.

This report describes a research study to obtain new and updated evidence on attitudes to aviation noise around airports in England, and how they relate to the UK aircraft noise exposure indices. The study was commissioned by the Department for Transport, and builds on earlier noise attitude surveys commissioned by DEFRA.

In part it aims to review the use of the $L_{Aeq,\,16h}$ noise contour which was adopted in 1990, based on an aircraft noise attitude survey undertaken in 1982 and reported as the UK Aircraft Noise Index Study (ANIS) in 1985. The 57dB L_{Aeq16h} contour was chosen as the threshold of community annoyance because it 'indicated a marked increase in some reported measures of disturbance', with 63 and 69dB $L_{Aeq,\,16h}$ representing medium and high annoyance and subsequently incorporated into planning policy guidance.

The SoNA study considered 1,877 participants using face-to-face surveys on attitudes to civil aircraft noise. Respondents were selected using a random, partially-clustered approach from around nine airports in England, having been exposed to average $L_{Aeq,\,16h}$ noise levels of at least 51dB in the summer of 2013.

Using the data gathered in the surveys, the study compared reported mean annoyance scores against average summer-day noise exposure defined using different noise indicators including N above (N60 or N70).

Evidence was found that mean annoyance score correlated well with the current average summer day noise exposure contour ($L_{Aeq,16h}$) whilst there was no evidence found that other metrics correlated better with annoyance than $L_{Aeq,16h}$.

However, the study did note that residents can struggle to understand the L_{Aeq} measure which is time averaged and reported on a logarithmic scale. It noted that there is merit in considering the greater use of N above (N60 or N70) metrics as supplementary metrics to help portray noise exposure but recognising that evidence-based decisions should continue to use $L_{Aeq, 16h}$.

When comparing the results to previous studies (ANIS, ANASE and Miedema) Annoyance scores were found to be comparable however for a given noise exposure, a lower proportion of respondents was found to be highly annoyed. This was demonstrated with the same percentage of respondents (9%) said by ANIS to be highly annoyed at 57 dB $L_{Aeq, 16h}$ now showing annoyance in SoNA at 54 dB.

Evidence was found that non-acoustic factors such as noise sensitivity, approximated social grade, and expectations – both prior to moving to an area exposed to aircraft noise and in the future – influence reported aircraft noise annoyance and these non-acoustic factors may be as important as the noise exposure level.

The full report can be viewed online by following this link:
https://publicapps.caa.co.uk/docs/33/CAP%201506%20FEB17.pdf

PRE CONSULTATION INFORMATION

In preparing the initial 'Round One' 2010 – 2015 Noise Action Plan we held a series of pre-consultation events with representatives from airlines, NATS, Local Authorities, local environment amenity groups and members of the Gatwick Airport Consultative Committee (GATCOM).

In producing this revised action plan we have consulted with the Noise Management Board, GATCOM, members of the Noise and Track Monitoring Advisory Group (NaTMAG), Crawley Borough Council and West Sussex County Council, and advised the Noise Management Board of this process, in line with the guidance issued from DEFRA.

Details of feedback received during this revision process is provided in Annex 9.

SECTION 6 – AVIATION POLICY AND REGULATION OVERVIEW

There are three main tiers of regulation which govern aircraft noise in the UK: International; European and national.

INTERNATIONAL REGULATION

The International Civil Aviation Organisation (ICAO) is an intergovernmental organisation. It aims to develop the principles and techniques of international civil air navigation and foster the planning and development of international air transport. ICAO establishes International Standards, Recommended Practices and Procedures regarding the technical areas of aviation, including aircraft noise. The Standards, once adopted, are put into effect by each ICAO member state in its own country.

An important pillar of the Balanced Approach to Aircraft Noise Management is the reduction of noise at source. Aircraft noise ("noise at source") has been controlled since the 1970s by the setting of noise limits for aircraft in the form Standards and Recommended Practices (SARPs) contained in Annex 16 to the Convention on International Civil Aviation (the "Chicago Convention"). This continues to be the case today. Noise provisions appear in Volume I of Annex 16. The primary purpose of noise certification is to ensure that the latest available noise reduction technology is incorporated into aircraft design and that this is demonstrated by procedures that are relevant to day-to-day operations. This aims to ensure that noise reductions offered by technology are reflected in reductions around airports.

The first noise standard was developed by the ICAO Committee on Aircraft Noise in 1971 and became applicable in 1973, setting noise limits as a direct function of Maximum Take-off Mass (MTOM) in order to recognize that heavier aeroplanes, which were of greater transport capability, produce more noise than lighter aeroplane types. This is the Chapter 2 Noise Standard contained in Annex 16, Volume I.

In the years following the introduction of Chapter 2, much higher bypass ratio jet engines were introduced into service. Not only did this new technology deliver improved fuel efficiency, it also resulted in reductions in engine noise. This allowed for the ICAO noise standard to be made more stringent and in 1977 the Chapter 3 Noise Standard was added to Annex 16, Volume I. In the following years, further noise reduction technologies were incorporated into engine and airframe designs which led to incremental improvements in aircraft noise performance and this resulted in progressively further increases in the stringency of noise standards as reflected in Annex 16, Volume I, Chapter 4 and Chapter 14.

Over time it has become common parlance when discussing aviation noise to refer to civil jet aircraft by which chapter of Annex 16 Volume 1 they sit in. The adoption of progressively more stringent standards has encouraged the phase out of noisier aircraft meeting the noise standards of earlier Chapters. Chapter 2 aeroplanes have been banned from operating within the EU since 1st April 2002, unless they are granted specific exemptions. The vast majority of civil aircraft now operating therefore fall within Chapters 3 and 4, and are much quieter than the previous Chapter 2 aircraft types. As yet, there is no agreed date for the phase out of Chapter 3 aircraft.

All new aircraft manufactured from 2006 onwards must meet the requirements of Chapter 4. The standard for Chapter 4 has been set at 10dB quieter than Chapter 3. This is based on an aggregate of reductions in noise measured at three standardised locations close to an airport. During the

process of agreeing the Chapter 4 standard, the industry discussed a stricter level at 18dB (aggregate) below the current Chapter 3, which would have reflected best available technology. This now forms the basis of Chapter 14 standard adopted in 2014 by the ICAO Council. This represented a new noise standard for jet and propeller-driven aeroplanes which is Chapter 4 minus 7dB (Chapter 3, -17dB). This new, more stringent standard will be the mainstay ICAO Standard for subsonic jet and propeller-driven aeroplane noise for the coming years. It is applicable to new aeroplane types submitted for certification on or after 31 December 2017, and on or after 31 December 2020 for aircraft less than 55 tonnes in mass.

The new Chapter 14 noise standard is expected to drive the continued reduction in aircraft noise emissions and lead to long term reductions in the number of people affected by aircraft noise.

ICAO also requires Member States to adopt a “balanced approach” to noise management. Both the EU and the UK have adopted the ICAO “Balanced Approach to Airport Noise Management”.

Where a noise problem has been identified at an airport, the Balanced Approach process requires the agreement of a noise objective. Following this, all potential measures to manage noise at the airport must be identified, and a cost benefit analysis to determine the most cost-effective package of measures, carried out.

The Balanced Approach consists of four main elements:

- **Noise at source**
- **Land use planning**
- **Operating procedures**
- **Operational restrictions**

NOISE AT SOURCE

Aircraft noise is generated by a number of different ‘sources’, though the dominant one is still the main engines, on approach airframe noise is now becoming important. Through the work of ICAO and the development of the aircraft chapter standards, the industry has invested heavily in Research and Development to continually reduce the noise impact of aviation.

LAND USE PLANNING

Land use planning covers a wide range of measures aimed at improving the noise climate around airports. The most effective long-term options include the definition of noise zones in which there are restrictions on residential and other noise sensitive property development, and these are used widely in the UK and across Europe.

OPERATING PROCEDURES

Using defined, or 'noise preferential' routes (NPR's) is one way of minimising exposure to noise for people living near airports. Such routes are chosen because they direct aircraft, where possible, over less densely populated areas.

Although originally developed as a procedure for reducing fuel use, Continuous Descent Operation (CDO) is an important tool for reducing the noise of aircraft approaching airports. It involves starting a continuous steady descent, from 6,000ft or higher, rather than following a number of short descents to set 'cleared' altitudes where level segments are flow before finally joining the 3° approach glide-slope from below, as is normally required by Air Traffic Control.

The CDO technique results in lower noise levels on the ground through two effects:

1. the CDO flight-path is always higher than in the traditional stepped approach - being further from the ground also results in lower noise levels;
2. by keeping the aircraft on a continuous descent, the overall engine power levels are kept lower, generating less noise than if the aircraft were required to fly level.

Gatwick Airport Ltd raised the level at which a CDO is measured to 7,000ft in 2016 and is exploring ways to raise this further through our work with the Noise Management Board.

Additional noise reductions may be achieved by using a Low Power/Low Drag (LPLD) procedure. In this, the aircraft is flown in a 'clean' condition (i.e. with no flap or wheels deployed) as long as possible, consistent with safety, this can result in lower noise levels when the aircraft are close to the ground.

OPERATING RESTRICTIONS

Operating restrictions may be necessary for some airports where noise mitigation is required, and other methods prove to be ineffective. In this respect, as part of the "Balanced Approach", operating restrictions may be applied to aircraft whose noise emissions are marginally below the Chapter 3 limits. Strict rules apply for the introduction of operating restrictions to ensure fair competition across Europe and maintain the efficiency of the EU aviation network.

At a number of airports, there are restrictions over and above the noise certification standard, the most common of which are applied at night. One example of this is the Night Jet Restrictions Scheme used at the "designated" London airports.

EUROPEAN REGULATION

The EU works to define the approach towards a common aviation policy in Europe. The EU has issued various directives relating to environmental issues including for the regulation of aircraft noise standards. Member States are obliged to comply with the requirements of the directives and incorporate them into national legislation.

On 23 June 2016, the EU referendum took place and the people of the United Kingdom voted to leave the European Union. Until exit negotiations are concluded, the UK remains a full member of the European Union and all the rights and obligations of EU membership remain in force. During this period the Government will continue to negotiate, implement and apply EU legislation.

The directives of most relevance to aircraft noise as follows:

EC Directive 92/14/EEC – This directive banned Chapter 2 aircraft from landing in the EU from 1 April 2002.

EC Directive 2002/49 ("Environmental Noise Directive") – This requires Member States to create noise maps from all transport sources in urban areas by 2007 and to develop and adopt Noise Action Plans to manage noise by 2008, and to repeat the mapping and produce revised Noise Action Plans every five years. This Noise Action Plan meets that requirement. The directive also aims to harmonise methods for measuring noise across the EU, but it does not include noise limits.

EU Regulation 598/2014 -This regulation applies rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports. This regulation replaced an earlier EC Directive, 2002/30 (March 2002) which prescribed that the ICAO balanced approach would be followed when the introduction of noise related operating restrictions was considered at EU airports. EU598/2014 updated 2002/30/EC by being more specific regarding the rights and

responsibilities of the interested parties during the noise assessment process, and provides for a new and wider definition of what constitutes an operating restriction:

'operating restriction' means a noise-related action that limits access to or reduces the operational capacity of an airport, including operating restrictions aimed at the withdrawal from operations of marginally compliant aircraft at specific airports as well as operating restrictions of a partial nature, which for example apply for an identified period of time during the day or only for certain runways at the airport.

When a new operating restriction is being considered, EU598/2014 requires a defined objective to be set, and demonstration of why other measures within the balanced approach (which would not restrict capacity) would not achieve the objective. It also prescribes a process for evaluation of the cost effectiveness of the proposed operating restrictions which involves reviewing the relative costs of noise restrictions options and considering how many people would benefit from them. New restrictions must be consulted upon, and then prior to their introduction a period of notice must be given.

EU598/2014 anticipates the introduction of noise restrictions aimed at reducing the number of marginally compliant Chapter 3 aircraft. It prohibits the introduction of restrictions aiming to reduce the number of aircraft meeting the Chapter 4 standard.

NATIONAL REGULATION

ACTS OF PARLIAMENT AND REGULATIONS

The UK Government also enacts Acts of Parliament and regulations which deal with aircraft noise. The relevant legislation is detailed below:

- **The Civil Aviation Acts 1982 and 2006**

These Acts grant the Government powers to introduce noise control measures to limit or mitigate the effect of noise and vibration connected with taking off or landing aircraft at designated airports (the Secretary of State has currently designated Gatwick). These powers are widened by the Civil Aviation Act 2006. The Act also permits an airport authority to charge aircraft operators for use of the airport based on noise and emissions. Airport operators can thereby introduce differential charges to incentivise the use of quieter and cleaner aircraft.

The Act also permits airport operators to levy financial penalties on aircraft operators who breach noise abatement requirements imposed by the Secretary of State. A sum equal to the penalties received must then be paid for the benefit of people who live in the vicinity of the airport. At Gatwick Airport, we enforce this power and did so long before 2006. All fines are paid to an independent charity, the Gatwick Airport Community Trust.

- **Airports Act 1986**

This Act gives power to the Secretary of State to make orders if it appears to them that the existing runway capacity of the airport is not fully utilised for a substantial proportion of the time during which it is available. It includes powers to limit the number of occasions on which aircraft may land or take off at an airport and schemes to allocate airport capacity.

- **Aeroplane Noise Regulations 1999**

These regulations set out the noise certificate requirements for both propeller and jet aeroplanes registered in the UK. It makes provision to ensure that no aircraft can land or take off in the UK without a noise certificate issued by its competent authority which meets at least equal requirements to those for UK registered aircraft. The regulations make reference to noise certification standards and noise limits issued by ICAO and also provides a list of aircraft that are exempt from the ICAO noise certification.

In accordance with its powers under the Civil Aviation Acts, the DfT has direct control over noise at Gatwick Airport and determines the night flight restrictions applicable to the designated London airports.

- **The 2003 Air Transport White Paper**

The 2003 Air Transport White Paper (2003 ATWP) was intended to provide a strategic framework for the development of air travel in the UK for the next 30 years. In case the conditions attached to the construction of a third Heathrow runway could not be met, the ATWP required that land at Gatwick be safeguarded for development of a second runway after 2019. This safeguarding presently remains in place.

- **The Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003**

The Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003 set out the procedures which major airports should follow when considering noise amelioration measures. Broadly, the Regulations require aerodromes to follow the 'balanced approach' when dealing with noise problems at an airport. These regulations transposed the EC Directive 2002/30/EC into UK law, they remain "within" the boundaries prescribed by EU598/2014, however, presumably were the UK to remain part of the EU, would be updated in accordance with it.

The main rules are that aerodromes:

- may consider economic incentives as a noise measure;
- shall not impose a measure or a combination of measures which is more restrictive than is necessary to achieve the environmental objectives established for the airport by the Airport Operator or in the case of a designated airport, the Secretary of State;
- shall not discriminate on grounds of the nationality or the identity of the air carrier or the aircraft manufacturer;
- should take into account the likely costs and benefits of the various noise measures available as well as airport-specific characteristics;
- when introducing restrictions based on an aircraft's noise performance, should base these upon the noise performance of the aircraft as determined by the certification procedure conducted in accordance with ICAO Annex 16;
- shall establish one or more environmental objectives for the airport before considering any measures under the Regulations.

- **Environmental Noise Objectives**

In June 2006, the Secretary of State published long-term statutory environmental noise objectives for Gatwick Airport. These are:

- to progressively encourage the use of quieter aircraft
- avoid allowing the overall noise from aircraft during the night quota period to increase above what was permitted in 2002- 2003
- to meet other noise-abatement objectives as adopted from time to time.

- **The Environmental Noise (England) Regulations 2006 (as amended)**

These regulations transpose the requirements of EC Directive 2002/49/EC (Environment Noise Directive – see above) into UK law. They place a duty on the Secretary of State to produce strategic noise maps and, under regulation 18, airport operators are obliged to produce noise action plans based on the strategic noise maps.

- **Local Authorities**

As well as Government legislation, additional noise-related controls are introduced by local planning authorities as part of the planning system. For example at Gatwick Airport there are several planning conditions relating to North Terminal which require towing of aircraft between 23:00 - 06:30 on some aircraft stands as well as limits of the amount of aircraft engine tests permitted. This is often done by way of planning obligations contained in Section 106 Legal Agreements made between the airport operator and the planning authority. Gatwick Airport signed a re-negotiated S106 Agreement in December 2015. This agreement, valid until 2018, outlines a number of obligations and action plan action; this is independently audited annually.

For details of Gatwick Airport's S106 Legal Agreement with West Sussex County Council and Crawley Borough Council please refer to our website[2].

- **2013 Aviation Policy Framework**

The **2013 Aviation Policy Framework (APF)** fully replaced the 2003 ATWP as Government's policy on aviation, alongside any decisions Government would later make taking account of the recommendations of the independent Airports Commission review which was ongoing at the time. The APF strongly supports making best use of existing airport capacity as part of a strategy to promote a vibrant aviation sector (§1.24, §1.60 and other references). This policy has been re-affirmed recently in the revised draft Airports National Policy Statement where Government states that it is supportive of all airports who wish to make best use of their existing runways (e.g. para 1.37).

The 2013 APF focuses on the benefits of aviation and its environmental impacts and frames national policy to strike a balance between the two. The APF seeks to integrate aviation noise policy contextually with other Government policies for land use planning in the National Planning Policy Framework (NPPF) and the promotion of good health and good quality of life through the management of noise in the Noise Policy Statement for England (NPSE). The APF also has wider objectives in relation to Safety, Security, Competition and Regulation Policy and Passenger rights.

[2] https://www.gatwickairport.com/business-community/community-sustainability/sustainability/s106-agreement/

- **Draft Airports National Policy Statement**

A Draft Airports National Policy Statement ("NPS") was published on 2 February 2017, for consultation running through to 25 May 2017. The draft NPS sets out the Government's policy on the need for new airport capacity in the South East of England, and its preferred location and scheme for delivering this capacity. In addition to work on the NPS, the Government plans to consult on various elements of a new Aviation Strategy during 2018. This will replace the Aviation Policy Framework (2013) and to include consideration of airport development requirements at all UK airports.

- **Revised Draft Airports National Policy Statement**

Between February and May 2017, the Department for Transport consulted on a draft Airports National Policy Statement (NPS), and received more than 70,000 responses from across the UK. In October 2017, the Government launched a period of further consultation to give people the chance to consider updated evidence which was unavailable in February 2017.

- **UK Airspace Policy**

The Government confirmed in October 2017 that it will be establishing a new independent noise body, which will help to ensure the communities around UK airports have a say in airspace changes which may affect them. The Independent Commission on Civil Aviation Noise (ICCAN) will produce guidance and best practice for making sure the process for taking airspace change decisions is trusted and transparent. To ensure this is happening, there will be a review of ICCAN within two years, with a view to considering whether statutory powers are required.

The announcement confirms that Government accepts recent research regarding the way noise effects should be assessed. These support the continued use of the L_{eq} noise assessment metric, but relating noise to risk of adverse effects to health and quality of life. Supplementary noise metrics are to be used to capture frequency of noise events in areas affected by noise below levels below those where adverse effects to health or quality of life occur.

It is intended that measures set out in October 2017 will enable the UK to make much greater use of new technology which gives the UK the ability to manage its airspace more effectively to tackle delays, cut emissions and reduce the need for stacking above the UK's busiest airports. More detailed methods of assessing the noise impacts of the required airspace changes are being consulted on.

GENERAL PLANNING POLICY – THE NPSE, AND THE NPPF

THE NOISE POLICY STATEMENT FOR ENGLAND

The Noise Policy Statement for England (NPSE) of March 2010 states the long-term vision of Government noise policy is to "promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development".

The long-term vision is supported by the following aims; through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life;
- Where possible, contribute to the improvement of health and quality of life.

The intention is that the NPSE should apply to all types of noise apart from noise in the workplace (occupational noise). For the purposes of the NPSE, "noise" includes:

- "environmental noise" which includes noise from transportation sources;
- "neighbour noise" which includes noise from inside and outside people's homes; and
- "neighbourhood noise" which includes noise arising from within the community such as industrial and entertainment premises, trade and business premises, construction sites and noise in the street.

The NPSE introduced the concepts of the Significant Observable Adverse Effect Level (SOAEL) and the Lowest Observable Adverse Effect Level (LOAEL) to draw the distinction between those noise levels that should be avoided (above SOAEL) and those that should be minimised (above LOAEL), all in the context of Government policy on sustainable development. Recent government research (the SONA 2014 report) indicates that the LOAEL is at L_{eq} 16 hour 51dB and recent airport planning decisions agree that the SOAEL is at L_{eq} 16 hr 63dB.

THE NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. The NPPF provides Government's policies to promote sustainable development and sets out that the purpose of the planning system is to contribute to the achievement of sustainable development[3]. Sustainable development includes three dimensions: economic, social and environmental, and thus, when planning decisions are made to increase capacity, the process requires weighing the relative balance of these three factors.

Planning law requires that applications for planning permission must be determined in accordance with the development plan, unless material considerations indicate otherwise. The National Planning Policy Framework must be taken into account in the preparation of local and neighbourhood plans, and is a material consideration in planning decisions. Planning policies and decisions must reflect and where appropriate promote relevant EU obligations and statutory requirements.

The NPPF does not contain specific policies for nationally significant infrastructure projects for which particular considerations apply. These are determined in accordance with the decision-making framework set out in the Planning Act 2008 and relevant national policy statements for

[3] NPPF §6

major infrastructure, as well as any other matters that are considered both important and relevant (which may include the National Planning Policy Framework). National policy statements form part of the overall framework of national planning policy, and are a material consideration in decisions on planning applications.

With reference to airports, the NPPF states:

*"When planning for ports, airports and airfields that are not subject to a separate national policy statement, plans should take account of their growth and role in serving business, leisure, training and emergency service needs. Plans should take account of this Framework (NPPF) as well as the principles set out in the relevant national policy statements and the Government Framework for UK Aviation."[*NPPF §33]

GOVERNMENT AVIATION NOISE POLICY

The Government's current aviation noise policy is encapsulated in the 2017 Airspace Policy Consultation Response, October 2017, as follows[4]:

"The government's overall policy on aviation noise is to limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise, as part of a policy of sharing benefits of noise reduction between industry and communities in support of sustainable development. Consistent with the Noise Policy Statement for England…"

The Noise Policy Statement for England makes a distinction between those significant adversely affected, and those adversely affected, and requires the focus of noise control to be on those people significantly adversely affected because those are the people most at risk of health impacts.

Within the overarching policy, "limiting" the effects of noise means avoiding significant adverse effects to health and quality of life, mitigating adverse effects, and where possible contributing to the improvement of health and quality of life. [Feb 2017 Airspace Policy Consultation §5.28]. Whereas Government's primary objective is economic growth [Ref APF Executive Summary §5], the noise policy can be interpreted as Government wanting to regulate aviation growth so that it occurs sustainably and so that industry continues to have the incentive to invest and deliver long term reductions in noise.

[4] §2.69 Consultation Response on UK Airspace Policy: A framework for balanced decisions on the design and use of airspace – October 2017.

SECTION 7 – NOISE MANAGEMENT AT GATWICK AIRPORT

Airports bring positive economic and social benefits as well as environmental impacts. They are important to the economy, providing jobs, encouraging inward investment and boosting local tourism. However, they can also have an impact for those communities that exist around airports. Noise remains a significant issue for people living or working close to airports or under flight paths.

Some of this noise results from Gatwick Airport's own operations, noise which we have the ability to directly control. However, noise is also generated from sources outside our direct control but where we can exert influence to bring about change. Limiting and, where possible, reducing the impact of noise is a long standing commitment of Gatwick Airport and is critical to maintaining the airport's licence to operate and grow.

OUR APPROACH

Gatwick is a designated airport, so the Government sets the policy framework which influences how the airport responds to aircraft noise issues. The Government's Aviation Policy Framework outlines several ways to control, mitigate and compensate for noise.

The Department for Transport has direct control over noise at Gatwick Airport. Local authorities also contribute to noise controls and we also work with airlines, air navigation services providers and local authorities towards achieving our noise objectives.

OUR PLANS

Alongside the statutory noise objectives, Gatwick Airport has set the following long term objective for the management of aircraft noise:

'To gain the trust of our stakeholders that we are using best practicable means to minimise aircraft noise impacts'

CURRENT MEASURES TO MANAGE AIRCRAFT NOISE AT GATWICK AIRPORT

We believe that we have a full and comprehensive range of noise management measures already in place when compared with other similar airports. These measures cover operational procedures, stakeholder communication and engagement as well as mitigation and compensation schemes.

OPERATIONAL PROCEDURES - AERONAUTICAL INFORMATION PUBLICATION

In aviation, an Aeronautical Information Publication (or AIP) is defined by the International Civil Aviation Organization as a publication issued by or with the authority of a state and containing aeronautical information of a lasting character essential to air navigation. It is designed to be a manual containing thorough details of regulations, procedures and other information pertinent to flying aircraft in the particular country to which it relates. It is usually issued by or on behalf of the respective Civil Aviation Administration.

The structure and contents of AIPs are standardised by international agreement through ICAO. AIPs normally have three parts – GEN (general), ENR (en route) and AD (aerodromes). The

document contains many charts; most of these are in the AD section where details and charts of all public aerodromes are published.

AIPs are kept up-to-date by regular revision on a fixed cycle. For operationally significant changes in information, the cycle known as the AIRAC (Aeronautical Information Regulation and Control) cycle is used: revisions are produced every 56 days (double AIRAC cycle) or every 28 days (single AIRAC cycle). These changes are received well in advance so that users of the aeronautical data can update their Flight Management Systems (FMS).

A range of noise controls relating directly to aircraft operations are set out in statutory notices and are published in the Gatwick Aerodrome AIP and elsewhere as appropriate. These controls cover aspects such as Continuous Descent Operations (CDAs), Low Power / Low Drag, departures noise abatement procedures and night flight restrictions.

A range of noise controls relating directly to aircraft operations at Gatwick Airport are set out in statutory notices and are published in the UK Aeronautical Information Package (UK AIP).

GATWICK AIRPORT AIP REQUIREMENTS

Departures:

- After take-off the aircraft shall be operated in such a way that it is at a height of not less than 1,000ft above aerodrome level at 6.5 km from the start of roll as measured along the departure track of that aircraft.
- After taking off the aircraft shall avoid flying over the congested areas of Horley and Crawley.

Arrivals:

- Between the hours of 23:30 (local) and 06:00 (local), inbound aircraft, whether or not making use of the ILS (instrument landing system) localiser and irrespective of weight or type of approach, shall not join the centre-line below 3,000ft (Gatwick QNH) closer than 10nm (nautical miles) from touchdown.
- Before landing at the aerodrome the aircraft shall maintain as high an altitude as practicable and shall not fly over the congested areas of Crawley, East Grinstead, Horley and Horsham at an altitude of less than 3,000ft (Gatwick QNH) nor over the congested area of Lingfield at an altitude of less than 2,000ft (Gatwick QNH).
- Additionally, pilots are requested to avoid the use of reverse thrust after landing, unless required for safe operation of the aircraft, between 23:00 and 06:00 (local time). This is to minimise disturbance in areas adjacent to the airport.

CONTINUOUS DESCENT OPERATIONS (CDO)

A CDO is a technique of flight in which a pilot descends at a continuous rate to join the glide-path at the correct height for the distance and thereby avoid the need for extended periods of level flight. The intention is to keep aircraft higher for longer, using reduced thrust and thereby reducing arrival noise. CDO requires co-operation between Air Traffic Control (ATC) and pilots in order to both provide information and guidance to allow the pilot to fly the optimum CDO, and for the pilot to manage the descent to deliver the aircraft safely and efficiently at the ILS joining point. There are numerous factors that can affect the delivery of an efficient CDO including weather, crew and ATC familiarisation and traffic conditions.

Levels of CDO achievement are regularly reported back to the Gatwick Airport Consultative Committee (GATCOM) as well as the Flight Operations Performance & Safety Committee (FLOPSC), which includes airline and ATC representatives. This engagement is focused on delivering continuous operational improvement in airline CDO achievement.

In 2016, Gatwick Airport raised the altitude from which CDO is measured from 6,000ft to 7,000ft and will continue to explore the feasibility of raising this further.

LOW POWER / LOW DRAG

Within the Gatwick Airport AIP, part of the Noise Abatement Procedures require aircraft that are approaching the aerodrome to land shall, commensurate with its ATC clearance, minimise noise disturbance by the use of continuous descent and low power, low drag operating procedures.

Where the use of these procedures is not practicable, the aircraft shall maintain as high an altitude as possible. In addition, when descending on initial approach, including the closing heading, and on intermediate and final approach, thrust reductions should be achieved where possible by maintaining a 'clean' aircraft configuration and by landing with reduced flap, provided that in all the circumstances of the flight this is consistent with safe operation of the aircraft.

Currently, apart from visual observations, there is no process for measuring low power low drag compliance with the AIP instruction. Thus Gatwick airport has focused on airline engagement and sharing best practice.

NIGHT RESTRICTIONS

The current night restrictions regime was introduced by the Department for Transport in 2006 and initially was meant to remain in force until 2012. This has since been extended until the end of summer 2017 when a revised regime was introduced.

There have, however, been night restrictions in force at Gatwick Airport for many years. Details of the number of aircraft moments and quota count permitted per season are detailed in Annex 6 – Summary of Limit Values in Place.

Gatwick Airport reports regularly to GATCOM and to the Department for Transport on usage of the movements limits and the quota counts utilised, details of any dispensations or exemptions granted. All dispensations granted by the airport have to be reported to the Department for Transport in writing within one week of the event occurring.

NOISE PREFERENTIAL ROUTEINGS (NPRS)

Noise Preferential Routes provide volumes of pre-defined airspace within which Standard Instrument Departure (SID) Routes are established which aircraft must follow on departure from an aerodrome and so provide some certainty as to which areas will be exposed to aircraft activity.

All aircraft leaving Gatwick Airport should follow the Noise Preferential Routes (NPRs) up to an altitude of 3,000ft or 4,000ft depending on the route. Although aircraft may be directed outside of the NPR below this altitude if required to maintain safety of flight, e.g. to avoid thunderstorms or other traffic.

With reference to Gatwick Airport, as a designated aerodrome, the locations of all of the Noise Preferential Routes are determined by the Department for Transport and have been in their present locations since the late 1960s and were designed to avoid over flight of built-up areas where possible.

A Noise Preferential Routes (NPR) consists of a 'centreline' and an associated compliance monitoring swathe (3km across, i.e. 1.5km either side of the NPR centreline). As long as aircraft remain within this 'swathe' up to the minimum vectoring altitude (3,000ft or 4,000ft), they are deemed to be on track.

Air Traffic Control is responsible for the routing of aircraft once airborne, once the aircraft is above the minimum vectoring altitude, they may give a flight a more direct heading (known as vectoring) off the route. This is subject to certain factors including weather conditions and/or other traffic in the vicinity.

There is a map illustrating the location of all of the Noise Preferential Routes (NPRs) at Gatwick Airport in Annex 7.

NOISE LIMITS

The current departure noise limits of 94 dB(A) (day), 89 dB(A) (shoulder) and 87 dB(A) (night) were implemented at the London airports (Gatwick, Heathrow and Stansted) in 2001. The noise limits are related to a fixed reference distance of 6.5 km from start of roll and have been defined in terms of a maximum A-weighted noise level, LAmax since 1992-93.

Recognising that the noise limits had been in place for many years, the Government announced in its March 2013 Aviation Policy Framework that ANMAC would review the departure noise abatement procedures at the London airports, including noise limits and use of penalties, to ensure that these remain appropriately balanced and effective.

The study by the ANMAC Technical Working Group has identified that there is limited scope for reductions in the noise limits at Heathrow until the retirement of the remaining Boeing 747-400 fleet. A small reduction of 1 to 2 dB in the daytime and shoulder limits might be feasible without causing the overall number of infringements to increase above historic levels.

The results for Gatwick and Stansted indicate that the current daytime, shoulder and night limits could be lowered, by up to 3 decibels or more in some cases, without significantly impacting the current fleets at those airports.

A lowering of the noise limits at Gatwick and Stansted would provide a backstop, dissuading the re-introduction of the noisiest aircraft types, but it would mean that the limits would no longer be applied equally across the three airports (which has been a matter of Government policy for many years).

Analysis has shown that whilst reductions in noise levels at the 6.5 km location could be achieved through changes to airline Noise Abatement Departure Procedures, this would be at the expense of noise increases elsewhere along or to the side of the flight path

Regarding the wider influence of Noise Abatement Departure Procedures on departure noise, ICAO guidance provides two examples: NADP 1 which can mitigate noise close to the aerodrome, and NADP 2 which can mitigate noise more distant from the aerodrome. A wide range of procedures may be developed within the NADP 1 and 2 definitions.

The limits apply at fixed noise monitors only. These night time limits are consistent with the night restrictions regime. Airlines whose aircraft breach the noise limits are fined by Gatwick Airport.

There are no arrivals noise limits.

1,000 FT RULE

Aircraft are required to be at a height of not less than 1,000 feet at 6.5 km from start-of-roll. After passing the 1,000 feet point (at 6.5 km), aircraft are then required to maintain a climb gradient of not less than 4% to an altitude of 4,000 feet.

The rationale for the climb gradient requirement is to ensure that progressively reducing noise levels at points on the ground under the flight path are achieved.

GROUND NOISE

Aircraft engine testing is also controlled by Gatwick Airport. This is done by establishing and enforcing ground noise controls by way of Gatwick Airport Directives (GADs).

In the case of engine run-up restrictions, the GAD states that unless there are urgent operational reasons for engine testing to be carried out at night, ground running must be confined to the period 07:00-22:00 local time. There are additional restrictions regarding the running of auxiliary power units.

A range of ground noise metrics are presented to the quarterly meetings of the Noise and Track Monitoring Advisory Group. These include Fixed Electrical Group Power availability, aircraft Auxiliary Power Unit audit results and the number of aircraft engine tests carried out.

NOISE MONITORING

Gatwick Airport has a noise and track-keeping system, which takes data from ATC radars, combines it with flight information along with data from both fixed and mobile noise monitors situated around the airport.

There are five fixed noise monitors around Gatwick (approximately 6.5km from either end of the runway) and six to seven mobile noise monitors located in communities further away from the airport. The mobile noise monitors are deployed for periods of typically one year and are usually located in areas affected by inbound or outbound aircraft).

The mobile noise monitors allow Gatwick Airport to gain an understanding of the noise climate in a particular area and, in conjunction with the Gatwick Noise Monitoring Group, commission detailed noise studies by our independent acoustic specialists.

NOISE CHARGES

The Conditions of Use and airport charges for Gatwick Airport are published every year in the Conditions of Use publication. The table below provides an overview of the criteria associated with each aircraft noise charge category.

Figure 1: Overview of the noise performance criteria for ICAO aircraft chapter

Charge Category	Noise Performance Criteria	Cumulative Margin (CM) Relative to ICAO Chapter 3 Limits
Chapter 3 & Below	• Does not satisfy Chapter 4 criteria.	-
Chapter 4	• Margin at each certification point is greater than 0. • Combined margin at any two certification points is greater than or equal to 2. • Cumulative margin relative to Chapter 3 limits is greater than or equal to 10.	10 <= CM < 17
Chapter 14 High	• Margin at each certification point greater than or equal to 1. • Cumulative margin relative to Chapter 3 limits is greater than or equal to 17.	17 <= CM < 20
Chapter 14 Base		20 <= CM < 23
Chapter 14 Minus		CM >= 23

Noise charges vary by time of day (Day / Night). The Day and Night periods are defined in the table below; all times are shown in UTC (GMT).

Figure 2: Defined day/night periods in the summer and winter

Charge	Day (Times in UTC)	Night (Times in UTC)
Summer (1 April – 31 October)	05:00 – 22:29	22:30 – 04:59
Winter (1 November – 31 March)	06:00 – 23:29	23:30 – 05:59

The table below details the aircraft noise charges that apply on take-off and landing.

Figure 3: Charges per ICAO chapter for the summer and winter seasons

Season	Charge Category	Charging Unit	Day	Night
Summer (1 April – 31 October)	**Unmodified A320 Family***	Per movement	£784.40	£988.02
	Chapter 3 & Below	Per movement	£78.44	£988.02
	Chapter 4	Per movement	£39.22	£494.01
	Chapter 14 High	Per movement	£23.53	£296.41
	Chapter 14 Base	Per movement	£19.61	£247.00
	Chapter 14 Minus	Per movement	£15.69	£197.60
Winter (1 November – 31 March)	**Unmodified A320 Family***	Per movement	£784.40	£988.02
	Chapter 3 & Below	Per movement	£0.00	£988.02
	Chapter 4	Per movement	£0.00	£494.01
	Chapter 14 High	Per movement	£0.00	£296.41
	Chapter 14 Base	Per movement	£0.00	£247.00
	Chapter 14 Minus	Per movement	£0.00	£197.60

*Unmodified A320 Family Aircraft Noise Charge

(1) With effect from 1 January 2018, any Airbus A320 family aircraft (A318 / A319 / A320 / A321) which has not been declared on the 'All Up Weight Return' form detailed in Schedule 5 to this Conditions of Use as having the fuel over pressure protector (FOPP) modification – as described under Section 2.2 of Gatwick Airport Independent Arrivals Review Report dated 28 January 2016 will be subject to this charge.

There are other charges applicable to aircraft movements including passenger charges, demand charges and NOx emissions charges. Full details are available here: https://www.gatwickairport.com/globalassets/publicationfiles/business_and_community/all_public_publications/2017/2017-18-conditions-of-use---final---sent-30jan17.pdf

AREAS OF OUTSTANDING NATURAL BEAUTY (AONB)

Gatwick Airport is surrounded by many AONBs hence overflight is often unavoidable. The Air Navigation Guidance (ANG) 2017 is a Department for Transport document which provides the Civil Aviation Authority with guidance on how it should exercise its air navigation functions.

Section 3.3 of the ANG also refers to overflight in the context of the protection of landscapes and scenic beauty. It states that:

a) 'in the airspace from the ground to below 4,000 feet the government's environmental priority is to limit and, where possible, reduce the total adverse effects on people;
b) where options for route design from the ground to below 4,000 feet are similar in terms of the number of people affected by total adverse noise effects, preference should be given to that option which is most consistent with existing published airspace arrangements;
c) in the airspace at or above 4,000 feet to below 7,000 feet, the environmental priority should continue to be minimising the impact of aviation noise in a manner consistent with the government's overall policy on aviation noise, unless the CAA is satisfied that the evidence presented by the sponsor demonstrates this would disproportionately increase CO_2 emissions;
d) in the airspace at or above 7,000 feet, the CAA should prioritise the reduction of aircraft CO_2 emissions and the minimising of noise is no longer the priority;
e) where practicable, it is desirable that airspace routes below 7,000 feet should seek to avoid flying over AONB and National Parks; and
f) all changes below 7,000 feet should take into account local circumstances in the development of the airspace design, including the actual height of the ground level being overflown, and should not be agreed to by the CAA before appropriate community engagement has been conducted by the sponsor'.

STAKEHOLDER COMMUNICATION AND ENGAGEMENT

ACCESSING INFORMATION

- **Flight Performance Team (FPT)**

Gatwick Airport monitors compliance with the various noise control measures detailed in the Aerodrome Information Publication (AIP) or locally and handles aircraft noise complaints through the Flight Performance Team.

The team also provides relevant statistics to the Department for Transport, the Noise and Track Monitoring Advisory Group, the Noise Management Board and the Gatwick Airport Consultative Committee.

- **Reporting**

We produce quarterly and annually FPT reports that provide information on performance against noise control measures.

- **Website and online flight tracking**

Detailed information relating to aircraft noise is available on our website. This has links to various reports, minutes from the Noise and Track Monitoring Advisory Group, the Noise Management Board and information regarding ground noise, aircraft overflight and night flights.

A further facility on the website is our flight tracking tool, the Casper Noise Lab. This is an online self-service aircraft noise complaints system showing Gatwick aircraft flight tracks in real time, heights and aircraft types. By using this facility it is possible to see where planes are flying in relation to where the complainant lives or works together with aircraft noise complaint statics in a given area.

Gatwick Airport Ltd continues to monitor the online complaints system and flight tracking service and when appropriate will introduce modifications to enhance both.

- **Complaint handling service**

Gatwick Airport's FPT registers and investigates all complaints received in line with our stated complaint handling policy.

Relevant information to help understanding of the issue is offered but the FPT will not repeatedly supply the same or similar information or substantial amounts of data, or undertake extensive data gathering exercises in individual cases.

This allows the FPT to concentrate on performance monitoring and overall studies with the aim of providing useful information about what, if any, improvements might be possible.

The FPT also continuously monitors overall performance, for example track keeping and CDA. This is not dependent on receipt of complaints.

Where there appears to be something unusual occurring it is investigated and the data is used to continue to work proactively with the airline community to enhance performance overall. See Annex 5 for complaint data.

STAKEHOLDER ENGAGEMENT

In addition to the above measures, Gatwick Airport also regularly engages with stakeholders including airlines, air navigation service providers, local community groups, local authorities and government bodies. This is done through various engagement forums such as the:

- Gatwick Airport Consultative Committee (GATCOM),
- GATCOM Steering Group,
- Noise Management Board,
- Noise and Track Monitoring Advisory Group (NaTMAG),
- Section 106 Steering Group, and
- The Gatwick Noise Monitoring Group.

MITIGATION AND COMPENSATION SCHEMES

The Government's Aviation Policy Framework states that their overall objective on noise is to limit and where possible reduce the number of people in the UK significantly affected by aircraft noise. The policy document makes clear that the acceptability of growth in aviation depends to a large extent on the industry continuing to tackle its noise impact and confirms that the Government expects the industry at all levels to continue to address noise.

The principal mitigation measure for aircraft noise impacts (at Gatwick Airport) is the provision of acoustic insulation and can be required on a statutory basis under section 79 of the Civil Aviation Act 1982. In practice however, all Gatwick Airport's current noise insulation schemes are provided on a voluntary basis and exceeds the expectations of the Aviation Policy Framework. Namely:

- Airport operators are to offer households exposed to levels of noise of 69 dB L_{Aeq},16h or more, assistance with the costs of moving.
- Airport operators are to offer acoustic insulation to noise-sensitive buildings, such as schools and hospitals, exposed to levels of noise of 63 dB L_{Aeq}, 16h or more.
- Where acoustic insulation cannot provide an appropriate or cost-effective solution, alternative mitigation measures should be offered.
- If no such schemes already exist, airport operators should consider financial assistance towards acoustic insulation for households. Where compensation schemes have been in place for many years and there are few properties still eligible for compensation, airport operators should review their schemes to ensure they remain reasonable and proportionate.
- Where airport operators are considering developments which result in an increase in noise, they should review their compensation schemes to ensure that they offer appropriate compensation to those potentially affected. As a minimum, the Government would expect airport operators to offer financial assistance towards acoustic insulation to residential properties which experience an increase in noise of 3dB or more which leaves them exposed to levels of noise of 63 dB L_{Aeq}, 16h or more.
- Any potential proposals for new nationally significant airport development projects following any Government decision on future recommendation(s) from the Airports Commission would need to consider tailored compensation schemes where appropriate, which would be subject to separate consultation.
- Airports may wish to use alternative criteria or have additional schemes based on night noise where night flights are an issue. Airport consultative committees should be involved in reviewing schemes and invited to give views on the criteria to be used.

Details of the boundaries of Gatwick's Noise Insulation Scheme, Home Owner Support Scheme and Property Market Support Bond are included in Section 15.

NEW NOISE SENSITIVE DEVELOPMENTS

Guidance on the planning of new noise sensitive development, such as housing, near airports can be found in some local authority local planning guidance. Following the repeal of national guidance on the subject, the Institute of Acoustics, Chartered Institute of Environmental Health and the Association of Noise Consultants produced Professional Practice Guidance (ProPG) Planning and Noise; New Residential Development in May 2017 which promotes good acoustics design to achieved suitable design standards in new housing in existing noisy environments including near airports. Under the Noise Management Board's work programme Gatwick Airport has worked with local authorities to promote good land use planning, and held a workshop sharing experiences in November 2017.

SECTION 8 – THE INDEPENDENT REVIEW OF ARRIVALS AND THE NOISE MANAGEMENT BOARD

THE INDEPENDENT REVIEW OF ARRIVALS

INTRODUCTION

In August 2015, in response to feedback from some of our local residents and resident groups, the then Chairman of Gatwick Airport Ltd, Sir Roy McNulty, commissioned an independent review of air traffic around Gatwick.

BACKGROUND

The Independent Review of Arrivals was led by industry experts Bo Redeborn and Graham Lake who were asked to provide a fully independent, professional analysis and report. As part of the review, the Independent Review of Arrivals team engaged with an extensive range of organisations, individuals, Parish, Town and District County Councils and MPs. They also held three interactive public meetings with local MPs which were attended by several hundred people. In addition, they received feedback and comments by email.

KEY FOCUS OF THE REVIEW

The review took over four months to complete and was published on 28 January 2016. Its main aim was:

- To make sure everything that can reasonably be done to alleviate issues raised by the local community is being done. This includes by Gatwick Airport as well as other agencies closely involved in the industry i.e. NATS, Civil Aviation Authority, airlines and the Department for Transport.
- To understand if the way Gatwick communicates with and provides information to the local community, including the handling of complaints, is fully adequate.

MAIN FINDINGS OF THE REVIEW

The report set out 23 practical steps that can be taken to improve noise and the key recommendations and findings from the review are as follows:

- To reduce the number of aircraft holding over land;
- To improve use of continuous descent arrivals which would generate significantly less noise, and to improve the sequencing and spacing of arrivals;
- To accelerate the modification of the Airbus A320 family of aircraft to reduce the whining noise they make during the approach phase of flight;
- To establish an independently chaired Noise Management Board to oversee joint strategies to deal with noise around the airport; and
- To develop a comprehensive online complaint management system.

GATWICK AIRPORT'S RESPONSE

Gatwick welcomed the findings of the review and published a detailed response and proposed Action Plan for the implementation of the review's 23 recommendations. This included the establishment of an independent Noise Management Board, comprising main aviation stakeholders and representatives of local communities.

A planning meeting of the proposed Noise Management Board was held on 18 May 2016.

Following publication of the Proposed Action Plan, Gatwick published its Final Action Plan. The Final Action Plan reflected the constructive feedback to the Arrivals Review and the Proposed Action Plan that has been received from communities and other stakeholders, as well as the results and conclusions of additional analysis.

NOISE MANAGEMENT BOARD

A key recommendation to come out of the Gatwick Airport Independent Arrivals Review was to establish an independently chaired Noise Management Board (NMB) to oversee joint strategies to deal with noise around the airport.

The purpose of the NMB is to develop, agree, oversee and maintain a coordinated noise management vision and consequent strategies for Gatwick, for all stakeholder organisations, intended to improve the situation for those affected by noise from aircraft using Gatwick.

This should include joint and coordinated reports through the NMB on progress of the implementation of these agreed strategies and, should seek to ensure consistent communication across all stakeholder groups, using verifiable data and transparent policies, to support the facilitation of their understanding by residents. This may also include when necessary, research and independent verification of information to be published.

The NMB can assist in ensuring that community concerns about aircraft noise are fully understood by key stakeholder organisations considering issues that may affect noise management around Gatwick. The NMB will focus initially on the implementation of recommendations from the Arrivals Review, but then extending to other important noise management issues.

The NMB should assist in the progressive development of consensus across its membership, to improve the alignment of responsibilities, initiatives and priorities of the key organisations able to influence change in the effect of noise from aircraft using Gatwick, whether for arrivals, departures or related to aircraft ground noise.

MEMBERSHIP

The Noise Management Board is made up of a wide range of industry experts and stakeholders. There are 13 seats on the Board, some of which are shared between a voting member and an alternate (back-up) member who have one vote and actively attend alternate meetings. The NMB has representation from the following members:

- Gatwick Airport Ltd
- Civil Aviation Authority (CAA)
- Department for Transport (DfT)
- National Air Traffic Services (NATS)
- Air Navigation Solutions - ANS - (the providers of air traffic services in the control tower at Gatwick)
- Airlines
- Chair of GATCOM (Gatwick Airport Consultative Committee)
- East Sussex and West Sussex County Councils
- Surrey and Kent County Councils
- The High Weald Councils Aviation Action Group (HWCAAG) and Association of Parish Councils Action Group (APCAG)
- East Sussex Communities for Control of Aircraft Noise (ESCCAN) and Tunbridge Wells Anti-Aircraft Noise Group (TWAANG)
- Communities against Gatwick Noise Emissions (CAGNE) and Plane Wrong
- Gatwick Obviously Not (GON) and People against Gatwick Noise Emissions (PAGNE)

The Board is chaired by Bo Redeborn and the secretary is Graham Lake. Bo and Graham conducted and wrote the Gatwick Airport Independent Arrivals Review.

On 18 May 2016, the NMB held a planning meeting in order to establish the membership, constitution and terms of reference for the Board. Following this, the first NMB meeting was held on 21 June 2016.

OBJECTIVES

1. The objective of the NMB is to develop, agree and oversee a coordinated noise management vision and consequent strategies for Gatwick, for all stakeholder organisations.
2. The initial focus will be on the implementation of the Recommendations of the Independent Review of Arrivals.
3. The NMB's remit extends to all important noise management issues related to Gatwick, including those related to departures, and aircraft ground noise, as well as arrivals.
4. The NMB's scope includes all commercial matters that might reasonably be expected to have a significant impact on the noise environment at Gatwick.
5. The NMB should be a body with real influence over operational stakeholders around the airport such as on airspace and aircraft operational issues.
6. The NMB should influence and monitor the effective use of noise awareness training policies for staff of all Gatwick stakeholders and reported through NATMAG.
7. The NMB should be consulted on all Gatwick noise related matters, such as compensation policy, noise insulation and community support.

8. The NMB should be a main channel (Notwithstanding the obligations of the Gatwick Areas Joint Authorities Group, hosted by Crawley Borough Council) through which GAL, NATS, ANS, Airlines, DfT and CAA communicate actions that are being taken to address the effects of noise from aircraft using Gatwick.
9. The NMB should seek to ensure the joint and co-ordinated reporting by stakeholders through the NMB, initially on progress of the Arrivals Review implementation and then on other noise issues and initiatives, and seek to facilitate better understanding by residents through more consistent communication and verifiable data.
10. The NMB should establish a mechanism to identify and address unintended and unexpected consequences of noise improvement initiatives.
11. Particular care will need to be taken by the NMB to avoid conflicting with the remits or duties of any of the other bodies already involved in noise matters related to Gatwick.
12. If and when the Government establishes an Independent Noise Authority the NMB should ensure appropriate alignment between its own Terms of Reference and the remit of such a body.
13. The NMB should agree and establish a process to set its SMART objectives and to regularly review and report its progress.
14. The NMB should establish and maintain a transparent mechanism to adapt these Terms of Reference when agreed by members of the NMB.
15. The NMB will seek to positively influence the noise environment of stakeholders by assisting the development of consensus among the various organisations represented through its membership.
16. In the event that it is not possible to reach NMB consensus on any matter, after exhausting all reasonable efforts, a majority decision can be made provided that it represents at least 75% of the NMB Membership.

MEETINGS AND REPORTING

- The NMB should meet every 2 months, or at intervals agreed by the members.
- The agenda and minutes of NMB meetings should be published (on the NMB website).
- NMB meetings will not be open to the public, unless agreed by the NMB members for specific dates or specific topics.
- It is expected that at least one public meeting will be conducted each year by the NMB, to facilitate community dialogue, a reasonable understanding in communities of the work areas of the NMB, and to report NMB progress and plans.

ONE YEAR ON

The Independent Review of Arrivals 'Recommendation IMM-20' was to provide an in-depth review of the activity and progress of the Gatwick Arrivals Review Final Action Plan developed in response to the Independent Arrivals Review.

The Imm-20 report, published on the 31st January 2017, provided an update on the range of activities and substantial work undertaken by Gatwick, industry stakeholders and the Noise Management Board (NMB). Progress one year on included:

- reduction of noise disturbance from aircraft using Gatwick;
- improved quality and transparency of information available;
- the access available to communities;
- active engagement with aviation stakeholders

A further update on progress was provided at the Gatwick Airport Airspace and Noise Management Board Public Meeting on 7th December 2017.

SECTION 9 - CONTROL MEASURES IN PLACE

CONTROL MEASURES IN PLACE APPLICABLE TO GATWICK AIRPORT

AERONAUTICAL INFORMATION PUBLICATION - LONDON GATWICK

- **EGKK AD 2.21 NOISE ABATEMENT PROCEDURES**

Adherence to the noise abatement procedures is reported quarterly and annually through Flight Performance Team Reports to the Noise and Track Monitoring Advisory Group and the Gatwick Airport Consultative Committee. These are published on the Airport website.

Performance Dashboard presented bi-monthly to the Flight Operations Performance and Safety Committee.

The FPT undertakes direct engagement with airlines to improve performance as and when required.

NIGHT FLIGHT RESTRICTIONS AT HEATHROW, GATWICK AND STANSTED AIRPORTS

Current regulations expire as of October 2017. New regime to come into effect that will expire in October 2022 with the objective to:

> 'Limit or reduce the number of people significantly affected by aircraft noise at night, including through encouraging the use of quieter aircraft, while maintaining the existing benefits of night flights'

The movements limit remains unchanged however the night quota limit will be reduced.

During the summer season, the air traffic movements limit is capped at 11,200 and during winter, this reduces to 3,250. The night quota limits will be reduced to 5,150 in the summer (from 6,200 in 2018) and to 1,785 in the winter (from 2,000 in 2017/18). This will further incentivise the use of quieter aircraft by encouraging industry to plan its operations with sufficient headroom to ensure the limits can still be complied with in the event of unplanned disruption or changes to their schedules.

Performance against the night flight restrictions are reported quarterly and annually through Flight Performance Team Reports to the Noise and Track Monitoring Advisory Group and the Gatwick Airport Consultative Committee. These are published on the Airport website.

Performance Dashboard presented bi-monthly to the Flight Operations Performance and Safety Committee.

Proactive direct engagement is undertaken by Gatwick Airport Limited with airlines, Airport Co-ordination Limited, Department for Transport and GAL Sales and Operations Planning to manage allocation, dispensations and usage.

SECTION 106 LEGAL AGREEMENT OBLIGATIONS AND NOISE ACTION PLAN

- **OBLIGATIONS 4.1 TO 4.5, ACTION PLAN ACTIONS 1 – 8**

Progress against the actions are reported annually in the Section 106 Annual Monitoring Report. Selected obligations and action plan actions are subject to audit. Final Annual Monitoring Report circulated to Crawley Borough Council and West Sussex County Council for circulation among the wider local authorities and the Gatwick Airport Consultative Committee. This report is published on the Airport website.

DECADE OF CHANGE

- **THE SUSTAINABILITY STRATEGY FOR GATWICK AIRPORT FOR 2010 – 2020**

Qualitative target of "Be consistently recognised as a best practice operator for noise management" and audited noise key performance indicators (track keeping, noise infringements and Continuous Descent Operations (CDO) compliance) included.

ENVIRONMENTAL NOISE DIRECTIVE NOISE ACTION PLAN

Contains 61 action plan actions (2013-2018) reported quarterly and annually to the Noise and Track Monitoring Advisory Group. The minutes are available online on the airport website where the annual report is also uploaded.

INDEPENDENT REVIEW OF ARRIVALS (Published January 2016)

The Noise Management Board initially focussed on the implementation of the 23 recommendations of the Independent Review of Arrivals. An annual update (Imm-20) was published in January 2017 which reported on progress against these recommendations.

A further update on progress was provided at the Gatwick Airport Airspace and Noise Management Board Public Meeting on 7th December 2017.

NOISE MANAGEMENT BOARD ANNUAL WORKPLAN

Annual workplan is negotiated, agreed and published on an annual basis, this details the key priorities and work streams of the Noise Management Board for the upcoming year including a defined short, medium and long term work plan. The workplan is publicly available from the NMB website.

SECTION 10 – EHS & ENVIRONMENTAL RISK MANAGEMENT

ENVIRONMENT, HEALTH AND SAFETY

At Gatwick Airport, we believe that exemplary environment, health and safety leadership is critical to successfully deliver a world-class service. Gatwick Airport considers environment, health and safety management a core business value and the strategy to deliver and achieve world class performance will be delivered through our approach: *GatwickSAFE - it's the way we do things around here.* It is paramount to our success and therefore demands our attention daily.

We are committed to delivering exemplary levels of environment, health and safety performance. When excellent examples are identified, we will replicate across our business and communicate them extensively so that everyone can benefit. We take our commitment to avoiding incidents, injuries and illness very seriously, learning from any incident, including near miss events, to continually improve our performance.

Our commitment to the environment and to the health and safety of everyone who visits Gatwick is at the heart of everything we do. Our priority is to build a strong EHS culture. We have an executive board member who oversees and is responsible for ensuring that environment, health and safety is always at the top of our agenda.

ENVIRONMENT, HEALTH AND SAFETY (EHS) POLICY

At Gatwick Airport we are committed to ensuring the health, safety and well-being of our employees, customers and business partners, as well as managing the impact of our business on the environment. We will achieve this by:

- Implementing and maintaining robust EHS management systems which are certified to industry recognised standards including ISO 14001, OHSAS 18001 and ISO 55001;
- Demonstrating strong, visible, felt leadership and behaviours for EHS where there is collective ownership throughout our business;
- Driving continuous improvement in our EHS performance by setting and monitoring clear, measurable objectives and key performance indicators that are visible and meaningful to our employees, achieving the vision of GatwickSAFE and meeting our Decade of Change sustainability targets;
- Protecting the environment including preventing pollution by managing pollution risks and maintaining pollution prevention systems;
- Protecting the health and well-being of our employees through proactive health surveillance and well-being initiatives;
- Incorporating EHS, both risk and opportunity identification, into our lifecycle decision making including the planning, design, construction, operation and decommissioning of our activities, facilities and assets;
- Verifying the effectiveness of our controls and plans through a robust EHS assurance programme;
- Ensuring compliance with all applicable legislation and other requirements as a minimum standard for performance;

- Ensuring our employees have the necessary information, instruction, training, supervision and resources to deliver EHS competence;
- Maintaining effective channels of communication with our employees, business partners and suppliers to ensure they have the right information, at the right time through the right media;
- Celebrating, rewarding and recognising, our successes and learning from our incidents and sharing what we learn with others.

IMPLEMENTATION

The Gatwick Airport Ltd Executive Management Board (EMB) will monitor and regularly review, this policy and supporting management systems at our Managing Corporate Responsibility (MCR) and Environment, Health & Safety and Operational Resilience (EHSOR) forums. Ensuring it remains relevant to the company's EHS risks/opportunities driving continuous performance improvement.

CERTIFICATION

Our performance has been validated by independent certification. In 2010 we obtained the ISO14001 standard for environmental management and in 2012 the OHSAS18001 standard for health and safety, demonstrating that we're managing risks and continuously improving.

ENVIRONMENTAL RISKS

Environmental risks need to be mitigated to ensure compliance with environmental legislation and to minimise environmental impact. Poor environmental performance has the potential to impact Gatwick's reputation, its licence to operate and potential to grow. These risks are mitigated at a number of levels including the implementation of an environmental management system which, as referenced above, is externally audited and certified to the ISO14001 standard. The management system includes the assessment and management of key environmental risks and opportunities including compliance obligations. Gatwick continues to monitor performance against annual improvement targets and undertakes internal audits and training programmes. Gatwick works proactively with stakeholders to ensure that it effectively manages the challenges posed to the environment by the Airport's operation.

The culture at Gatwick Airport is critically important in improving environment, health and safety. This is affected not only by us and those who work with us, but also those who come into contact with the airport. Building a strong EHS culture will not only make our environment, health and safety performance world class, it will enable us to achieve improved performance, and provide a safe, healthy and enjoyable place to work.

MEASURING OUR SUCCESS

We will ensure both our leading and lagging key performance indicators drive the correct actions and behaviours. Our corporate (internal and external) EHS audits will seek to identify inappropriate controls before adverse consequence materialise. Actions taken in response will encourage a proactive culture. In focussing on underlying factors, we will pay particular attention to collating, trending and targeting actions based on incidents and near misses, and, where practicable, utilise safety improvement ideas prior to these incidents occurring.

SECTION 11 - AIRCRAFT NOISE INDUSTRY STAKEHOLDERS

CIVIL AVIATION AUTHORITY (CAA)

The Civil Aviation Authority (CAA) is the statutory corporation which oversees and regulates all aspects of civil aviation in the United Kingdom. It is a public corporation established by Parliament in 1972 as an independent specialist aviation regulator. One of its four environmental goals is to contribute to a cleaner and quieter aviation industry.

DEPARTMENT FOR TRANSPORT (DFT)

The Department for Transport (DfT) is the government department responsible for the English transport network and a limited number of transport matters in Scotland, Wales and Northern Ireland that have not been devolved.

It has put in place a long-term framework aimed at balancing the delivery of social and economic benefits from aviation, with the need to reduce and mitigate the environmental impacts of air transport and airport development.

DEPARTMENT FOR ENVIRONMENT, FOOD AND RURAL AFFAIRS (DEFRA)

The Department for Environment, Food and Rural Affairs (DEFRA) is the UK Government department responsible for safeguarding the natural environment, supporting the UKs world-leading food and farming industry, and sustaining a thriving rural economy. DEFRA's broad remit means it plays a major role in people's day-to-day life, from the food they eat, and the air they breathe, to the water they drink.

NATS

NATS is a UK's provider of air traffic control services, handling 2.4 million flights and 250 million passengers in UK airspace per annum. NATS provides en-route air traffic control services to flights within the UK Flight Information Regions and the Shanwick Oceanic Control Area and provides air traffic control services to fourteen UK airports. NATS is split into two main service provision companies: NATS En-Route PLC (NERL) and NATS Services Ltd (NSL):

- NERL is the sole provider of civilian en-route air traffic control over the UK and is regulated by the CAA who, for example, determine the charges NERL can make. NERL is funded by charging airlines for the provision of air traffic services.
- NSL competes for contracts in the free market to provide air traffic control at airports in the UK and overseas, as well as providing related services including engineering, consultancy, information services and training.

The overarching guiding principle of air traffic control is that safety is paramount.

The airspace about our homes and places of work contain a network of corridors, or airways. They mainly link busy areas of airspace known as terminal control areas, which are normally above major airports like London Gatwick. All of these airways are designated "controlled airspace". Aircraft fly in them under the supervision of air traffic controllers at all times.

AIR NAVIGATION SOLUTIONS (ANS)

Since 1st March 2016 Air Navigation Solutions Ltd has been responsible for the tower air navigation service provision at Gatwick Airport.

The scope of the services to be provided are:

- Aerodrome air traffic control – including, air, ground movement control, delivery and all training;
- Air traffic engineering services – including safeguarding and other support services;
- Emergency and alerting services;
- Meteorological services.

ANS is a wholly owned subsidiary of the Deutsche Flugsicherung (DFS) and has been awarded a 10-year contract for the future provision of Air Traffic Control and Air Traffic Engineering Services at Gatwick Airport.

AIRLINES

Airlines and their flight crew have a duty to operate their aircraft in order to comply with the various rules and regulations stipulated for flying in UK controlled airspace. The commander of an aircraft has the primary responsibility for the safety of the crew and passengers at all times.

CRAWLEY BOROUGH COUNCIL (CBC)

As the airport's local planning authority, CBC ensure that the airport is compliant with all Section 106 planning obligations, some of which relate to aircraft operations.

WEST SUSSEX COUNTY COUNCIL (WSCC)

As the airport's local highway authority, WSCC, with CBC as the lead members of the Local Authority Gatwick Officers Group ensure that the airport is compliant with all Section 106 planning obligations, some of which relate to aircraft operations.

AVIATION ENVIRONMENT FEDERATION (AEF)

The Aviation Environment Federation (AEF) is the principal UK non-governmental organisation campaigning exclusively on the environmental impacts of aviation and promoting a sustainable future for the sector. It formed as a federation in 1975 at a time when the sector was beginning to grow rapidly and noise was becoming an issue around airfields and airports. As aviation is exempt from noise nuisance legislation its members sought action to influence the national policy level. AEF continues to focus on policy change but its work now extends beyond national policies to influencing European and global policy makers. Its work covers issues ranging from local air quality to global climate change, and from local participation in an airport consultative committees to the overall national economic impact of any new runway.

THE INDEPENDENT COMMISSION ON CIVIL AVIATION NOISE (ICCAN) – PROPOSED

This will produce guidance and best practice for making sure the process for taking airspace change decisions is trusted and transparent. To ensure this is happening, there will be a review of ICCAN within two years, to consider whether statutory powers are required.

SECTION 12 - COMMITTEES ATTENDED REGARDING AIRCRAFT NOISE

EXTERNAL COMMITTEES

GATWICK AIRPORT CONSULTATIVE COMMITTEE (GATCOM)

GATCOM is constituted to meet the requirements of Section 35 of the Civil Aviation Act 1982 for an airport "to provide adequate facilities for consultation with respect to any matter concerning the management or administration of the airport which affects the interests of users of the airport, local authorities and any other organisation representing the interests of persons concerned with the locality in which the airport is situated".

GATCOM aims to:

- Foster communication and build understanding between the airport and its users, local authorities and interest groups.
- Consider and comment upon the impacts of the airport's administration, operation and development in relation to:
    - The environment,
    - The passenger experience,
    - Surface access issues associated with the airport,
    - Employment,
    - The local, regional and national economy,
    - The circumstances of local communities and their residents.
- Consider and, if appropriate, respond to any factual or consultative reports, from Governmental or other sources, which are material to the operation or development of the airport.
- Make suggestions to Gatwick Airport Limited where this might further the interests of those represented.

The members of the committee are drawn from three broad groups:

- **Users**: travel and tourism industry, aviation industry including airlines, passengers.
- **Local authorities**: all those whose boundary abuts Gatwick Airport or the M23 spur road.
- **Local interest groups**: groups representing local people affected by the airport's operations including environmental and noise groups, business and economic groups and employees.

THE GATCOM STEERING GROUP

The Steering Group is composed of the Chairman and Vice-Chairman and ten other members of GATCOM reflecting the composition of interests of the main Committee. The role of the Steering Group is to give preliminary consideration to new or detailed matters to be dealt with by GATCOM and to identify the facts and major issues, and to make recommendations to GATCOM. The Steering Group also deals with urgent matters on behalf of GATCOM.

NOISE AND TRACK MONITORING ADVISORY GROUP

The aims of the Noise and Track Monitoring Advisory Group (NATMAG) are:

- To oversee the operation of the Gatwick Airport Limited's Flight Performance Team's system to ensure that the requirements of the local community are taken into account in respect of the production of statistics, information and complaint handling.
- To advise Gatwick Airport Limited on issues relating to noise and track monitoring which derive from the results obtained from the monitoring equipment.
- To assist Gatwick Airport Limited in seeking improvements to the noise climate and track-keeping performance around Gatwick.
- To provide information and recommendations regarding noise and track monitoring to the GATCOM via the GATCOM Steering Group.

GATCOM also has representation on this group.

NOISE MANAGEMENT BOARD

The core role of the Noise Management Board (NMB) is to develop, agree, oversee and maintain a co-ordinated noise management vision and subsequent strategies for Gatwick on behalf of stakeholder organisations. The main aim of this work is to reduce the impact of noise on the local community.

The Noise Management Board is made up of a wide range of industry experts and stakeholders. There are 13 seats on the Board, some of which are shared between a voting member and an alternate member who have one vote and actively attend alternate meetings. The NMB has representation from the airport, Civil Aviation Authority, Department for Transport, air navigation service providers, airlines, County Councils, the Gatwick Airport Consultative Committee and various community noise protest groups.

The Board is chaired by Bo Redeborn and the secretary is Graham Lake; both conducted and wrote the original Gatwick Airport Independent Arrivals Review.

GATWICK NOISE MONITORING GROUP

This is where local environmental health professionals and representatives from the environment departments of local authorities meet with the Airport to discuss the location of mobile noise monitors, the duration they are to be onsite and to review and verify the data.

This group also makes recommendations on the format the data should be reported to NATMAG and the wider community.

FLIGHT OPERATIONS PERFORMANCE AND SAFETY COMMITTEE

The Flight Operations Performance and Safety Committee (FLOPSC) ensures the development of best practice in flight operations by all airlines using Gatwick Airport in order to minimise their effect on the local community.

Matters discussed include departure track keeping, continuous descent operations and noise infringements. FLOPSC meets bi monthly and is attended by the Airport, air traffic control, airlines and a representative of GATCOM.

AIRCRAFT NOISE MANAGEMENT ADVISORY COMMITTEE

The Aircraft Noise Management Advisory Committee (ANMAC) was set up by the Department for Transport (DfT) to advise it on policy relating to aircraft noise at Heathrow, Gatwick and Stansted - these airports being 'designated' for the purposes of s.78 of the Civil Aviation Act 1982.

ANMAC's membership includes representatives from London Gatwick plus representatives from the other designated London airports, NATS, the Environmental Research and Consultancy Department (ERCD) of the Civil Aviation Authority, the Scheduling Committees and a representative of the consultative committee at each of the three airports.

AIRSPACE AND NOISE ENGAGEMENT GROUP

The Airspace and Noise Engagement Group (ANEG) acts as a formal channel of communication between the Department for Transport and airspace and airport noise stakeholders.

The ANEG covers all aspects of national airspace and airport noise policy development. It acts as a sounding board to identify, discuss and, where possible, resolve airspace and airport noise issues that impact on the work of the department. Discussions are at a strategic policy level. The ANEG does not debate or attempt to resolve individual local issues. The ANEG is also an open forum for members to share their own relevant airspace and airport noise projects.

ANEG members include representatives from each of:

- air navigation service providers
- airlines
- airports
- Aviation Environment Federation
- Civil Aviation Authority
- community groups
- express delivery industry
- general aviation
- local authorities
- aerospace manufacturers
- passenger organisations
- Sustainable Aviation
- UK airport consultative committees
- independent noise body (ICAAN when established)

S106 LEGAL AGREEMENT MEETINGS

We work closely with the local authorities close to Gatwick on social, environmental and economic matters. In 2001, Gatwick Airport signed a Section 106 (S106) legal agreement with West Sussex County Council and Crawley Borough Council (following consultation with seven other local authorities in the area). The agreement reflected a shared desire to see the airport grow, with measures in place to minimise as far as possible its short and long term impacts. The S106 was renewed for a further seven years in 2008 and in December 2015 it was extended until the end of 2018.

The agreement defines how Gatwick's operation, growth and environmental impacts will be managed responsibly and ensures that our wider sustainability strategy is aligned with local authority partners. It is considered as a best practice case in the UK by external stakeholders. The agreement underpins the important relationship between the airport owner and the local authorities with responsibility for planning, environmental management and highways.

To ensure delivery of our S106 obligations, and additional commitments that we have made on sustainable development, we maintain a set of ten action plans on topics covered by the S106 agreement and by our Decade of change sustainability strategy. The current action plans cover the period 2015-2018.

Performance against the S106 agreement is reported in the S106 Annual Monitoring Report which covers our actions to fulfil our obligations and commitments; and is also communicated to the Gatwick Airport Consultative Committee (GATCOM).

The airport meets with Crawley Borough Council and West Sussex County Council a number of times per year to discuss progress against the S106 Legal Agreement Obligations and Action Plan Actions and to discuss matters of mutual interest.

INTERNAL GROUPS

EXECUTIVE MANAGEMENT BOARD

This includes the Chief Executive Officer, the Chief Financial Officer and other members of senior management. The Executive Management Board meets monthly and is responsible for the day-to-day management of the Airport. In particular, the Executive Management Board has collective responsibility for assisting the Board of Directors in the performance of their duties for the Group including:

- the development and implementation of strategy, operational plans and budgets;
- the achievement of business plans and targets;
- the assessment and control of risk;
- ensuring compliance with legal and regulatory requirements; and
- the development and implementation of the Group's ethics and business standards and health, safety, security and environmental policies and procedures.

ENVIRONMENT HEALTH AND SAFETY AND OPERATIONAL RESILIENCE COMMITTEE

The Environment Health and Safety and Operational Resilience Committee is responsible for reviewing the Airport's strategy with respect to health and safety, operational resilience and business continuity. The Committee monitors the Group's performance against targets and drives management commitment and accountability with respect to managing risks.

(FUTURE) AIRSPACE & ATS DESIGN INTEGRATION PANEL (AADIP)

The purpose of this committee is to develop and review design and integration of options for future airspace routing/procedures of Gatwick Airport Ltd / NATS Air Traffic Services.

The panel will consider the strategic design and integration/development challenges.

- To guide development in the design and integration of Gatwick Airport Ltd/NATS Air Traffic Services.
- To help prioritise, coordinate and integrate service delivery.
- To consider airspace requirements and develop strategies for its acquisition and use.
- To develop coherent inputs to the Master Plan and Gatwick Airport Ltd.'s growth strategy.
- To input into the strategic engagement with third parties: NATS, CAA, Department for Transport policy and local communities.
- To provide strategic input into the Noise Management Board on options to further reduce the impact of Air Traffic Movements.
- To review proposed changes to Department for Transport policy, CAA regulation and Air Traffic Movements.

DECADE OF CHANGE WORKING GROUP

The purpose of the Decade of Change working Group is to improve transparency and efficient coordination around key Decade of Change deliverables, e.g. Decade of Change and Section 106 Action Plan Actions and reporting, certifications and new initiatives.

Key outcomes from this working group are improved audit results on Decade of Change issues and greater awareness of Decade of Change as a proactive driver in the business.

MANAGING CORPORATE RESPONSIBILITY

The role of the Managing Corporate Responsibility (MCR) Committee is to establish a systematic and aligned management approach to:

- Deliver the Company's strategy with respect to Environment, Health, Safety and Operational Resilience (EHSOR) and Sustainability;
- Monitor the Company's exposure to EHSOR and sustainability risks;
- Monitor the Company's performance against EHSOR and sustainability targets; and
- Encourage management commitment and accountability with respect to Company-wide EHSOR and sustainability initiatives, policies and procedures.

SECTION 13 – SUSTAINABLE AVIATION

Gatwick Airport Ltd is a 'Council' Member of Sustainable Aviation, is a long term strategy which sets out the collective approach of UK aviation to tackling the challenge of ensuring a sustainable future for the aviation industry. Launched in 2005, it is a world first bringing together major UK airlines, airports, manufacturers and air navigation service providers.

The industry is committed to delivering a sustainable future, and Sustainable Aviation is critical to delivering that. The signatories and members are focused on finding collaborative ways of improving environmental performance and creating a balanced debate to ensure sustainable growth of the aviation industry, which is crucial to the health of the UK's island trading economy.

Sustainable Aviation has set a range of goals and commitments covering climate change, local air quality and noise to deliver a sustainable future for the aviation industry. Sustainable Aviation regularly reports on the progress towards these objectives, monitoring and tracking the practical cooperative work being undertaken.

Sustainable Aviation is funded by its signatories who also provide technical expertise. The number of signatories continues to grow, with over 90 per cent of UK airlines, airports and air navigation service providers, as well as all major UK aerospace manufacturers represented.

SUSTAINABLE AVIATION AND AIRCRAFT NOISE

Sustainable Aviation's (SA) goal with respect to aircraft noise is to 'Limit and, where possible, reduce the impact of aircraft noise'. The Sustainable Aviation Noise Road-Map is published in support of this goal.

The Road-Map is structured as a toolkit for individual areas of the UK aviation industry to assess and implement measures to reduce noise from aircraft operations. It also helps inform stakeholders, including those making future strategic decisions in which aircraft noise is an issue.

The document sets out SA's projection of aircraft noise impacts from UK aviation. This projection is based on the UK Government forecasts of aviation demand-growth published in 2013. Together with SA's own assumptions concerning the deployment of technology, operational measures, land use planning, communication, community engagement activities and, where necessary, the use of operating restrictions.

One of the most significant challenges in producing this Road-Map is the subjective nature of noise. As history and experience of seeking to manage aircraft noise issues have shown, people's reactions and perception of aircraft noise is a complex problem. Based purely on 57 Leq noise contour data, the reduction in aircraft noise achieved by the industry over the last half century has resulted in fewer people being significantly affected by noise. However based on regular stakeholder feedback received by the industry and reinforced in the UK Aviation Policy Framework, it is apparent that noise from aircraft operations remains a real source of tension between airports and local communities. Many local communities believe that current noise metrics, including the use of average noise contours, do not fully reflect their experience of aircraft noise.

SA believes that the number of people adversely affected by aircraft noise is influenced by a number of complex variables which combine to generate the total result as illustrated in Figure 4 overleaf.

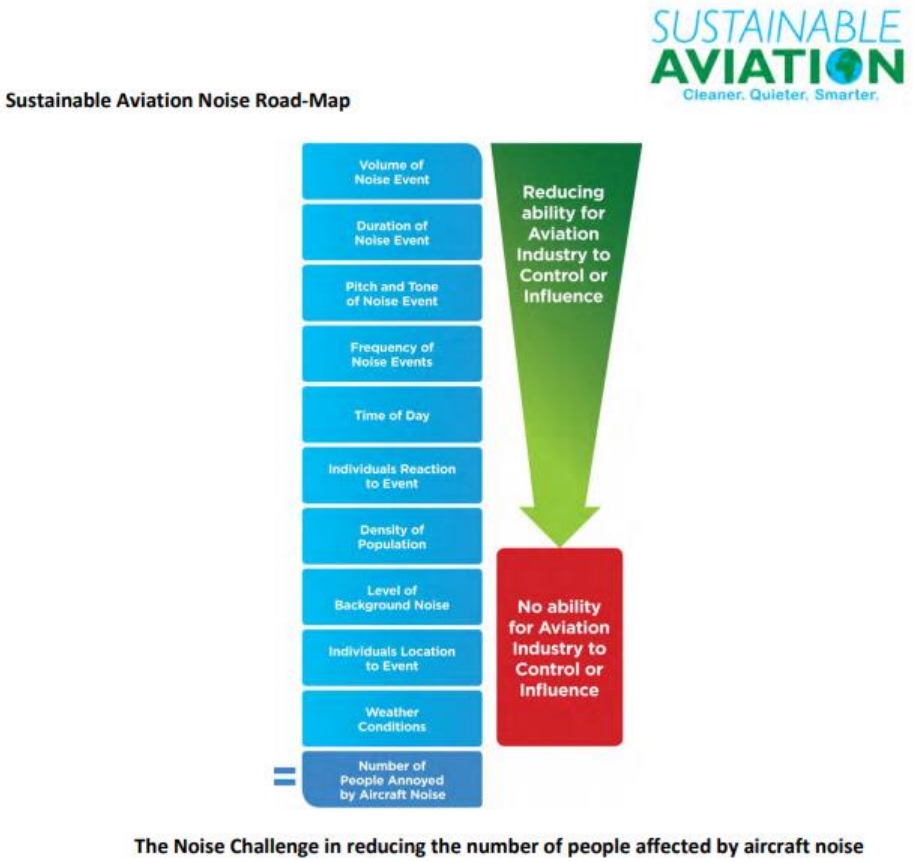

Figure 4: The challenges in reducing the number of people affected by aircraft noise from the SA Noise Road-Map

Three key conclusions arise from this diagram:

1. The number of people impacted by each variable is not consistent, for instance a loud aircraft event on a windy morning generally results in fewer people annoyed than the same aircraft event on a still, foggy morning.
2. While the aviation industry can take direct control of some of the variables, it has only indirect influence over others and no control at all over the remainder.
3. Research is required to understand in more detail the specific weighting and interrelationships each of the variables has on the final result.

In addition to these complexities, the nature of the noise problem can often change over time, even as a result of attempts to reduce its impact. For example, noise from departing aircraft was at one time the key area of concern among local communities. Technology solutions were developed to reduce departure noise, only for this to make arrival noise much more noticeable. Similarly, reducing the source noise of aircraft engines created a new focus on airframe noise, as that source then became dominant.

These unintended consequences of initiatives to reduce noise impact are common. There can be other unintended outcomes; reducing engine source noise often makes the engine heavier and therefore leads to additional fuel burn and emissions. Whilst a drive to concentrate noise impact on as few people as possible will obviously be better for those who escape it, but worse for the smaller communities that experience all of the noise.

This dynamic nature of noise problems, together with the risk of trade-offs and unintended consequences is at the forefront of the industry's mind in developing technologies and initiatives to limit and reduce noise impacts.

It makes the job of measuring, managing and reducing the number of people adversely affected by noise from aircraft very challenging. Unlike SA's Carbon Road-Map which used carbon dioxide emissions (CO_2), which are both easily measurable and with definable outcomes, measuring noise is more complex because of the multiplicity of noise metrics and human responses.

This Noise Road-Map therefore seeks to define future scenarios where best practice approaches can be used to limit and, where possible, reduce the number of people exposed to aircraft noise. To that end, the SA Noise Road-Map has been designed to identify and advocate best practice approaches to factors such as improved land use planning controls and community engagement as well as technology and operational advancements.

SA concludes that UK aviation is able to accommodate significant growth in air transport movements to 2050 and at the same time achieve a potential reduction to UK aviation's total noise output compared to 2010. The diagram below shows how the introduction of imminent and future aircraft and engine technology offers the potential to reduce UK aviation noise output by 2050 compared to 2010. Without this technology, given the forecast growth in demand for air transport, UK aviation's noise output would almost double.

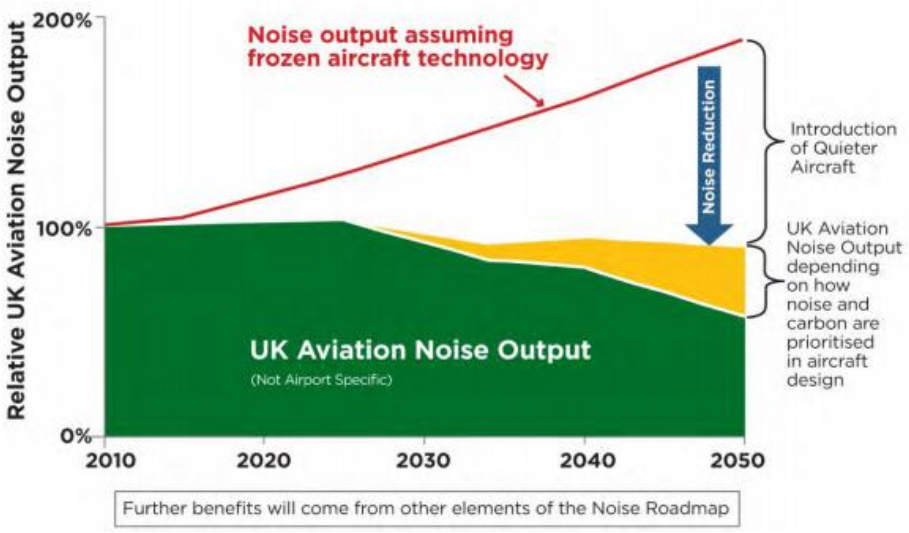

Figure 5: Sustainable Aviation (SA) Noise Road-Map

The graph shows an aggregated UK picture of noise output and how this is predicted to change between 2010 and 2050. The graph is not airport specific and cannot be read as the projection of noise output for any particular airport. This will depend on the aircraft types and rates of penetration of newer aircraft at individual airports.

Further improvements can be achieved through the wider implementation of operational improvements in the use of airspace and flying techniques and through better land use planning in the immediate vicinity of airports.

Developing the tools discussed in this Road-Map will require collaboration and co-ordination of efforts across the UK aviation industry, local and national Government along with national and local community groups. Responding to this, the SA signatory companies make the following commitments:

- SA members will use this Road-Map to develop best practice noise management strategies for the future.
- The Aerospace sector will continue to invest in aircraft technology research programmes.
- The Aerospace sector will work to achieve the visionary noise goals of Flightpath 2050 and CLEEN5.
- The industry will increase the use of existing operational techniques that reduce noise where safe and feasible.
- The industry will collaborate to explore and develop new operational techniques that reduce noise where safe and feasible.
- The industry will actively contribute to improving aircraft noise guidance in local planning policy.
- Airports will review masterplans to ensure they are consistent with Noise Action Plans.
- Airports will work with Government, local authorities and local communities to achieve identified land use planning improvements.
- The industry will promote open and transparent engagement with communities affected by noise, to better understand their concerns and priorities and to establish trust in the engagement process.
- The industry will ensure that any changes to noise impacts or noise mitigation efforts are clearly communicated through agreed channels in a timely and non-technical manner.
- The industry will present the best practice engagement mechanisms from the Road-Map to local stakeholders through channels such as consultative committees to help airport operators better evaluate their engagement techniques.
- The industry will work with Government and other stakeholders to identify and resolve research gaps in:
    - how the variables in the 'Noise Challenge' diagram are weighted and consult on whether a more accurate model can be developed to predict the number of people annoyed by aircraft noise under various 'what if' scenarios,
    - understanding of individual reactions to aircraft noise,
    - noise acceptability vs. noise annoyance and
    - a basis for better noise metrics.

SA requests the UK Government to:

- Support research and development in aerospace technology ensuring the right incentives are in place to enable uptake by the industry.
- Work with the aviation industry to clarify relative environmental impacts between reducing noise and CO2 emissions to enable future aeronautical design priorities.
- Strengthen and support local authorities' ability to enforce land use planning controls around airports.
- Implement improved airspace structures and operational procedures through the CAA.
- Work with the industry to support independent research to improve our understanding of the noise challenge and how people react to aircraft noise events.
- Work with the industry, local authorities and communities to optimise noise communication, monitoring and reporting processes.
- Ensure that operating restrictions are employed only as a last resort after full consideration has been given to the other dimensions of the ICAO Balanced Approach, namely reduction of noise at source, land use planning and management and noise abatement operational procedures.

SECTION 14 – THE NEED FOR AIRSPACE MODERNISATION

Airports rely on the effectiveness of the airspace that surrounds them to permit efficient operating procedures, and to minimise the environmental impact of operations. Our airspace safely handles over two million flights every year but it has remained little changed in over 50 years and is now in urgent need of modernisation. The airspace above the south-east of England was designed around procedures and infrastructure designed in the 1960's and is rapidly approaching the limit of its capacity. Not only does it contain choke points, but the use of legacy solutions, such as holding 'stacks' and movement limits, compound delays, increases operating costs and intensifies environmental impacts.

Designed over 50 years ago, for an industry vastly different in scale to the one we have today, it was never envisaged that our airspace would eventually handle more than two million aircraft and carry 250 million passengers, as it did in 2015. Many, including the Department for Transport, forecast that passenger demand will grow by a further 30% before 2030, with 3.1 million aircraft carrying 350 million passengers necessitating an additional 1 million aircraft movements per year. The boosts to trade and tourism from this growth are substantial, but if no action is taken it is expected that the current, ineffective design will lead to more than 1 in 3 flights being delayed by at least 30 minutes. It is widely recognised in government and across the aviation industry that urgent action is needed. We need to modernise our invisible infrastructure without further delay.

That means moving from traditional ground-based beacons to modern satellite navigation, the capability for which already exists on many modern aircraft. The UK is at the forefront of aerospace technological development, and since 2005 UK airlines alone have introduced over 470 new aircraft into service, representing an investment of over $49 billion. We now need to modernise our airspace to match. It will improve safety and increase efficiency and capacity whilst minimising the impact on the global environment and benefitting communities under flightpaths.

Through better operating procedures, that can be utilised with a modern airspace structure, there is a potential carbon saving to UK aviation by 2050 of between 9% and 14% and alongside the introduction of quieter aircraft 'the potential to reduce UK aviation noise output by 2050 compared to 2010' according to Sustainable Aviation. Aircraft can fly more directly and routes can be designed to avoid noise sensitive areas or provide a more equitable spread of noise as aircraft are not constrained by ground-based aids.

In essence, aircraft would be able to fly quieter and more efficient routes by greater utilising Continuous Descent and Climb operations which reduce noise and CO_2 emissions. New technology will also reduce the need for conventional orbital holding. It will also benefit the UK economy. Airspace modernisation across Europe will deliver over £29bn to UK GDP and 116,000 jobs by 2035 (IATA, 2016), as well as improving productivity. Without it, delays faced by passengers are likely to soar to 4 million minutes by 2030, up from 90,000 minutes in 2015 (NATS, 2015).

There will also be benefits to business and leisure fliers. Simpler airspace structures and boundaries will improve safety; and implementing continuous climb and descent operations for commercial air traffic has the potential to release some lower levels of controlled airspace.

FUTURE AIRSPACE MODERNISATION AT GATWICK AIRPORT

In July 2017 the Department for Transport directed NATS to re-energise the work on the Future Airspace Strategy for the southern half of the UK. This will include a fundamental redesign of the en-route airspace and the London Terminal Management Area (LTMA) along with refreshed airport specific procedures, by 2024. The Industry does not underestimate the size and complexity of this challenge. This programme will require the integration of NATS-led changes with parallel airport-led airspace changes and will constitute the single biggest airspace change in the UK. Gatwick Airport embraces the opportunity this programme presents and is helping to shape the programme's design and identify how risks can be shared and mitigated.

Gatwick Airport envisages the new airspace design will utilise Performance Based Navigation (PBN) solutions. PBN will not only allow improved avoidance of noise sensitive areas around airports on departure, but also enable more predictable routing options for arriving aircraft. Additionally, it is anticipated that the use of new technology will allow for more accurate management of arriving flights and so improve the efficiency of the runway operation.

Other design concepts that are expected to be adopted will permit aircraft to climb more steeply and more consistently to their cruising altitudes. This should create smaller noise footprints and decrease the noise levels experienced by some communities. Similarly, arriving flights will be able to make more direct, and continuous descents, saving distance, reducing emissions and reducing their noise and visual impact.

Gatwick Airport considers airspace redesign to be of the highest importance and as a result is actively investing time and resources to assist with the process and seek solutions that will deliver operational and environmental improvements. The airspace redesign will require the airport to update its departure and arrival procedures so that these link seamlessly with the upper airspace network in a considerate and environmentally sensitive manner.

The redesign of the wider airspace will be led by NATS and airspace operators; this will necessitate public consultation on the process and it is envisaged that this will happen during the latter part of 2018. Once there is sufficient clarity on the emerging airspace designs, Gatwick Airport can carry out its own public consultation with the local communities, on the options for connecting Gatwick's approach and departure routes to the updated airspace concept/s. This will provide the opportunity to address local concerns and seek to identify the optimum operational and environmental solutions.

INTERACTION WITH THE NOISE MANAGEMENT BOARD

Gatwick Airport also expects that the airspace change will allow the airport to deliver aspects of the Noise Management Board Action Plan that have the potential do deliver a meaningful improvement in the noise environment. The intent is to engage all parties at the earliest opportunity, explain how change will be managed under the new airspace change process, and to work with the communities to align on what must, should and could be changed.

While this process will place a major burden on the resources of all stakeholders, the airport sees this as a unique opportunity to modernise a key piece of national infrastructure. If successful there will be more efficient flight operations, with less fuel burn and less delays, along with meaningful noise benefits for local communities. The process will follow the new airspace change process being introduced by the Civil Aviation Authority which requires increased transparency and community engagement. The Noise Management Board will play an important role in the successful completion of this process.

SECTION 15 – DETAILS OF CURRENT NOISE ASSISTANCE SCHEMES

NOISE INSULATION SCHEME

The current Noise insulation Scheme was launched in 2014. This scheme was expanded significantly from the previous version covering 1,000 more properties in areas across Surrey, West Sussex and Kent.

The major changes to the scheme are two-fold. First the noise boundary for the scheme has increased by using a lower level of noise from 66 L_{eq} to 60 L_{eq} as a baseline with the boundary line drawn flexibly to ensure entire roads and communities are included. Secondly, the noise contour boundary has been drawn along the flight paths by 15km to both the east and west of the airport.

Gatwick Airport Ltd offered all local households eligible for the previous scheme the opportunity to comment and feedback on it before designing the new scheme, as well as local authorities and the Gatwick Airport Consultative Committee (GATCOM).

All eligible households were notified in writing of their eligibility and can receive up to £3,000 plus VAT towards acoustic insulation.

The Noise Insulation Scheme boundary can be viewed in Annex 7.

HOME OWNER SUPPORT SCHEME

Where land and property values are affected by new infrastructure, such as an airport development, property owners are not usually able to apply for compensation until a year after the new runway comes into use, when owners can seek compensation for the loss in the value of their property under the land Compensation Act 1973.

In the event that a second Gatwick runway goes ahead, it is likely to be many years before any runway would be open. In the meantime, there is no legal obligation to provide any support, although property values could be affected in the years before the development opens.

In these intervening years, it is recognised that an assurance of this later statutory compensation is not always enough to keep a property marketable. To allow for this, certain owner-occupiers have an entitlement in law to serve a Blight Notice, allowing them to require the promoter to purchase their property. These provisions only apply in tightly defined circumstances, and are set out in Schedule 13 of the Town and Country Planning Act 1990.

In order to support the local property market in the years before eligible property owners can receive any statutory support, we have developed a voluntary scheme. At the heart of the scheme is a fully transferable Home Owner Support Scheme (HOSS) Option Agreement. This will allow eligible property owners to require Gatwick to purchase their property for its unblighted market value (as if no runway development had been proposed) if and when Gatwick announces the intention to proceed with construction (having received planning permission).

The Home Owner Support Scheme aims to do four things to support the owners of properties which, if the development went ahead, would be newly exposed to medium-to-high levels of noise (66 decibels L_{eq}):

First, to make sure that affected properties can be bought and sold at normal market rates in the years before any development takes place. This is to counter any negative impact on property prices caused by the Government's proposals for possible runway development.

There are then two schemes for those people who want to move before they can require Gatwick to buy their property:

Once Gatwick announces its intention to apply for planning permission for a new runway, the scheme will allow property owners who wish to move, and have been unable to sell the property for a price within 15% of the prevailing market value, to sell their property to Gatwick at an unblighted price. We are calling this **Early Movers' Home Purchase**.

Once Gatwick announces its intention to apply for planning permission for a new runway, the scheme will provide property owners who wish to move and who are able to sell their properties for a price within 15% of the index-linked option price, with a contribution to sale costs of up to 5% of their property's sale price to property owners. We are calling this **Early Movers' Contribution to Sale Costs**.

Finally, if we receive planning permission for a new runway and once we announce our intention to begin construction, the scheme will enable property owners to sell their property to Gatwick at an unblighted price, without any loss of value threshold.

Our voluntary scheme means that people **will not have to wait until any new development has opened for any support or assistance** against blight, as they would usually have to if Gatwick only fulfilled its legal obligations.

The scheme applies to the area where properties will be newly exposed to medium-to-high levels of noise, resulting from a new runway at Gatwick. The area covered by the 66-decibel L_{eq} noise contour for a second runway has been forecast by the Civil Aviation Authority's Environmental Research and Consultancy Department. The scheme will only apply to properties which would fall within a 66-decibel L_{eq} noise contour for a new runway and are not currently within a 66-decibel L_{eq} noise contour for the existing airport.

A map of the area is enclosed in Annex 7. The area is defined by where a new runway would be sited.

We recognise that when we finalise the details of the new runway, the 66-decibel L_{eq} contour could change. If this happens we will extend the scheme to include any properties which fall inside the revised contour. We will also honour inclusion in the scheme for any properties that were inside but then fall outside the boundary.

PROPERTY MARKET SUPPORT BOND

Where land and properties need to be bought by a public body, statutory undertaker or infrastructure provider (such as Gatwick), the law allows that organisation to apply for a Compulsory Purchase Order, normally during the planning application process or after planning approval has been given.

Under a Compulsory Purchase Order, the land and property have to be bought by the developer at a fair, unblighted market price (i.e. as if no development had been proposed and no reduction in value had occurred). Eligible property owners are therefore guaranteed compensation under law for less of their property. However, this compensation is only paid once the developer has bought the property.

In the event that a second Gatwick runway goes ahead, it is likely to be many years before planning approval is granted and properties will have to be bought. In the meantime, there is no legal obligation to provide any support, although property values could be affected in the years before Compulsory Purchase Orders are granted.

In order to support the local property market in the years before eligible property owners could receive any statutory support, we have developed a voluntary scheme, which aims to do two things:

First, to make sure that properties in the area where land would be needed for any new runway development can be bought and sold at normal market rates in the years before any development takes place. This is to counter any negative impact on property prices caused by the Government's proposals for possible runway development.

Second, to enable people who take part in the scheme to sell their property to Gatwick, if Gatwick announces its intention to apply for planning permission for a second runway. We stand by our legal agreement that precludes runway construction before August 2019 and it consequently seems unlikely that such an announcement would need to occur much before 2012, and might be some years later than that.

Our voluntary scheme means that people won't have to wait until planning permission is granted for any support or compensation against blight, as they would generally have to if Gatwick only fulfilled its legal obligations. The scheme applies to the area where land would be required by Gatwick for a new runway development. We indicate this area in the map in Annex 7.

SECTION 16 - EVALUATING THE NOISE ACTION PLAN

We use a set of performance indicators to monitor and assess the effectiveness of our plan. Our performance against these indicators is regularly reviewed internally through our environmental governance structure and reported quarterly to the Noise and Track Monitoring Advisory Group (NaTMAG). An annual performance report is also presented to the Gatwick Airport Consultative Committee (GATCOM).

Set out below is a series of key performance indicators which we publish annually through our S.106 Annual Monitoring Report and Flight Performance Team reports. Certain KPIs are also published within the Decade of Change Annual Report and is subject to independent audit. We have included historical figures for the 'Round One' noise mapping for 2006 together with 'Round Two' for 2011 and the most recent 'Round Three' in order to set a baseline for this Noise Action Plan and to monitor progress.

Figure 6: Key Performance indicators to evaluate the Noise Action Plan

Key Performance Indicator	Round 1 2006	Round 2 2011	Round 3 2016
Percentage of Chapter 4 (or equivalent) aircraft	3%	96%	99%
Percentage of Chapter 14 aircraft[5]	-	-	-
Area inside the 55dBA L_{den} contour (km^2)	94.5km^2	85.6km^2	104.9km^2
Area inside the 48dBA L_{night} night-time (winter & summer seasons combined) contour (km^2)	41.3km^2 *2003 figure	34.1km^2	73.2km^2
Area inside the 57dB $L_{Aeq\ 16\ hour}$ daytime summer contour (km^2)	46.7km^2	40.4km^2	44.2km^2
Average quota count of aircraft operating during the night quota period (2330-0600)	0.82 Winter 2005/6 0.71 Summer 2006	0.65 Winter 2011/12 0.53 Summer 2011	0.59 Winter 2016/17 0.44 Summer 2016
Number of infringements of the daytime departure noise limit Number of infringements of the shoulder and night period	9 2	0 4	0 1
Percentage of aircraft achieving a CDO (24 hour period)	81.0%	90.5%	88.6%
Percentage of aircraft achieving a CDO Day / Shoulder period	79.9%	90.2%	88.2%
Percentage of aircraft achieving a CDO during the core night period	89.6%	94%	93%
Percentage of departing aircraft on-track (all routes)	98.2%	97.4%	98.6%
1,000ft Infringements (No.)	11	3	0
1,000ft Infringements (No. below 900ft)	6	1	0
Number of individual callers making noise related enquiries	587	343	2,324
Total noise complaints received	4,791	2,673	17,715
Percentage of noise related enquiries responded to within eight working days	94.5%	98.4%	46.6%

[5] In 2017, 39% of aircraft movements at Gatwick were billed at the Chapter 14 noise standard. Of these, 63% were in the quietest noise categories, Chapter 14 Base and Chapter 14 Minus

Figure 7: Airport Traffic Statistics

Traffic Statistics	2006	2011	2016
Total aircraft movements	262,832	251,068	280,089
West / east runway split	68/32	67/33	67/33
Total passengers	34,384,000	33,660,146	43,136,800
Night quota movements summer	7,749.5	9,859	11,303
Night quota movements winter	1,355.25	1,411	2,022

As a way of measuring the success of the revised noise action plan we have identified a number of expected outcomes. These are also set out below:

- No operations in 2024 by Chapter 3 aircraft.
- At least 80% of aircraft movements by Chapter 14 or equivalent aircraft by 2024.
- Performance against the noise abatement procedures in the UK Aeronautical Information Publication (AIP) will consistently be maintained and where practicable improved against a 2016 baseline.
- No daytime infringements against 94dB (A) daytime departure noise limit.
- 24 hour CDO achievement of no less than 90%.
- Track Keeping of no less than 98%.
- The 48dB (A) 6.5 hour night contour (winter and summer combined) will be within 47km^2.

The Flight Performance Team, along with other relevant Gatwick Teams track performance against these outcomes and report on progress within the quarterly and annual reports. Additional information is provided in Section 18.

SECTION 17 – RESULTS OF THE 2016 NOISE MAPPING

Gatwick Airport has, for many years, had an extensive noise management system in place and has annually produced summer L_{Aeq} 16 hour day contours. Therefore, the results of the 2017 noise mapping of 2016 do not raise any significant new issues. Traditionally our approach to noise management has contained actions aimed at addressing areas outside of these contours and, additionally, ground noise. As stated above, the actions contained within this revised plan will continue to adopt this approach.

The location of Gatwick Airport and the alignment of the main and standby runways mean that aircraft arrive and depart mostly over lightly populated rural areas. The alignment of the main runway means that residents of areas such as Lingfield to the east of the airport and Okewood Hill to the west are impacted by the airport's operation. Gatwick Airport has witnessed steady growth over recent decades, handling approximately 275,633 runway movements in 2016 compared to 220,000 in 1996.

The prevalence of westerly winds means that approximately 70% of aircraft arrivals come from the east and around 70% of departures are to the west however this figure does fluctuate.

There are four departure routes (noise preferential routes - NPRs) to the east of Gatwick and five to the west. The L_{den} maps indicate the impact of these NPRs particularly to the west where the departure routes form a spur in the 55dB L_{den} contour over Capel and the surrounding area.

For aircraft arriving at Gatwick the contour is influenced by arrivals from the east where the 55dB Lden contour extends over Lingfield, Marsh Green and Hever. The impact of departures is less marked on the L_{night} contour map reflecting that the night period typically consists of scheduled arrivals.

Detailed below, overleaf and in Annex 3, are the results of the 2016 noise mapping, showing the estimated number of people and dwellings exposed above various noise levels. This data has been sourced directly from the data pack provided to us by DEFRA. We have included data from L_{day}, $L_{evening}$, L_{night}, L_{den} and L_{eq} noise contours. We considered these results and our current noise mitigation measures in revising this noise action plan.

The number of dwellings has been rounded to the nearest 50, except when the number of dwellings is greater than zero but less than 50, in which case the total has been shown as '<50'.

The associated population has been rounded to the nearest 100, except when the associated population is greater than zero but less than 100, in which case the total has been shown as '<100'.

Figure 8: Estimated Total Number of People and Dwellings above Various Noise Levels, L_{den}

Noise Level (Db)	Number Of Dwellings	Number Of People
≥ 55	5,450	13,500
≥ 60	950	2,300
≥ 65	250	600
≥ 70	<50	<100
≥ 75	0	0

Figure 9: Estimated Total Number of People and Dwellings above Various Noise Levels, L_{day}

Noise Level (Db)	Number Of Dwellings	Number Of People
≥ 54	4,000	9,800
≥ 57	1,350	3,200
≥ 60	550	1,400
≥ 63	250	600
≥ 66	50	200
≥ 69	<50	<100

Figure 10: Estimated Total Number of People and Dwellings above Various Noise Levels, $L_{evening}$

Noise Level (Db)	Number Of Dwellings	Number Of People
≥ 54	3,300	8,000
≥ 57	900	2,100
≥ 60	450	1,000
≥ 63	150	400
≥ 66	<50	100
≥ 69	0	0

Figure 11: Estimated Total Number of People and Dwellings above Noise Levels, $L_{aeq, 16H}$

Noise Level (Db)	Number Of Dwellings	Number Of People
≥ 54	3,850	9,400
≥ 57	1,200	2,900
≥ 60	550	1,300
≥ 63	200	600
≥ 66	50	200
≥ 69	<50	<100

Figure 12: Estimated Total Number of People and Dwellings above Various Noise Levels, L_{night}

Noise Level (Db)	Number Of Dwellings	Number Of People
≥ 48	3,650	9,000
≥ 51	1,150	2,800
≥ 54	500	1,100
≥ 57	200	500
≥ 60	50	200
≥ 63	<50	<100
≥ 66	0	0

METHODOLOGY FOR CALCULATION OF POPULATION AND DWELLING EXPOSURE STATISTICS

In order to derive the statistics presented in this section, analysis has been undertaken to count the population and number of dwellings within the specified noise contours. This assessment was carried out utilising a strategic residential population location dataset. The following paragraphs summarise the method used in constructing this dataset.

Residential dwellings and buildings containing residential dwellings were identified through the 2015 (OS) AddressBase Premium and Topography layer respectively. An average population per residential dwelling was calculated for each discrete dwelling utilising population data attained from the mid-year population estimates from the Office of National Statistics (ONS), June 2015.

The total number of residential dwellings and the total associated population were calculated for each residential building polygon, taking into account building polygons with multiple dwellings. Examples of building polygons containing multiple dwellings located within a single polygon include tower blocks and apartments.

The previous noise mapping from 2011 and 2006 is provided within Annex 10 for the purposes of allowing comparisons to be made.

SECTION 18 – OUR NOISE ACTION PLAN

Over the following pages are the individual actions that make up this Noise Action Plan.

Figure 13: Our Noise Action Plan actions, impact areas, benefits, performance indicators, reporting and targets

Quiet Fleet							
ACTION	IMPACT AREA	NOS AFFECTED[6]	EXPECTED BENEFIT AND COST	PERFORMANCE INDICATOR, AND REPORTING	EXTERNAL SUPPORT REQUIREMENT	TIMESCALE	TARGET
1. We will maintain a charging differential in our published airport charges which incentivises the use of aircraft with the best in class noise performance.	Arrivals, Departures and Ground	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Increased use of the quietest and cleanest Chapter 14 certified aircraft at Gatwick. These aircraft are 7 EPNdB quieter than Chapter 4 and 10 EPNdB than Chapter 3. **Cost:** Airline fleet replacement.	**Indicator:** Fleet mix including % of Chapters 4 and 14 Aircraft. **Reported:** Quarterly to NaTMAG.	Use of established airline engagement forums and channels.	On-going	By 2024, 90% of movements are by Chapter 14 aircraft.
2. We will continue to apply and report upon charging penalties to those aircraft operators of Airbus A320 family aircraft that have not had the Fuel Over Pressure Protector (FOPP) modification retrofitted.	Arrivals, Departures and Ground	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Use of FOPP modified A320 family aircraft, a modification which can deliver arrivals noise reductions of up to 9dB. **Cost:** Airline fleet modification.	**Indicator:** Percentage of A320 fleet retrofitted or delivered with modification in place. **Reported:** Quarterly to NaTMAG.	Use of established airline engagement forums and channels.	On-going	By 2020, 99% of all A320 family flights are by FOPP modified aircraft.
2a. If additional aircraft or manufacture specific noise defects which can be rectified by a modification are identified (similar to the FOPP) we will seek to identify, consult and implement corresponding charging penalties.	Arrivals, Departures and Ground	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Identification and rectification of potential fleet/aircraft specific noise issues. **Cost:** Airline fleet modification.	**Indicator:** To be decided based upon any potential issues identified. **Reported:** Quarterly to NaTMAG.	Use of established airline engagement forums and channels.	On-going	To be decided based upon any potential issues identified.

[6] The number of people affected by each action has been based upon an estimate of the area of impact correlated to the strategic noise mapping provided by DEFRA. In cases where the impact contour estimate does not correlate with the specific contours in the DEFRA mapping, the next contour down has been used to maintain a conservative approach.

Quiet Fleet							
	ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
3	We will review the landing fee differential at least every five years.	Arrivals, Departures and Ground	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** As above for Action 1. **Cost:** As above for Action 1.	**Indicator:** Review of the landing fees. **Reported:** Online publication of the Conditions of Use.	Use of established airline engagement forums and channels.	5 yearly	Publication of revised conditions of use.
4.	Gatwick Airport Ltd will consult with its airline partners annually regarding the Airport Charges Structure. The Noise Management Board will also be asked for its feedback.	Strategic Approach	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** As above for Action 1. **Cost:** As above for Action 1.	**Indicator:** Review of the airport charges structure. **Reported:** Online publication of the Conditions of Use.	Use of established airline engagement forums and channels.	Annually	Annual publication of revised conditions of use.
5.	In conjunction with our airline partners we will seek to re-introduce, by the end of this Noise action Plan period a programme that will rank our airline partners in relation to their overall performance for a range of noise and any other appropriate topic potentially including, but not limited to metrics such as compliance with abatement techniques, fleet age, engine fit and passenger loads per km.	Arrivals, Departures and Ground	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Continual operational improvement in noise and emissions by providing a public facing league table whilst also providing clear and transparent information to stakeholders. **Cost:** Development and ongoing management of the league table along with airline engagement to drive improvements.	**Indicator:** Introduction and publication of the Gatwick airline league. **Reported:** Progress prior to implementation will be reported to the NMB. Once prepared the table will be reported regularly.	Use of established airline engagement forums and channels.	2019	Implement, publish and regularly update the league table.

Night Time Operations							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
6. We will continue to administer the Department for Transport night flight regime and ensure that we operate at night within the prescribed ATM and QC limits.	Night flights	Communities within and beyond 48dB Lnight (in excess of 9,000)	**Benefit:** Incentivise the use of the quietest aircraft in the night period through the application of the DfT's night flight regime with reduced QC limits and a new QC category. **Cost:** Implementation of the revisions and ongoing management of the regime.	**Indicator:** Application of and management of the revised DfT night flight regime. **Reported:** Regularly to the DfT and quarterly to NaTMAG.	Program managed by GAL with oversight provided by DfT using established process.	On-going	Controlled management of night flights in accordance with the DfT program.
7. We will report on a quarterly basis to the Noise and Track Monitoring Advisory Group the number of flights delayed from planned daytime arrival into night movements (after 23:30 local).	Night flights	Communities within and beyond 48dB Lnight (in excess of 9,000)	**Benefit:** Increased awareness of delayed arrivals allowing for proactive action to be taken within Action 8. **Cost:** Management, data analysis and reporting on the regime.	**Indicator:** Off-schedule performance statistics for aircraft affected. **Reported:** Quarterly to NaTMAG.	Engagement and participation with NaTMAG, an established group.	Quarterly / Annually	Report off-schedule flights which are delayed into the night period.
8. We will, as far as is practicable, take all necessary steps to manage the late running of aircraft to prevent scheduled day movements taking place during the sensitive night period.	Night flights	Communities within and beyond 48dB Lnight (in excess of 9,000)	**Benefit:** Reduction in the number of late running aircraft, planned for the daytime, operating in the sensitive night period. **Cost:** Management, data analysis and reporting on the regime. Actions taken could result in the potential cancellation of flights.	**Indicator:** The number of off-schedule flights which are delayed into the night period. **Reported:** Airside operations and airlines.	Use of established airline engagement forums and channels.	On-going	Minimise as far as possible, the number of off-schedule flights which are delayed into the night period.
9. We will implement a voluntary ban on operations of Quota Count 4 aircraft within the core night period by the end of 2022.	Night flights	Communities within and beyond 48dB Lnight (in excess of 9,000)	**Benefit:** Incentivise the use of the quietest and cleanest aircraft in the night period. **Cost:** Airline fleet replacement.	**Indicator**: Number of QC/4 aircraft operating in the night period. **Reported:** Quarterly to NaTMAG.	Use of established airline engagement forums and channels.	2022	Implement a voluntary ban by 2022.

Ground Noise Control							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
10. We will continue to monitor adherence to and review the effectiveness of our ground noise operational controls.	Ground	Communities within and beyond 65dB Lden (in excess of 600)	**Benefit:** Continual reduction in ground noise and emissions from engine testing and APU running in accordance with our S106 agreement. **Cost:** Management, data analysis and reporting on the operational controls.	**Indicator**: Publication of Gatwick Airport directives pertaining to Auxiliary power unit usage and audit findings reports. **Reported:** Quarterly to NaTMAG.	Engagement and participation with NaTMAG, along with an airline/ground handler education program on ground noise controls.	On-going	Maintain effective ground noise operational controls.
11. We will report on a quarterly and annual basis the following: • Fixed Electrical Ground Power availability. • The amount of Ground Power Unit dispensations granted. • The number of audit checks of aircraft auxiliary power unit running. • The number of non-compliances of aircraft auxiliary power unit runs identified. • The number of aircraft engine runs undertaken.	Ground	Communities within and beyond 65dB Lden (in excess of 600)	**Benefit:** Continual reduction in ground noise and emissions. **Cost:** Management, data analysis and reporting on the operational controls.	**Indicator**: Quarterly Ground noise monitoring reports. **Reported:** Quarterly to NaTMAG and annually in the Section 106 Annual Monitoring Report.	Engagement and participation with NaTMAG, an established group along with an airline/ground handler education program on ground noise controls.	On-going	Maintain effective ground noise operational controls.
12. We will continue to minimise aircraft auxiliary power unit use in order to reduce ground noise and local air quality emissions via Gatwick Airport Directives and monitoring of compliance.	Ground	Communities within and beyond 65dB Lden (in excess of 600)	**Benefit:** Continual reduction in ground noise and emissions. **Cost:** Management, data analysis and reporting on the operational controls.	**Indicator**: Quarterly Ground noise monitoring reports. **Reported:** Quarterly to NaTMAG and annually in the Section 106 Annual Monitoring Report.	Engagement and participation with NaTMAG, along with an airline/ground handler education program on ground noise controls.	On-going	Maintain effective ground noise operational controls.

Arriving Aircraft							
ACTION	IMPACT AREA	NOS AFFECTED[6]	EXPECTED BENEFIT AND COST	PERFORMANCE INDICATOR, AND REPORTING	EXTERNAL SUPPORT REQUIREMENT	TIMESCALE	TARGET
13. We will continue to promote adherence to the Arrivals Code of Practice through groups such as FLOPSC, Sustainable Aviation and other engagement events.	Arrivals	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Continual improvement in operational practices leading to a reduction in arrivals noise and emissions. **Cost:** Airline engagement and operational improvement facilitated by GAL and NATS.	**Indicator**: Quarterly and Annual FPT reports covering metrics such as CDO performance etc. **Reported:** Quarterly to FLOPSC and NaTMAG.	Engagement and participation with established forums (FLOPSC and SA) along with direct airline engagement where required.	On-going	Share code of practice with all new airlines.
14. We will continue to promote, monitor, seek to improve and report on adherence to the arrival noise abatement procedures detailed in the London Gatwick Aeronautical Information Publication.	Arrivals	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** As above for Action 13. **Cost:** As above for Action 13.	**Indicator**: Quarterly and Annual FPT reports covering metrics such as CDO performance etc. **Reported:** Quarterly to FLOPSC and NaTMAG.	Engagement and participation FLOPSC, an established forums along with direct airline engagement where required.	On-going	By 2020 provide, adherence data to airlines on a regular basis to drive continuous improvement.
15. In conjunction with Sustainable Aviation, Gatwick Airport will identify a low noise arrival procedure which will capture Low Power Low Drag measures and result in a metric which will supplement Continuous Descent Operations as an additional measurable target.	Arrivals	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Introduction of a new, low noise target across the UK, for airlines to enable additional reductions in arrivals noise. **Cost:** The initial study (funded by the Future Aviation Strategy) along with airline training and continual engagement and operational improvement facilitated by GAL and ATC personnel.	**Indicator**: Project progress reports. **Reported:** Reported and tracked by Sustainable Aviation[7].	Program management by Sustainable Aviation with funding from the Future Aviation Strategy.	2019	Implement the low noise arrivals metric at Gatwick.

[7] The use of a low noise arrivals metric was first proposed by the Noise Management Board. To enable maximum uptake of the initiative, Gatwick Airport developed a proposal to seek funding from the Future Airspace Strategy to allow the program to be undertaken by Sustainable Aviation as a UK wide study. The study has now commenced and is proposed for completion in December 2018, with its subsequent implementation at Gatwick in 2019.

Arriving Aircraft							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
16. In line with Noise Management Board initiatives and the commitments in the Sustainable Aviation Noise Road Map, we will work with our airlines and air navigation services providers to improve CDO at Gatwick.	Arrivals	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Continual improvement in operational practices leading to a reduction in arrivals noise and emissions. **Cost:** Airline engagement and operational improvement facilitated by GAL and NATS.	**Indicator**: CDO performance figures. **Reported:** Provided to airlines on a monthly basis and to FLOPSC/NaTMAG at every meeting.	Engagement and participation with FLOPSC, an established forums along with direct airline engagement where required.	On-going	Maintain Gatwick's position as the No. 1 airport for UK CDO performance.
17. We will implement agreed Noise Management Board Work Plan solutions that are intended to reduce the noise impact of arriving aircraft.	Arrivals	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Reduction in arrivals noise through the delivery of activities listed in the published NMB 2017/18 Work Plan covering Fair and Equitable Distribution (FED), improvements in CDO and the sharing of best practice. **Cost:** Varied depending on the activity in question but will require support from GAL, Airlines NATS, ANS and DfT.	**Indicator**: Initiatives will be tracked according to their individual project plans. **Reported:** in progress updates to every NMB and publicly in an annual report.	Support and engagement with the NMB, an established group, which includes industry and community representatives.	2019 - 2024	Delivery of agreed Noise Management Board Work Plan activities.

Departing Aircraft							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
18. We will continue to promote adherence to the Departures Code of Practice through groups such as FLOPSC, Sustainable Aviation and other communication events.	Departures	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Continual improvement in optimal departures performance. **Cost:** Airline engagement and operational improvement facilitated by GAL and ATC personnel.	**Indicator**: Metrics such as track keeping etc. **Reported:** Shared with FLOPSC and NaTMAG and publicly within the FPT reports.	Engagement and participation with established forums (FLOPSC) along with direct airline engagement where required.	On-going	Continue to share code of practice with airlines and by 2020 provide timely performance data to drive continuous improvement.
19. We will continue to promote, monitor, seek to improve and report on adherence to the departure noise abatement procedures detailed in the London Gatwick Aeronautical Information Publication.	Departures	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** As above for Action 18. **Cost:** As above for Action 18.	**Indicator**: Metrics such as track keeping etc. **Reported:** Shared with FLOPSC and NaTMAG and publicly within the FPT reports.	Engagement and participation with established forums (FLOPSC) along with direct airline engagement where required.	On-going	By 2020 provide timely performance data to drive continuous improvement.
20. We have an annual limit of no more than 5% off-track departures. In future, we will compare on an annual basis the percentage of off-track departures against the average performance over the previous five years.	Departures	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Management and control of departures track keeping up to the minimum vectoring altitude. **Cost:** Airline engagement and operational improvement facilitated by GAL and ATC personnel. In certain cases airspace change may be required to improve track keeping.	**Indicator**: Metrics such as track keeping etc. **Reported:** Shared with FLOPSC and NaTMAG and publicly within the FPT reports.	Engagement and participation with established forums (FLOPSC) along with direct airline engagement where required.	2019 - 2024	No more than 5% off-track departures per year.
21. In conjunction with our partners and the Noise Management Board we will adopt a preferred Noise Abatement Departure Procedure (NADP).	Departures	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Controlled management of departures noise. **Cost:** Fuel burn, CO_2, NO_x and noise vary depending on the procedure selected however the study will aim to determine the optimum solution.	**Indicator:** Publication of DfT ANMAC and NMB study on NADP. **Reported:** To the NMB and NaTMAG.	Engagement and participation with established forums (DfT ANMAC, FLOPSC and NMB).	2019	Implement a preferred NADP by the end of 2019.

Departing Aircraft							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
22. We undertake to explore opportunities to remove the altitude restrictions on departure Routes intended to reduce the noise impact of departing aircraft.	Departures	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Increase in the ability to perform continuous climb operations and reduce noise and emissions. **Cost:** Airspace change and consultation process at Gatwick and nearby London airports.	**Indicator:** Completion of the feasibility studies. **Reported:** To the NMB and NaTMAG.	NATS to validate studies as required.	2024	Identify opportunities and implement options.
23. We undertake to explore the feasibility of introducing an alternative Standard Instrument Departure routes within our Noise Preferential Routes in order to provide dispersions and / or respite.	Departures	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Use of alternative SID routes within a single NPR could be used to avoid sensitive areas or multiple routes could be used to provide a wider distribution or respite. **Cost:** Airspace change and consultation process.	**Indicator:** Completion of the feasibility study. **Reported:** To the NMB and NaTMAG.	NATS to validate the study.	2019	Identify opportunities and implement options.

Airline Supplementary Charges							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
24. We will continue to fine aircraft in breach of the Department for Transport departure noise limits with all such monies passed to the Gatwick Airport Community Trust.	Departures	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Management of excessively noisy departures. **Cost:** Management and upkeep of the program.	**Indicator:** Aircraft noise infringements identified by the airport Noise and Track Keeping system. **Reported:** in FPT quarterly and annual reports.	Direct airline engagement.	On-going	Apply fines for breeches and direct these to the Gatwick Airport Community Trust.
24a. We will review and increase the fines currently levelled against airlines which breech departure noise limits with all such monies passed to the Gatwick Airport Community Trust.	Departures	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Management of excessively noisy departures. **Cost:** Review process.	**Indicator:** Aircraft noise infringements identified by the airport Noise and Track Keeping system. **Reported:** in FPT quarterly and annual reports.	Direct airline engagement.	On-going	Increase fines for breeches of noise limits and continue to direct fines to the Gatwick Airport Community Trust.
25. Through engagement with the Department for Transport, Aircraft Noise Management Advisory Committee and/or through unilateral action review our departure noise limits.	Departures	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Drive continual and further improvement in departures performance. **Cost:** Research and implementation of relevant noise controls.	**Indicator:** Input papers and letters as appropriate to Sustainable Aviation and DfT ANMAC working groups. **Reported:** to FLOPSC, NMB and NaTMAG.	Engagement and participation with established DfT ANMAC forum. Analysis work as required to be carried out by CAA ERCD.	2024	Attendance at meetings and propose the review.

Airline Supplementary Charges							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
26. We will work with our airlines and noise governance groups to explore the feasibility of introducing supplementary charges for aircraft departures which persistently fail to operate in accordance with Noise Preferential Routes prescribed for the airport as measured by the noise and track monitoring system operated by Gatwick Airport Ltd, with all such monies passed to the Gatwick Airport Community Trust.	Departures	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Drive continual and further improvement in departures performance. **Cost:** Research on applicable charges, airline engagement and implementation of supplementary charges.	**Indicator:** Input papers and letters as appropriate to Airlines, NMB, NaTMAG and FLOPSC. **Reported:** to FLOPSC, NMB and NaTMAG.	Engagement and participation with established forums (FLOPSC, NaTMAG and NMB) along with direct airline engagement where required.	On-going	Identify opportunities and implement options.

Mitigation Schemes							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
27. We will continue to provide a vortex-damage repair scheme to repair roofs that have been damaged by aircraft vortices.	Community assistance scheme	Communities within and beyond 60dB Lden (in excess of 2,300)	**Benefit:** Community reassurance that GAL will recompense damaged caused by aircraft wake vortices. **Cost:** Management of the program.	**Indicator:** Applications received for the program. **Reported:** to internal management.	Scheme contractor via a commercial agreement.	On-going	Maintain the scheme and introduce transparent reporting.
28. We will continue a scheme that helps with the cost of acoustically insulting homes against the effects of aircraft noise. We undertake to review the scheme every 5 years to ensure it remains appropriate and relevant.	Community noise mitigation initiative	Communities within and beyond 60dB Lden (in excess of 2,300)	**Benefit:** Reduction in indoor noise levels for those significantly affected by aviation noise levels. **Cost:** Management of the program.	**Indicator:** Applications received for the current program. Along with a review and implementation of changes as required. **Reported:** to internal management.	Insulation contractor via a commercial arrangement.	2019 - 2024	Maintain the current scheme and implement any changes arising from reviews.
28a We will undertake a review of our acoustic noise insulation programs by the end of 2019. With subsequent reviews considered every 5 years as noted in Action 28.	Community noise mitigation initiative	Communities within and beyond 60dB Lden (in excess of 2,300)	**Benefit:** Updated noise reduction program for those significantly affected by aviation noise levels. **Cost:** Review of the program.	**Indicator:** Review conducted. **Reported:** to internal management.	Insulation contractor.	2019 - 2024	Review completed by the end of 2019.
29. We will continue to offer acoustic insulation to noise sensitive buildings within the $60L_{Aeq}$ noise contour.	Community noise mitigation	Communities within and beyond 60dB Lden (in excess of 2,300)	**Benefit:** Reduction in indoor noise levels for those significantly affected by aviation noise levels. **Cost:** Management of the program.	**Indicator:** Applications received for the current program. **Reported:** to internal management.	Insulation contractor via a commercial arrangement.	2019 - 2024	Maintain the current scheme and implement any changes arising from reviews.

Mitigation Schemes							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
30. To address the impacts of future growth we will continue to offer to purchase those properties suffering from both a high level of noise (63dB(A) Leq or more) and a large increase in noise (3dB(A) Leq or more), in accordance with the Terms of Reference of the Property Market Support Bond and Home Owners Support Scheme.	Community noise mitigation Initiative	Communities within and beyond 65dB Lden (in excess of 600)	**Benefit:** Community reassurance that those who may be significantly affected by future growth of Gatwick. **Cost:** Financial commitment to the Scheme.	**Indicator:** Applications received for the current program. **Reported:** Not currently reported.	None required.	On-going	Maintain the current scheme.

Noise Reduction Measures							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
31. In conjunction with the Noise Management Board we will explore innovative methods to reduce both inbound and outbound aircraft noise levels.	Arrivals, Departures / community trust and awareness	Communities within and beyond 55dB Lden (in excess of 13,500)	**Benefit:** Reduction in arrivals and departures noise through the implementation of activities on the NMB 2017/18 work plan (and subsequent iterations). **Cost:** Varied depending on the activity in question but will require support from GAL, Airlines NATS, ANS and DfT. Implementation may require an airspace change process in some cases.	**Indicator**: Implementation progress reports. **Reported:** to each NMB meeting with public reports published annually.	Support and engagement with the NMB, an established group, which includes industry and community representatives.	2019 - 2024	Implement the identified and agreed tasks within the relevant NMB work plan for that period.

Monitoring and Reporting our Progress							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
32. We will ensure that our Noise and Track Keeping (NTK) systems are suitable, relevant and reliable, providing updates as appropriate.	Community trust and awareness	Not Applicable	**Benefit:** Provision of a suitable, relevant and reliable NTK system for use by industry and community stakeholders. **Cost:** Licencing and software development to cover regular updates.	**Indicator**: Provision of the NTK service, including updates where required. **Reported:** Updates will be presented to NaTMAG.	Engagement and participation with NaTMAG, an established group. NTK supplier via a commercial agreement.	On-going	Continually review and update the NTK system.
33. We will continue to provide public access to flight track information and noise related data via the Gatwick Airport noise website and the online flight tracking facility, available both on desktop and mobile devices.	Community trust and awareness	Not Applicable	**Benefit:** Provision of a suitable, relevant and reliable flight tracking system for use by industry and community stakeholders **Cost:** Licencing and software development to cover regular updates.	**Indicator:** Provision of the Noise and Track Keeping service on desktop and mobiles. **Reported:** Updates will be presented to NaTMAG.	NTK supplier via a commercial agreement.	On-going	Provision of the Noise and Track Keeping service on desktop and mobiles.
34. We will continue to provide an airspace analysis service and implement service improvements where identified. The team will continue to provide accurate and timely data to aid strategy development and noise complaint handling.	Arrivals Departures Ground along with community trust and awareness	Not Applicable	**Benefit:** Provision of a dedicated analysis, engagement and operational improvement team to deliver further reductions in arrival and departure noise and emissions. **Cost:** Staffing of the FPT along with ATC and airline engagement.	**Indicator:** Provision of FPT services including but not limited to: • Support to NMB initiatives • Noise Abatement Reporting, • Ad-hoc Analysis, • Night Flight Administration, • Complaints Handling. **Reported:** Published quarterly and annually within the FPT report.	None required.	On-going	Continual provision of an FPT service and the publication of quarterly and annual reports.

Monitoring and Reporting our Progress							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
35. We will improve the availability of, and access to, airspace and noise related data.	Strategic Approach/ community trust and awareness	Not Applicable	**Benefit:** Improved provision of timely and transparent data for airport and community stakeholders. **Cost:** Part of the function of the FPT.	**Indicator:** Review of current information provision. **Reported:** Updates and changes will be presented to NaTMAG.	Engagement and participation with NaTMAG, an established group.	2020	Publication of data in the improved format.
36. We will explore the feasibility of introducing an information service for local communities. This could include updates on airport operations, e.g. scheduled northern runway operations, change in runway direction, meteorological information, scheduled number of aircraft movements during the day and night periods, reported thunderstorm activity etc.	Community trust and awareness	Not Applicable	**Benefit:** Improved provision of timely and transparent data for airport and community stakeholders. **Cost:** Part of the function of the FPT.	**Indicator:** Review of available options. **Reported:** Updates and changes will be presented to NaTMAG.	Engagement and participation with NaTMAG, an established group.	2022	Implement the information service.
37. We will continue to provide a Community Noise Monitoring Scheme, operated under the supervision of the Noise and Track Monitoring Advisory Group and the Gatwick Noise Monitoring Group.	Arrivals Departures Community trust and awareness	Not Applicable	**Benefit:** Improved understanding of arrivals and departure noise whilst measuring the benefits delivered by the actions proposed in this plan. **Cost:** Part of the function of the FPT.	**Indicator:** Deployment of mobile noise monitoring terminals to locations around the airport. **Reported:** to NaTMAG via the Gatwick Noise Monitoring Group.	Engagement and participation with NaTMAG, an established group.	On-going	Timely publication of community noise monitoring reports.

Monitoring and Reporting our Progress							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
37a. We will seek to expand the Community Noise Monitoring Scheme with additional noise monitoring terminals and update the reporting process to include holistic noise reports for the area around Gatwick Airport.	Arrivals Departures Community trust and awareness	Not Applicable	**Benefit:** Additional noise monitoring capability to gather quantifiable data on noise impacts. **Cost:** Procurement of noise monitors and development of reporting processes.	**Indicator:** Procurement of additional noise monitoring terminals and new reporting process. **Reported:** to NaTMAG via the Gatwick Noise Monitoring Group.	Engagement and participation with NaTMAG, an established group.	On-going	Procurement and deployment of additional monitors. Publication of new reports.
38. We will report progress against the published Noise Abatement Procedures contained within the London Gatwick Aeronautical information Publication and this Noise Action Plan on a quarterly basis to the Noise and Track Monitoring Advisory Group, the Gatwick Airport Consultative Committee and on our webpages.	Arrivals Departures Ground	Not Applicable	**Benefit:** Tracking and reporting of adherence to deliver further reductions in arrival and departure noise and emissions. **Cost:** Part of the function of the FPT.	**Indicator:** Data analysis on the compliance with the AIP. **Reported:** Quarterly to NaTMAG and published quarterly and annually within the FPT reports.	Engagement and participation with NaTMAG and GATCOM, both established groups.	On-going	Timely publication of quarterly and annual FPT reports.
39. We will update to our website the following noise contours: • Summer 16 hour day L_{eq} (actual) • Summer 16 hour day (standard) L_{eq} • Summer Night L_{eq} (actual) • The above compared to the previous year. • Summer Night 10 year average modal split L_{eq}	Arrivals Departures Ground	Not Applicable	**Benefit:** Provision of an independent assessment of noise contours using a long term assessment method. **Cost:** GAL/ CAA ERCD resource.	**Indicator:** Commission the contours from CAA ERCD. **Reported:** Published online.	CAA ERCD via a commercial agreement.	On-going	Noise contours published on the Gatwick website.

Monitoring and Reporting our Progress							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
39a. We will aim to reach a measure of consensus with community groups on future airport utilisation relative to noise impacts. In order to achieve this we will conduct a review of Government policy including how Government policy should be interpreted and how that policy has been applied in practice. Following the establishment of a workable policy baseline we will aim to develop new noise metrics and reporting to complement the current noise contours and measure our future noise performance. This work will be used to more precisely describe outcomes to support this END Noise Action Plan.	Strategic Approach	Not Applicable	**Benefit:** Measurement of noise performance. **Cost:** GAL resource.	**Indicator:** Commencement of the study. **Reported:** Circulated to the relevant airport noise groups (GATCOM, NaTMAG and NMB) as appropriate.	Engagement with, Sustainable Aviation, DfT ANMAC, environmental health officers, GATCOM, NaTMAG and NMB as required.	2020	Publication of supplementary metrics.

Managing Aircraft Noise Complaints							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
40. We will seek to respond to at least 95% of all complaints and enquiries within eight working days of receipt, in line with the extant Complaints Handling Policy, and publish our performance in FPT quarterly reports.	Community trust and awareness	Not Applicable	**Benefit:** Timely review, investigation and response to noise complaints. Whilst long term trend analysis supports operational improvement. **Cost:** Part of the function of the FPT.	**Indicator:** Complaint tracking and management by the FPT. **Reported:** Quarterly to NaTMAG and published quarterly and annually within the FPT reports.	None required.	On-going	Timely publication of quarterly and annual FPT reports.
41. We will continue to log all complaints relating to aircraft operations in line with the extant Noise Complaints Handling Policy and publish the statistics on our website quarterly.	Community trust and awareness	Not Applicable	**Benefit:** Collection and analysis of complaints to support operational improvement. **Cost:** Part of the function of the FPT.	**Indicator:** Complaint tracking and management by the FPT. **Reported:** Quarterly to NaTMAG and published quarterly and annually within the FPT reports.	None required.	On-going	Timely publication of quarterly and annual FPT reports.
42. We will continue to offer various methods for complaints about aircraft noise events.	Community trust and awareness	Not Applicable	**Benefit:** Allow complainants to provide complaints using various methods suited to their individual needs. **Cost:** Part of the function of the FPT.	**Indicator:** Availability of the various methods (Casper and free post). **Reported:** Availability reported publicly.	None required.	On-going	Implement a complaints phone line by the end of 2019.

Managing Aircraft Noise Complaints							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
43. In order to achieve community confidence in the Complaints Handling Policy and provide transparency of information, we will, where appropriate update our procedures relating to the receipt, processing and reporting of aircraft noise complaints.	Strategic Approach	Not Applicable	**Benefit:** Improved transparency and confidence in the complaints handling process. **Cost:** Part of the function of the FPT.	**Indicator:** Review and update to the Complaints Handling Policy. **Reported:** Updates and changes will be presented to NaTMAG.	None required.	On-going	Online publication of the policy.

Engagement							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
44. Gatwick will continue to engage actively with Government, the Regulator, Sustainable Aviation and such ad-hoc reviews that may be established and will respond appropriately to relevant consultations, engagement exercises and recommendations arising from those activities.	Strategic Approach	Not Applicable	**Benefit:** Continual improvement in the operational and strategic management of noise and emissions. **Cost:** Staffing to support the ongoing engagement activity.	**Indicator:** Engagement with relevant stakeholders. **Reported:** Submission of consultation responses.	Membership of working groups.	On-going	Submission of consultation responses.
45. Gatwick Airport will implement relevant recommendations resulting from feasibility studies in conjunction with the CAA and the DfT as and when they are released.	Strategic Approach	Not Applicable	**Benefit:** Continual improvement in the operational and strategic management of noise and emissions. **Cost:** Staffing to support the ongoing engagement activity.	**Indicator**: Publication of the findings and recommendations of the relevant studies. **Reported:** Implementation of recommendations as required.	Support from CAA, NATS, ANS and airlines as and when required and achieved through extant working relationships.	On-going	Implement relevant findings.
46. We will continue to engage with local communities through the established noise governance groups.	Community trust and awareness	Not Applicable	**Benefit:** Provision of airport information to the community and an understanding of local issues by the airport. **Cost:** Staffing to support the ongoing engagement activity.	**Indicator**: Continual operation and attendance at community meetings. **Reported:** Meeting minutes published.	Engagement and participation with NaTMAG, GNMG, NMB and GATCOM along with sub-groups as required.	On-going	Attendance at each meeting and production of papers as required.

Engagement							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
47. We will continue to support the existence of, and engage with a Noise Management Board, the workplan and meeting papers, which will be adequately published to our other noise governance groups and online.	Arrivals Departures Ground/ Community trust and awareness	Not Applicable	**Benefit:** Continual improvement in the operational and strategic management of noise and emissions. Whilst implementing operational initiatives and strategies to reduce the impact of aviation noise. **Cost:** Staffing to support the ongoing engagement activity.	**Indicator:** Participation and support to the NMB. **Reported:** Meeting minutes and relevant papers published.	Engagement and participation with NMB and sub-groups as required.	On-going	Attendance at each meeting and production of papers as required.
48. We will continue to engage with and provide noise data as required to local Environmental Health Officers through the Gatwick Noise Monitoring Group.	Strategic Approach	Not Applicable	**Benefit:** Provision of timely and transparent data to Environmental Health Officers. **Cost:** Part of the function of the FPT.	**Indicator**: Participation and support to the GNMG. **Reported:** To NaTMAG and publicly within the NaTMAG minutes.	Engagement and participation with GNMG.	On-going	Attendance at each meeting and production of papers as required.
49. In conjunction with the Gatwick Noise Monitoring Group we will commission noise studies to gain an insight into the noise climate in a particular area and holistically across the Gatwick area. We will publish these reports on our website.	Strategic Approach	Not Applicable	**Benefit:** Improved understanding of arrivals and departure noise whilst measuring the benefits delivered by the actions proposed in this plan. **Cost:** Part of the function of the FPT.	**Indicator**: Participation and support to the GNMG. **Reported:** To NaTMAG and publicly within the NaTMAG minutes.	Engagement and participation with GNMG.	On going	Publication of local and holistic noise studies.
50. We will continue to host an annual airspace seminar, to include an annual update from the Noise Management Board, inviting local interest groups and stakeholders.	Community trust and awareness	Not Applicable	**Benefit:** Provision of airport information to the community and an understanding of local issues by the airport. **Cost:** Staffing to support the ongoing engagement activity.	**Indicator**: Hosting the event. **Reported:** Relevant papers published online.	Support from CAA, NATS, ANS and airlines as and when required and achieved through membership of the NMB.	On going (annually)	Hold an airspace seminar once per year.

Engagement							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
51. We will continue to engage with local planning authorities in order to ensure they are well informed about noise issues at Gatwick, and to provide information on the airport and its operation.	Strategic Approach	Not Applicable	**Benefit:** Provision of timely and transparent data to local planning authorities. **Cost:** Part of the function of the FPT.	**Indicator**: Participation and support to the Quarterly S106 steering group meetings. **Reported:** S106 reports published online.	Engagement and participation with local authorities.	On-going	Circulation of data and publication of reports as appropriate.

FUTURE AIRSPACE CHANGE							
ACTION	**IMPACT AREA**	**NOS AFFECTED[6]**	**EXPECTED BENEFIT AND COST**	**PERFORMANCE INDICATOR, AND REPORTING**	**EXTERNAL SUPPORT REQUIREMENT**	**TIMESCALE**	**TARGET**
52. We will participate in all activities relating to 'LAMP2' – the redesign of the London Terminal Manoeuvring Area (LTMA) and en-route airspace to eliminate chokepoints, alleviate areas of intensive aircraft concentrations, reduce the number of people affected by noise and to create a structure that has capacity to accommodate forecast traffic levels beyond 2040.	Strategic Approach / Arrivals Departures Ground	Not Applicable	**Benefit:** Large, LAMP 2 has the potential to deliver significant reductions in noise and emission through continuous descent and climb whilst providing increased capacity. **Cost:** Large requiring significant and long term input from all airports in the south east of the UK, CAA, NATS and the DfT.	**Indicator**: Engagement with airports, NATS, CAA and DfT via bilateral and established working groups. **Reported:** Progress reports circulated to GATCOM, NaTMAG and NMB as appropriate.	Support from CAA, NATS, ANS and airlines via established LAMP 2 groups.	2024	By 2024 implement LAMP 2 airspace.
53. Ensure that local communities are informed about LAMP 2 plans and the progress and airport plans for the integration of Gatwick specific departure and arrival procedures.	Strategic Approach / Arrivals Departures Ground	Not Applicable	**Benefit:** Local communities are aware of the LAMP 2 plans and area able to provide input to the airspace concept and design. **Cost:** Large requiring significant and long term input from all airports in the south east of the UK, CAA, NATS and the DfT.	**Indicator:** Information provided on the LAMP 2 process along with consultation documents, events and presentation as and when required. **Reported:** As and when required.	Engagement and participation with NaTMAG, GNMG, NMB and GATCOM along with sub-groups as required.	2024	Conduct of airspace consultation in accordance with CAP1616.

SECTION 19 – QUANTIFICATION OF THE NOISE ACTION PLAN

THE ORIGINAL 2010 – 2015 NOISE ACTION PLAN

In developing the original Noise Action Plan we took into account the guidance issued to airport operators at that time. This suggested that residential areas exposed to an annual noise level of 69L_{Aeq}, 16h or more should be considered for further measures as a first priority. However unlike the guidance for the other major environmental noise sources (road and rail) the guidance did not offer a specific level by which to determine important areas within the strategic noise maps.

Subsequently we took the following steps to determine the most appropriate and effective actions to include in our draft noise action plan.

PRIOR TO PUBLIC CONSULTATION

Firstly we considered the areas enclosed by the strategic noise maps and our existing noise complaint database. This confirmed our expectation that complaints about the impact of aircraft noise originate from locations both inside and outside the area within the strategic noise maps (see Section 7 of the original report) and are about both air and ground noise. It also showed that issues such as night flying, runway alternation, arrivals noise, the number of over flights and low flying were consistently among the top issues of concern. Without guidance to the contrary and with our evidence and experience in managing noise from Gatwick we were determined that our action plan should include actions to limit, and where practicable, reduce noise impacts for areas both inside and outside the contours as well as ground noise. In this regard we extended the scope of the action plan beyond the END requirements.

Next we used results from three international benchmarking studies by independent consultants, to help identify potential actions we could consider. Over 30 international airports worldwide were selected based on the number of annual movements and regional prominence. This exercise revealed that for operational noise controls Gatwick was one of, if not the leading airport worldwide. Similarly, although direct comparison is difficult, our mitigation and compensation benchmarking study showed Gatwick to be among the leading airports in this area. The final area of benchmarking concerned stakeholder engagement and communication. The results of this showed the greatest opportunities for improvement, with more than a dozen airports more effective in this area.

We used this information to review all our existing noise management activities, identify additional ones and consider how they would impact on the areas enclosed by the 2006 noise mapping results and beyond. These new actions were then given a general ranking (high, medium and low) in terms of costs and benefits.

Following on from this and in order to prepare the then 'draft' noise action plan for full public consultation we held a series of pre-consultation, events with representatives from airlines, NATS, local authorities, local residents groups and members of the Gatwick Airport Consultative Committee.

A number of key themes emerged such as concern over current flight paths, night flights and sleep disturbance, application of noise mitigation and compensation schemes, the frequency of overflight, and a desire for recognition of the impact beyond the areas within the strategic noise maps.

Subsequently a total of 52 actions of which around 14 could be considered new activities were issued for public consultation over 16 weeks between 18 June and 7 October 2009. Key issues raised by the consultation included calls to stop night flights and to provide more financial help for insulation schemes, as well as the need to address issues relating to arrival and departure trajectories (44%). There were also a number of issues raised in relation to changing the current flight paths at Gatwick (30%) and how the action plan should be enforced (24%).

RESPONDING TO THE FEEDBACK

In response we reviewed and amended our performance indicators and established targets whenever possible.

As regards our insulation schemes we noted the many comments and remained committed to undertaking a review of the schemes in 2010. We also continued to support efforts to improve operational practices, including examining departure and arrival procedures.

We also added actions indicating our intention to request that the Government review the existing departure noise limit restrictions, airspace utilisation and night noise limits.

We also sought to identify opportunities to further involve key stakeholders in some of the actions detailed in the plan. For example we amended our benchmarking actions to include input from members from the Noise and Track Monitoring Advisory Group. Similarly we also sought the groups input in the formulation of a suite of noise metrics to describe our noise impacts.

REVISION OF THE NOISE ACTION PLAN 2013 – 2018

In 2013 following the second round of noise mapping for Gatwick Airport it was necessary to review and revise, as necessary, the Noise Action Plan that had previously been prepared and adopted by the Secretary of State. As the actions detailed in the original Noise Action Plan were already in existence and are therefore in most instances remained valid the guidance received was to review, update and generally refresh the document taking into account the following:

- the results of the noise mapping completed in 2012;
- the progress made against the actions described in the original action plan;
- any relevant updates about the airport and its operation;
- updating information about relevant legislation and standards;
- updating relevant national and local policies;
- information about any proposed new actions and any on-going actions.

Once the plan had been revised, it was presented to the Gatwick Airport Consultative Committee (GATCOM) for comment. Gatwick Airport Ltd reflected upon the comments received from the Gatwick Airport Consultative Committee, description of which were be included in the revised plan together with a reasoned justification for the response to the issues raised.

REVISION OF THE NOISE ACTION PLAN 2018 – 2024

In 2017, following the third round of noise mapping for Gatwick Airport it once again become necessary to review and revise, as necessary, the Noise Action Plan that had previously been prepared and adopted by the Secretary of State.

The guidance to airport operators remained similar to that of previous years as there had been no substantive changes to the content or underlying regulatory requirements. As Gatwick Airport already had an Action Plan in place, a relatively light touch "review and revise" updating process was proposed by DEFRA. This did not stop airports from undertaking a more detailed review and update should it be deemed appropriate. In revising the Noise Action Plan, the airport was required to include:

- updated details about the airport and its operation;
- the results of the noise mapping completed in 2017;
- the progress made against the actions described in the current Action Plan;
- updated information about relevant legislation and standards;
- updated relevant national and local policies;
- information about on-going actions; and
- information about any proposed new actions.

DEFRA guidance stated that once the plan had been revised it would be presented to the Airport's Consultative Committee for comment, and any other appropriate bodies depending on the extent and nature of the revisions. The Airport Operator would summarise the comments received in the revised plan together with the responses to the issues raised.

IT WAS PROPOSED THAT:

1. The draft Noise Action Plan be prepared by Gatwick Airport Ltd in accordance with the published guidance.
2. The Noise Management Board be advised of the revision of the draft Noise Action Plan in order for it to advise the Gatwick Airport Consultative Committee accordingly.
3. The draft Noise Action Plan be presented to the Gatwick Airport Consultative Committee, Crawley Borough Council and West Sussex County Council (being the lead local authorities of the Memorandum of Understanding with wider local authorities) for feedback and comment.
4. Any other feedback received be evaluated by Gatwick Airport Ltd and, if appropriate included.
5. Once all feedback has been received, it will be evaluated by Gatwick Airport Ltd and, if appropriate included into the draft Noise Action Plan. Details of feedback received will be included in the annexes of the draft Noise Action Plan. The decision of Gatwick Airport Ltd is final and correspondence will not be entered into regarding the decision to include material or otherwise.
6. The draft Noise Action Plan will be submitted to DEFRA for adoption. Once adopted, the Noise Action Plan will cease to be in draft status.

It was agreed at the meeting of GATCOM on 26 April 2018 that the draft Noise Action Plan, having been updated in response to the feedback received, be presented to the 21 June 2018 meeting of the GATCOM Steering Group for consideration prior to it being presented for a final time to the full meeting of GATCOM, scheduled for 19 June 2018. The effect of this additional stage of consultation is that there has been three stages of consultation; commencing with the circulation of a proposed list of Action Plan Actions, the circulation of an initial draft Noise Action Plan and culminating in the final draft of the Noise Action Plan being presented.

The airport publicised the revision of the END Noise Action Plan through the various committees attended and also online. We encouraged members of the community to contact their GATCOM Representative in the first instance with any feedback or requests for particular issues to be considered for inclusion.

Any other feedback received from interested parties is included in the annexes of this draft Noise Action Plan, in common with previous years.

NOTES

NOTICE OF ADOPTION

This EU Environmental Noise Directive (2002/49/EC) 'Round 3' Noise Action Plan was formally adopted by the Parliamentary Under Secretary of State for the Environment on 11 February 2019, as required by the Environmental Noise Directive and the Environmental Noise (England) Regulations 2006 (as amended).

Issued by Gatwick Airport Ltd
Corporate Affairs, Planning and Sustainability
7th Floor Destinations Place
Gatwick Airport
West Sussex
RH6 0NP

YOUR LONDON AIRPORT
Gatwick

www.gatwickairport.com/noise

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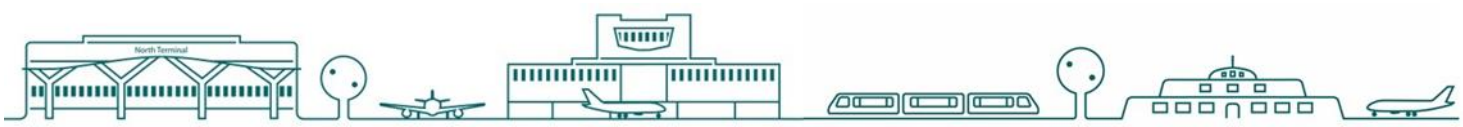


AIRPORT
EXPANSION
CONSULTATION

NOISE INSULATION POLICY

JUNE 2019

Heathrow

AIRPORT EXPANSION CONSULTATION (JUNE 2019)

Heathrow is consulting on proposals for an expanded airport.

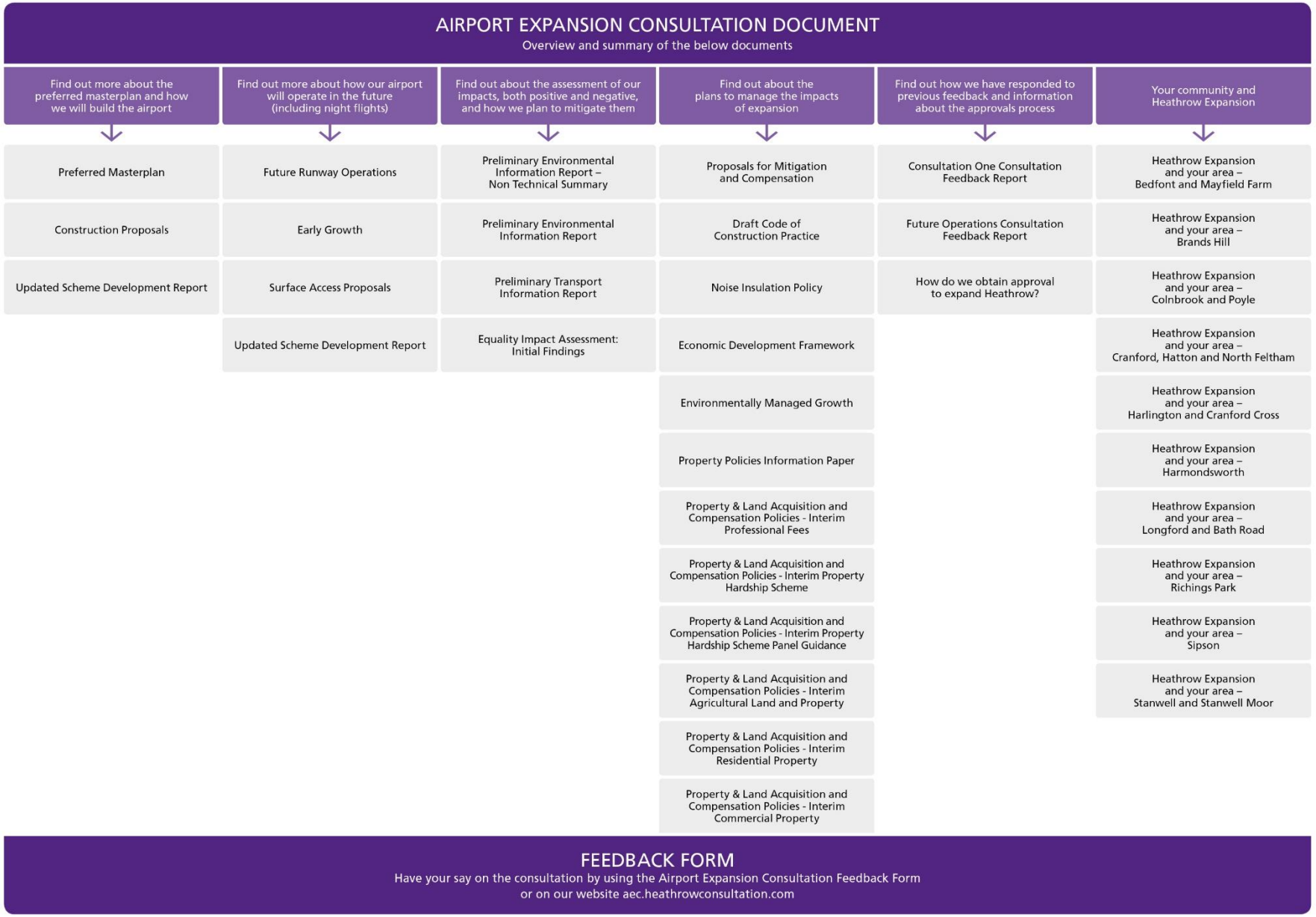
The Airport Expansion Consultation is our statutory consultation and we will be seeking your view on four key areas:

- Heathrow's preferred masterplan for expansion: our proposals for the future layout of the airport including the runway and other airport infrastructure such as terminals and road access. The masterplan will also reveal the airport's growth in phases – from runway opening in around 2026, to the end masterplan in approximately 2050;
- Plans to operate the future airport: how the future three runway airport will be operated, including important elements such as night flights, as well as how potential additional flights before the new runway opens could be operated on our existing two runways;
- Assessment of impacts of the airport's growth: our preliminary assessment of the likely impacts of expansion on the environment and local communities;
- Plans to manage the impacts of expansion: we will set out the airport's plans for mitigating the effects of expansion, including property compensation, our Noise Insulation Policy, a Community Fund, and measures to mitigate against air pollution, carbon, and other environmental effects.

We are grateful for feedback provided at previous consultations and have considered these responses in developing our proposals. We now ask for your views on our preferred proposals, so that we can further improve our project before we apply for development consent next year. You can provide feedback:

- online using the feedback form on our website aec.heathrowconsultation.com
- complete a feedback form, available at events or on request calling 0800 307 7996
- email us at feedback@heathrowconsultation.com
- write to us at Freepost LHR AIRPORT EXPANSION CONSULTATION

We have set out our proposals in a number of documents covering different topics and different levels of detail. All of these are available on our website, at Document Inspection Locations and at consultation events.


AIRPORT EXPANSION CONSULTATION DOCUMENT
Overview and summary of the below documents
Find out more about the preferred masterplan and how we will build the airport
Find out more about how our airport will operate in the future (including night flights)
Find out about the assessment of our impacts, both positive and negative, and how we plan to mitigate them
Find out about the plans to manage the impacts of expansion
Find out how we have responded to previous feedback and information about the approvals process
Your community and Heathrow Expansion
Preferred Masterplan
Construction Proposals
Updated Scheme Development Report
Future Runway Operations
Early Growth
Surface Access Proposals
Updated Scheme Development Report
Preliminary Environmental Information Report – Non Technical Summary
Preliminary Environmental Information Report
Preliminary Transport Information Report
Equality Impact Assessment: Initial Findings
Proposals for Mitigation and Compensation
Draft Code of Construction Practice
Noise Insulation Policy
Economic Development Framework
Environmentally Managed Growth
Property Policies Information Paper
Property & Land Acquisition and Compensation Policies - Interim Professional Fees
Property & Land Acquisition and Compensation Policies - Interim Property Hardship Scheme
Property & Land Acquisition and Compensation Policies - Interim Property Hardship Scheme Panel Guidance
Property & Land Acquisition and Compensation Policies - Interim Agricultural Land and Property
Property & Land Acquisition and Compensation Policies - Interim Residential Property
Property & Land Acquisition and Compensation Policies - Interim Commercial Property
Consultation One Consultation Feedback Report
Future Operations Consultation Feedback Report
How do we obtain approval to expand Heathrow?
Heathrow Expansion and your area – Bedfont and Mayfield Farm
Heathrow Expansion and your area – Brands Hill
Heathrow Expansion and your area – Colnbrook and Poyle
Heathrow Expansion and your area – Cranford, Hatton and North Feltham
Heathrow Expansion and your area – Harlington and Cranford Cross
Heathrow Expansion and your area – Harmondsworth
Heathrow Expansion and your area – Longford and Bath Road
Heathrow Expansion and your area – Richings Park
Heathrow Expansion and your area – Sipson
Heathrow Expansion and your area – Stanwell and Stanwell Moor
FEEDBACK FORM
Have your say on the consultation by using the Airport Expansion Consultation Feedback Form
or on our website aec.heathrowconsultation.com

NOISE INSULATION POLICY (DRAFT FOR CONSULTATION)

Non-Technical Summary

This document sets out the Noise Insulation Policy for the Heathrow Expansion Programme (the Project) to address the requirements of the Government policy - "*Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England*" 2018 (Airports NPS).

This policy will address noise from aircraft movements in the air and on the ground, road, rail and construction noise associated with the Project.

The Noise Insulation Policy forms part of the extensive noise control measures included in the expansion Project to meet the aims of Government noise policy. The control measures on the aircraft fleet and operations first mitigate and minimise potential adverse noise effects arising from expansion and reduce existing noise from the airport. In a complementary manner, noise insulation provides compensatory control measures that aim to avoid residual significant adverse effects on health and quality of life from existing and predicted noise. This approach meets the aims of Government noise policy as stated in the Airports NPS.

For home owners, three levels of scheme will be offered, depending on the existing or predicted noise exposure level, as indicated by the relevant noise contour, source of noise and if confirmed through third-party assessment:

Scheme 1	Full cost of noise insulation fitout, potentially including new acoustic double glazing or secondary glazing, loft or ceiling insulation, ceiling over-boarding, external door upgrades and ventilation for aircraft noise.
Scheme 2	A package of noise insulation to exposed facades, potentially including acoustic double glazing or secondary glazing to windows, external door upgrades and attenuated ventilation for road, rail and construction noise exposure.
Scheme 3	A fixed £3,000 contribution to approved noise insulation works.

Eligibility for schemes will be based on published noise contours of the defined Action Levels, or thresholds, as set out in the government Airports NPS for aircraft noise, extended to include road, rail and construction noise.

Noise Insulation Schemes will be made available before defined Action Levels are expected to occur as a result of the expansion project.

In the lead up to Development Consent Order (DCO) approval, we plan to insulate homes that will be exposed to the highest noise from the Project and that are already exposed to similar noise from existing Heathrow operations. This will be via a replacement of our existing noise insulation schemes expanded in the light of changing Government policy. Homes expected to be exposed to early construction noise from the Project as well as existing high levels of aircraft noise will also be prioritised. This will help develop and test our systems and suppliers, also avoid long waiting times between applications and fit outs. Once the DCO is approved we will prioritise those forecast to be newly affected by construction, road and rail traffic and aircraft noise. We will ensure that the insulation is offered and, if accepted, installed before the new noise occurs.

Home and community building owners identified as being within the eligibility contours will be contacted and invited to apply for the schemes. We will use a seven-stage awareness process to ensure property owners are aware of their eligibility and are encouraged to apply.

Once we have received an application, an assessment will be conducted to confirm eligibility. Approved contractors will deliver a standard package of noise insulation measures, within a quality management scheme including sample completion testing.

For the very few properties that will be newly exposed to very high noise levels, where an application is not received or an offer accepted, we may need to obtain compulsory rights to provide treatments to prevent unacceptable noise exposure levels.

A dedicated support team will be provided to assist applicants throughout the process, including investigation of complaints during and after completion. Applicants will also be able to appeal to an Independent Panel.

The schemes will remain open until they cease to be relevant (for example, at the end of the construction period for the construction noise insulation), or the scheme is updated (for example if noise mitigation means that a property is no longer within a relevant contour).

These schemes will replace the existing noise insulation schemes currently offered by Heathrow including the Quieter Homes Scheme, the Day Scheme and the Night Scheme. Before existing schemes are closed, properties in those areas will be informed and advised of the scheme closure and possible eligibility for the replacement schemes. The contact period, of at least 12 months, will allow time for applications under the existing schemes before they close.

Heathrow's Community Buildings Noise Insulation Scheme will be extended to include the impacts of Expansion.

In addition to the noise insulation schemes in this draft Noise Insulation Policy, Heathrow has two other existing noise and vortex related schemes that will be refreshed. These are the Home Relocation Assistance Scheme which offers financial help to eligible homeowners living in the noisiest areas around Heathrow to move away from the area if they wish; and the Vortex Protection Scheme which is designed to protect and repair homes from around the airport damaged by wind currents from aircraft wings.

Heathrow will also introduce a Temporary Home Relocation Scheme for those most impacted by short term construction noise.

These schemes are summarised at the end of the draft Noise Insultation Policy for reference.

PREFACE: DEVELOPMENT OF THE NOISE INSULATION POLICY

1. The remainder of this document sets out the draft policy relating to noise insulation schemes to be provided in connection with the development and operation of a new north-west runway and associated infrastructure to expand Heathrow Airport. This draft policy is subject to consultation.

2. Once finalised taking into account feedback from consultation and draft policy would form the basis for the implementation of our Noise Insulation programme, if development consent is granted and we proceed with construction,

3. If the DCO application is granted, this document would become the basis for the implementation of our Noise Insulation programme. It was thought helpful, therefore, to provide a working draft of the document for this consultation in order that stakeholders could understand the terms on which Heathrow proposes to commit and comment on them whilst they remain in draft.

4. Within the document itself, there are passages which represent explanatory text for the purposes of this consultation and which will be deleted from the version published before and submitted with the DCO application. Those passages are highlighted in grey.

5. With the benefit of this explanation, hopefully this draft document is clear in its purpose and we would be pleased to receive feedback on its content and approach.

CONTENTS

1. INTRODUCTION

1.1 The Noise Insulation Policy for Heathrow Expansion Programme

1.1.1 This document sets out the Noise Insulation Policy for the Heathrow Expansion Programme (the Project) to address the requirements of the *Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England 2018* (Airports NPS).

1.1.2 The Noise Insulation Policy forms part of the extensive noise control measures included in the Project, to meet the aims of Government noise policy, as laid out in the Airports NPS at paragraph 5.68 (see below). Firstly, there are the mitigation control measures which cover actions ranging from aircraft fleet development, operational procedures, airport layout, airspace design, and night flight management, to managed respite through runway and airspace alternation. These control measures mitigate and minimise potential new adverse noise effects arising from expansion and, for many areas, reduce existing noise from the airport, within the context of Government policy on sustainable development. This Noise Insulation Policy provides compensatory control measures, which in combination with the mitigation controls, sets out to achieve the following:

- Firstly: to meet the Government noise policy to avoid significant adverse effects on health and quality of life that would otherwise newly arise from the expansion proposals, including preventing unacceptable adverse noise effects;
- Secondly: to avoid significant adverse effects on health and quality of life that would otherwise occur after expansion, but would also have occurred if Heathrow did not expand; and
- Thirdly: to more widely compensate for the adverse effects of aircraft noise both newly arising from expansion and that would have occurred if Heathrow did not expand, in line with Heathrow's committed community compensation scheme as set out in the Airports NPS (paragraph 5.245).

1.1.3 The objectives of this Noise Insulation Policy are to achieve the following:

- Set out the basis for Heathrow's noise insulation strategy and the definition and delivery of the Noise Insulation Schemes.
- Address noise from:
    - aircraft movements in the air and activity on the ground,
    - changes to road traffic associated with the airport expansion,
    - changes to rail traffic associated with the airport expansion, and,

- construction noise associated with the expansion programme.

- Describe how the package of Noise Insulation Schemes addresses the requirements of the Airports NPS and specifically the aim set out in paragraph 5.68 to avoid significant adverse effects on health and quality of life.

1.1.4 This document is structured to cover the following:

- the national, international and local policy, standards and guidance background,
- the assessment metrics and action levels that will be used to identify properties eligible for noise insulation,
- the Noise Insulation Schemes, and
- the staged delivery of these Schemes.

1.1.5 This document also includes outlines of the related, non-insulation programmes with respect to the Project – the Construction Temporary Rehousing Scheme, the Home Relocation Assistance Scheme (HRAS), and the Vortex Protection Scheme.

1.2 Heathrow's Noise Insulation Strategy

1.2.1 This Noise Insulation Policy for the Project can be viewed as a part of Heathrow's long-term noise insulation strategy which has three major policy components.

1. Development of our existing noise insulation schemes designed to address our current operations and changing Government policy.
2. Processes are now underway for certain non-expansion (two-runway) airspace changes such as Independent Parallel Approaches (IPA), easterly alternation and redesigning of the Compton departure route.
3. The Noise Insulation Policy for the Heathrow Expansion Programme (the Project) which includes the development of a new third runway and insulation mitigation options required by the Airports NPS.

1.2.2 The same Noise Insulation Schemes and processes will be used to deliver each of these policy components.

2. CONTEXT: POLICY, STANDARDS AND GUIDANCE

2.1 Airports National Policy Statement

2.1.1 The Government designated the "Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England" (Airports NPS) in June 2018.

2.1.2 The Airports NPS addresses a range of issues including Heathrow airport expansion and noise insulation. For noise impacts Airports NPS says:

"5.47 The Government wants to strike a fair balance between the negative impacts of noise (on health, amenity, quality of life and productivity) and the positive impacts of flights…

"5.48 The International Civil Aviation Organisation introduced the concept of a 'Balanced Approach' to noise management (resolution A33/7). This is given legal effect in the UK through EU Regulation 598/2014.

…

"5.68 Development consent should not be granted unless the Secretary of State is satisfied that the proposals will meet the following aims for the effective management and control of noise, within the context of Government policy on sustainable development:
- Avoid significant adverse impacts on health and quality of life from noise;
- Mitigate and minimise adverse impacts on health and quality of life from noise; and
- Where possible, contribute to improvements to health and quality of life.

…

"5.244 People are entitled to know what steps will be taken to help protect them against aircraft noise and, where appropriate, to help them to move house.

"5.245 In addition to statutory requirements, Heathrow Airport has publicly committed to a community compensation package comprising a number of more generous offers:

- *…*
- *Following a third-party assessment, to provide full acoustic insulation for residential property within the full single mode easterly and westerly 60dB $L_{Aeq,16hr}$ noise contour of an expanded airport;*
- *Following a third-party assessment, to provide a contribution of up to £3,000 for acoustic insulation for residential properties within the full single mode easterly*

and westerly 57dB $L_{Aeq,16hr}$ or the full 55dB L_{den} noise contours of an expanded airport, whichever is the bigger; and

- *To deliver a programme of noise insulation and ventilation for schools and community buildings within the 60dB $L_{Aeq,16hr}$ contour."*

2.2 Aviation Policy Framework

2.2.1 The Government published the Aviation Policy Framework (APF) in March 2013 which included the statement:

"3.17 We will continue to treat the 57dB $L_{Aeq,16\ hr}$ contour as the average level of daytime aircraft noise marking the approximate onset of significant community annoyance. However, this does not mean that all people within this contour will experience significant adverse effects from aircraft noise. Nor does it mean that no-one outside of this contour will consider themselves annoyed by aircraft noise."

2.2.2 The Draft UK Airspace policy published by the Department for Transport (DfT) in February 2017 and the consultation response that the DfT published in October 2017 has modified the APF.

"Consistent with the Noise Policy Statement for England, our objectives in implementing this policy are to: … limit and, where possible, reduce the number of people in the UK significantly affected by the adverse impacts from aircraft noise." (para 2.69 Oct 2017)

"The government acknowledges the evidence from recent research which shows that sensitivity to aircraft noise has increased, with the same percentage of people reporting to be highly annoyed at a level of 54dB $L_{Aeq,16hr}$ as occurred at 57dB $L_{Aeq,16hr}$ in the past. The research also showed that some adverse effects of annoyance can be seen to occur down to 51dB $L_{Aeq,16hr}$." (para 2.70 Oct 2017)

"We will set a LOAEL at 51dB $L_{Aeq,16hr}$ for daytime and based on feedback and further discussion with CAA we are making one minor change to the LOAEL night metric to be 45dB $L_{Aeq,8hr}$ rather than L_{night} to be consistent with the daytime metric." (para 2.72 Oct 2017).

2.2.3 The Consultation Response also states that the Government:

- *"expects airport operators to offer acoustic insulation to noise sensitive buildings, such as schools and hospitals, exposed to levels of noise of 63dB $L_{Aeq,16hr}$ or more*
- *expects airport operators to offer financial assistance towards acoustic insulation to residential properties exposed to levels of noise of 63dB $L_{Aeq,16hr}$ or more."*

2.2.4 However, the government published the Aviation 2050 consultation in December 2018 which proposes the following noise insulation measures:

- *"to extend the noise insulation policy threshold beyond the current $L_{Aeq,16hr}$ 63dB contour to $L_{Aeq,16hr}$ 60dB.*
- *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 ICCAN to issue new guidance to airports on best practice for noise insulation schemes, to improve consistency*
- *for airspace changes which lead to significantly increased overflight, to set a new minimum threshold of an increase of L_{AeqT} 3dB, which leaves a household in the $L_{Aeq,16hr}$ 54dB contour or above as a new eligibility criterion for assistance with noise insulation."*

2.2.5 These proposals have not yet been adopted by government but may need to be considered in the final Noise Insulation Policy submitted with the DCO if they would increase the area of eligibility. The progression of these Government policies (and draft policies) is summarised in Appendix B.

2.3 Noise Policy Statement for England

2.3.1 The Government published the Noise Policy Statement for England (NPSE) in March 2010 and refers to it in the Airports NPS. The NPSE policy aims, that are repeated in the Airports NPS at paragraph 5.68, are:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.*"

2.3.2 The NPSE explanatory notes provide guidance on significant and adverse impacts:

"2.20 LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

2.22 It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

2.3.3 In addition to the above, Planning Practice Guidance-Noise (2014) includes the concept of Unacceptable Adverse Effect Level (UAEL). This is a level of noise exposure that would be perceived as "*intrusive and very disruptive*" and that "*at the highest extreme, noise exposure would cause extensive and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of activity causing noise, this situation should be prevented from occurring*."

2.3.4 The LOAEL, SOAEL and UAEL values being applied to the Project are provided in Chapter 17 of the Preliminary Environmental Information Report (PEIR) and will be adopted in this document when published. They are also summarised in Appendix B of this document.

2.3.5 We consider that this Noise Insulation Policy is one aspect of "avoiding" significant adverse noise effects on health and quality of life and "preventing" unacceptable noise effects.

2.4 World Health Organisation Guidelines for Community Noise (1999)

2.4.1 In 1999, the World Health Organisation (WHO) released Guidelines for Community Noise (GCN). These guidelines have informed a wide range of UK standards and guidelines, and contain recommended values for internal noise for specific environments and maximum night time noise levels that remain current.

2.4.2 WHO has also published:

- Night Noise Guidelines 2009 (NNG) which recommend a LOAEL and refer to GCN guideline text as remaining valid, and

- Environmental Noise Guidelines for the European Region 2018 (ENG) which recommend Noise Guideline values which are defined for L_{den} (which includes penalty for evening and night period) and L_{night}.

2.4.3 The WHO publications are guidance only and do not take precedence over Government legislation or policy.

2.5 Noise Insulation Regulations (1975)

2.5.1 The Noise Insulation Regulations provide a schedule of noise insulation measures to be provided if noise levels from a highway or road development are predicted to exceed action levels predicted using the Government method, Calculation of Road Traffic Noise (CRTN). CRTN is a historic calculation method which uses a different metric to those normally used for aircraft noise, $L_{A10,18hr}$, but this metric can be converted to $L_{Aeq,T}$ for normal highway noise and this conversion is described in the PEIR.

2.6 The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996

2.6.1 The Noise Insulation (Railways etc) Regulations provide a schedule of noise insulation measures to be provided if noise levels for a rail or similar development are predicted to exceed action levels predicted using the Government method, Calculation of Rail Noise (CRN).

2.7 Guidance on sound insulation and noise reduction for buildings: BS8233:2014

2.7.1 British Standard BS8233 provides guidance on the control of sound in and around new buildings, including noise from aircraft, roads and construction sites.

2.7.2 For residential buildings guideline internal noise levels are provided as annual average levels. BS8233 recognises that it may be desirable to build houses or flats above the guideline values for other reasons, such as access to transport, shopping etc, and that a relaxation of the guidance values may provide reasonable living conditions.

2.7.3 For non-residential buildings, BS8233 refers to a number of sector guidelines, including Building Bulleting BB93 for schools and Health Technical Memorandum HTM 08-01 for hospitals and recommends that a suitably qualified acoustician is retained for specialist uses, such as theatres, concert halls and cinemas.

2.8 Code of practice for noise and vibration control on construction and open sites. Noise BS5228-1:2009 and A1:2014

2.8.1 British Standard BS5228-1 provides guidance on the calculation and control of noise at construction sites and is widely used on minor and major development sites. Annex E of the Code addresses significance of effects with Example 1 being the “A-B-C" method that produces a table of threshold levels at various times of the day and night.

2.9 Airports NPS Tests

2.9.1 This Noise Insulation Policy has been designed so that the DCO will meet the first aim of the Airports NPS 5.68 (and NPSE), which is “*within the context of Government policy on sustainable development: to avoid significant adverse impacts on health and quality of life from noise*.”

2.9.2 The Airports NPS refers to the “Noise Mitigation – Noise Control Hierarchy” and this is discussed in more detail in the PEIR associated with this Airport Expansion Consultation. Within the control hierarchy, noise insulation will be relied upon where other higher priority mitigation is not practical or sustainable. To avoid significant adverse noise impacts, the Noise Insulation Policy will prioritise those properties and populations which will be newly exposed to noise levels above the SOAEL, including any properties which will be newly exposed to noise levels above UAEL.

2.9.3 The SOAEL values for aircraft noise, as identified in the PEIR, are daytime 63dB $L_{Aeq,16hr}$ and night-time 55dB $L_{Aeq,8hr}$ or one additional awakening. The daytime UAEL is 71dB $L_{Aeq,16hr}$ and the night-time UAEL is 66dB $L_{Aeq,8hr}$. All these values are 92-day summer averages. See Appendix A for a glossary of terms and Appendix B for references to night time aircraft noise and other noise sources.

2.9.4 As quoted above, Airports NPS (paragraph 5.245) explicitly reiterates public commitments for noise insulation made by Heathrow which are a key part of the strategy to avoid significant noise impacts for areas newly above the SOAEL.

2.9.5 This Noise Insulation Policy will meet or exceed the minimum requirements of the first aim of Airports NPS 5.68 for the following reasons:

- Homes that will be newly exposed above any SOAEL value in the opening year, will have insulation offered (and installed, if accepted) in advance of the new runway opening.
- As the number of aircraft movements increases after the opening year to a point when the airport’s noise impact is forecast to be highest, homes that will

be newly exposed above the SOAEL values will have insulation offered (and installed, if accepted) in advance of the SOAEL value being exceeded.

- Heathrow will extend the offer of noise insulation to homes that are already exposed to levels above the SOAEL values and will continue to be exposed above the SOAEL values after the new runway opens and as the air traffic to and from the expanded airport increases.
- After opening of the new runway, full insulation (Scheme 1) will be progressively offered to homes out to the Action Level of 60dB $L_{Aeq,16hr}$. As this is lower than the 63dB SOAEL for aircraft, this means more people and properties will be eligible for insulation.
- We have also made a commitment to use a combined contour based on both full, single mode contours, namely the easterly and westerly mode contours. This will produce a noise contour area larger than the area for the actual averaged east-west operations and effectively will treat areas impacted by one mode as if it occurred for the entire year.
- As use of the new runway grows after its 2026 opening, further areas for insulation will be sequenced to treat homes in advance of any air traffic growth and any associated noise forecast to newly exceed SOAEL.

2.9.6 As described in the PEIR, the other two aims of para 5.68 will be addressed by other mitigations, compensations and outcomes.

2.9.7 The second aim to mitigate and minimise adverse impacts on health and quality of life from noise will be addressed by a whole spectrum of noise mitigation measures. These range from promoting the aircraft fleet at Heathrow as the newest and quietest aircraft possible, and operational procedures including runway and airspace alternation to minimise noise levels and maximise predictable respite for communities.

2.9.8 The third aim is to, where possible, contribute to improvements to health and quality of life will be best addressed by our commitment that the expansion programme will achieve fewer people impacted by significant noise than “today” (i.e., 2013, the noise ‘policy baseline’ set by the Airports NPS).

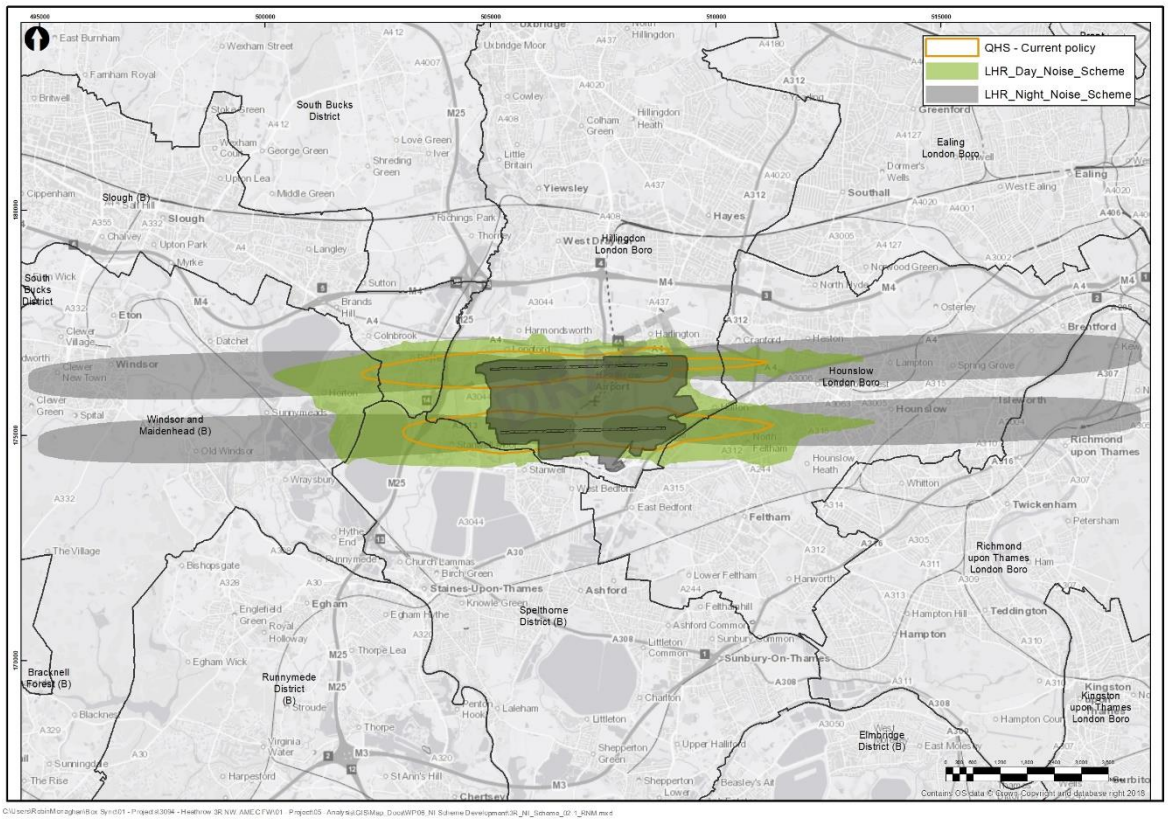
3. OUR NOISE INSULATION SCHEMES

3.1 Existing Noise Insulation Schemes

3.1.1 The new Noise Insulation Schemes associated with the Project will replace the existing noise home insulation schemes including the Quieter Homes Scheme, the Day Scheme and the Night Scheme. The existing scheme boundaries are shown in Figure 3.1 below.

- The Quieter Homes Scheme (QHS) applies to homes based on the 2011 69dB $L_{Aeq,16hr}$ contour. It covers the full cost of carrying out the work which can include loft and ceiling insulation, double-glazing or external door replacements and loft and ceiling over-boarding. (This is practically the same as the new Scheme 1.)
- The (Residential) Day Noise Insulation Scheme (or Day Scheme) is based on the 1994 69dB $L_{Aeq,18hr}$ contour and is designed to protect those homes exposed to the aircraft noise in the day, including in the early morning arrival period before 06:00. These properties are eligible to receive 50% of the cost of replacement windows and external doors, or free secondary-glazing, and free loft insulation and ventilation.
- The Night Noise Insulation Scheme (or Night Scheme) is designed to address the impact of night flights on local residents. The scheme boundary is based on the footprint of the noisiest aircraft regularly operating between 23:30 and 06:00. These properties are eligible to receive 50% of the cost of replacement bedroom or bedsitting room windows, or free secondary-glazing of bedroom or bedsitting room windows, and free loft insulation and ventilation.

Figure 3.1 Boundaries for Existing Noise Insulation Schemes



3.1.2 The Community Buildings Noise Insulation Scheme applies to noise-sensitive buildings around Heathrow that are exposed to a medium to high level of noise (within the 2002 63dB $L_{Aeq,16hr}$ noise contour). This includes hospitals, schools and colleges, nurseries attached to schools and hospices, nursing homes, registered nurseries, libraries and community halls. The scheme pays for buildings to make noise-insulating modifications such as double-glazing, replacement windows and ventilation. Eligible buildings are those in widespread use within the community, where people spend long periods of time, or where they are vulnerable.

3.1.3 Heathrow has two other schemes to assist home owners that are not directly related to noise insulation. The Home Relocation Assistance Scheme which offers financial help to eligible homeowners living in the noisiest areas around Heathrow to move away from the area if they wish. The Vortex Protection Scheme is designed to protect and repair homes around the airport damaged by wind currents from aircraft wing. These are discussed in more detail in Section 6.

3.2 Proposed New Residential Noise Insulation Schemes

3.2.1 The Noise Insulation Schemes are designed to ensure a suitable internal acoustic amenity for habitable rooms as summarised in the table below.

Table 3.1 New Residential Noise Insulation Schemes

Scheme	Noise Source	Description
Scheme 1	Aircraft noise	This includes a full package of noise insulation to habitable rooms, including bedrooms, living rooms, and dining rooms. This may include kitchens, toilets, bathrooms, but does not including porches, conservatories, out buildings and rooms solely for leisure activities. Windows may be upgraded to acoustic double glazing or by the addition of secondary glazing or both. External doors to habitable rooms may be upgraded. Ceilings or lofts may be over-boarded with additional lining. Acoustic thermal insulation batts (or equivalent) may be installed above ceilings in lofts. Suitable ventilation may be provided so that windows can be kept closed in warm weather. The scheme will be prioritised in the following order to: a) prevent exposure above UAEL due to the Project, b) avoid exposure newly above SOAEL due to the project, c) avoid exposure above SOAEL due to the project or existing operations, and d) deliver Heathrow's wider noise insulation commitments
Scheme 2	Road, rail and construction noise	Existing windows may be upgraded with replacement acoustic double-glazed units with "acoustic ventilation" or by the addition of secondary glazing, and external doors to habitable rooms may be replaced with doors that comply with the requirements of the Noise Insulation Regulations. Works are usually only to the façade (side) of the house that is closest to (or has line of sight of) the road or construction site.
Scheme 3	Aircraft noise	This is a £3000 contribution to a package of noise insulation treatment. For example, an owner might choose to replace certain windows or external doors, or install ventilation.

3.2.2 The Noise Insulation Schemes will provide additional noise insulation within properties that are exposed, or likely to be exposed, above the Action Levels set out below in Section 4.2.

3.2.3 Insulation aims to improve the internal acoustic amenity of the property in accordance with NPSE and the Airports NPS. The scheme is not intended to improve the noise environment outside of the property or building e.g. gardens.

3.2.4 To ensure the schemes are sustainable and will provide lasting benefit for people and properties, Heathrow will provide work packages from agreed suppliers with

suitable quality management procedures and aim to meet or exceed the minimum requirements of Airports NPS as set out above.

3.2.5 The schemes will provide “like for like” replacement of existing windows, doors etc, where reasonably practicable. This means that existing PVC windows will be replaced with PVC, aluminium with aluminium, and white with white. Approved contractors may be able to offer upgrades (e.g. timber effect or painted frames) as an extra cost option to the applicant. Cat flaps cannot normally be fitted to acoustic doors and windows but may be moved to doors or walls of non-habitable rooms.

3.2.6 The schemes will not be provided to properties that currently meet or exceed the benefit of the eligible package to avoid disruption without benefit, or even degradation, of existing properties.

3.2.7 Roofs are not replaced in the Noise Insulation Schemes and due to complications associated with existing roof conditions, it is not practical to replace roof windows or skylights. Generally, roof windows are replaced when a vortex protection roof is installed under the Vortex Protection Scheme. (See Section 6).

3.2.8 For practical reasons, ceiling over-boarding is usually undertaken by the home owner or their contractor with guidance provided and costs covered by the Noise Insulation Scheme.

3.3 Community Buildings Noise Insulation Scheme

3.3.1 The current community buildings scheme will be extended to cover community buildings impacted by expanded activity at Heathrow.

3.3.2 Community buildings include schools and colleges, hospitals, hospices and nursing homes, libraries and other public buildings where a large number of people will spend long periods of time or where the use is considered to be noise sensitive.

3.3.3 The scheme will identify potentially eligible community buildings within the contour whose owners will be invited to apply. Unsolicited applications will also be considered.

3.3.4 As per Airports NPS (5.245), the Action Level for schools will reduce to 60dB $L_{Aeq,16hr}$ (for a future operational scenario) compared to the current scheme based on the 2002 63dB $L_{Aeq,16hr}$.

3.3.5 A desktop or drive-by initial assessment may be used to determine if a site inspection is needed. Each eligible community building will receive an assessment to identify a suitable package of measures which will be carried out by an approved installer.

3.3.6 The scheme may include the provision of replacement acoustic double glazing or secondary glazing, external doors and ventilation. Eligible schools will also be invited to apply for grants for adobe buildings which provide outdoor noise-reducing shelter.

3.3.7 Insulation will only be offered if the building is not already insulated to an equivalent level to that of our scheme.

3.4 Impact on Existing Schemes

3.4.1 All residents entitled to claim for the existing schemes will be notified of the scheme closure with a period of at least 12 months during which claims may be lodged before closure.

3.4.2 The Quieter Homes Scheme (QHS) will be expanded to reflect any changes in Government policy before DCO is granted. If the DCO is granted and there is a decision to proceed with construction, then Scheme 1 will replace QHS. The Action Level for Scheme 1 will be lower than the existing QHS, so there will be expanded eligibility. This means homes eligible for the current QHS will be eligible for Scheme 1.

3.4.3 The Day and Night Schemes will be closed down if the DCO is granted and there is a decision to proceed with construction. Property owners in the areas of the schemes will be notified prior to the scheme closure and will also be advised if they are likely to be eligible for the new schemes. They will have the option to apply for the existing scheme before closure or apply for the new schemes when they open. Some areas of both schemes will become eligible for Scheme 1 which is a more complete treatment of the house but may not be delivered until after opening of the new runway. In some areas currently in the Night Scheme, furthest from the airport, night-time noise levels have decreased, and some homes may become eligible for Scheme 3 after the opening of the new runway.

3.4.4 The Community Buildings Noise Insulation Scheme (CBNIS) will be extended and no currently eligible building will lose eligibility.

3.4.5 The Home Relocation Assistance Scheme and the Vortex Protection Scheme will be refreshed to take the Project into account. See Section 6 of this document.

4. DEFINING ACTION LEVELS

4.1 Outline

4.1.1 Action Levels are the noise levels which can trigger the actions in the Noise Insulation Schemes. They are the threshold levels of eligibility for the Project's different schemes and noise sources. The Action Levels will be presented geographically as "contour lines" identifying the boundary of land where the Action Levels are exceeded.

4.1.2 In addition to aircraft noise, the Project will generate construction noise and noise from new or altered roads and railways that may cause potential adverse effects on communities. The Noise Insulation Schemes for each source vary and are described in more detail in Section 3.2.

4.2 Action Levels

4.2.1 The Action Levels for air, road, rail and construction noise, are provided below, based on metrics described in more detail in Appendix B and the PEIR.

Table 4.1: Action Levels for Aircraft, Road, Rail and Construction Noise

Noise Source	Action Level	Noise Insulation Scheme	Requirement Reference
Aircraft Noise	Unacceptable Adverse Effect Level (UAEL) Day time: 71dB $L_{Aeq,16hr}$ Night time: 66dB $L_{Aeq,8hr}$	Scheme 1 (with bespoke insulation package)	PEIR
	Initially, SOAEL values of 63dB $L_{Aeq,16hr}$ day, 55dB $L_{Aeq,8hr}$ night and one additional awakening per night (92-day summer averages). Then the full single mode easterly and westerly 60dB $L_{Aeq,16hr}$ noise contour of an expanded airport	Scheme 1	PEIR/ Airports NPS
	The full single mode easterly and westerly 57dB $L_{Aeq,16hr}$ or the full 55dB L_{den} noise contours of an expanded airport, whichever is the bigger	Scheme 3	Airports NPS
Road Noise	Day time: 63dB $L_{Aeq,16hr}$ Night time: 55dB $L_{Aeq,8hr}$ (and a change of at least 1dB from before expansion)	Scheme 2	PEIR
Rail Noise	Day time: 65dB $L_{Aeq,16hr}$ Night time: 55dB $L_{Aeq,8hr}$ >20 passbys per night: 80dB L_{Amax} <20 passbys per night: 85dB L_{Amax}	Scheme 2	PEIR

Noise Source	Action Level	Noise Insulation Scheme	Requirement Reference
	(and a change of at least 1dB from before expansion)		
Construction Noise	Refer to section 11 of the Draft Code of Construction Practice or Appendix B of this policy.	Scheme 2	CoCP and BS5228

4.3 Combined noise sources

4.3.1 The cumulative effect of different noise sources on health and quality of life is difficult to evaluate, especially where different noise metrics are used.

4.3.2 As a starting point, the noise level for each source (aircraft, road, rail, or construction) will be assessed separately using the relevant Action Level. Where a resident is affected by more than one noise source (for example construction noise and aircraft noise) a cumulative assessment will be undertaken that, as appropriate, will take account of when insulation may be triggered for the different sources and combined effects. Details of the assessment methodology will be defined in the Environmental Statement supporting the DCO application and this document will be updated.

4.3.3 Noise from natural sources, such as wind and rain, is not included in the NPSE definition of environmental noise. Furthermore, other noise sources that are not associated with the airport activity such as existing roads and railways are also excluded from this Noise Insulation Policy. When assessing a house site for noise insulation, any noise measurements or calculations will be undertaken or adjusted to exclude noise sources that are not caused by airport operations or expansion.

5. DELIVERY

5.1 Phasing and Transition from existing schemes

5.1.1 The new noise insulation schemes will replace the existing noise insulation schemes as described above. The stages of the Noise Insulation Policy are shown below in Table 5.1 below.

5.1.2 We will also consider options to assess the effectiveness of the new Noise Insulation Schemes, and to demonstrate our ability to deliver our schemes for subsequent stages.

5.1.3 The staged roll out of programmes may overlap and will ensure all properties likely to be significantly exposed to adverse noise effects will be offered noise insulation before the source of the noise effect is introduced. This staging will also help to avoid long waiting times between applications and fit outs.

Table 5.1 – The Staged Roll-out of Noise Insulation Schemes.

Stage	Period	Homes for Noise Insulation	Scheme
Stage 1	From late 2019 (subject to CAA approval) until DCO application is granted	Homes that are exposed to the highest noise with existing operations, in line with latest Government policy, and this includes homes that would also be exposed to the highest noise with the Project. Also homes potentially exposed to early construction noise as well as existing high aircraft noise. Homes will also be selected in this stage to develop and test our systems and suppliers. (Figure 5.1)	Scheme 1
Stage 2	Between DCO application granted and start of major construction phases	Homes identified as potentially impacted by construction noise, but outside forecast aircraft noise impacted areas. (Figure 5.2 shows the indicative construction noise study areas.)	Scheme 2
Stage 3	Between DCO application granted and new runway opening	Homes forecast to be newly exposed to high, or very high, noise levels from aircraft or the new or altered roads or rail, in stages as the Project progresses.	Scheme 1 and Scheme 2
Stage 4	New Runway opening onwards	Insulation provided in advance for homes forecast to exceed SOAEL for aircraft (i.e. 63dB $L_{Aeq,16hr}$ day and 55dB $L_{Aeq,8hr}$ night) as traffic using the expanded airport grows to a point where the airport's noise impact is forecast to be highest (the peak year as defined in the Environmental Statement). There will also be progressive roll-out of offers to homes at aircraft noise levels from SOAEL down to the 60dB Action Level as airport movements grow.	Scheme 1

Stage	Period	Homes for Noise Insulation	Scheme
		Figure 5.3 has the current estimate of the predicted noise contour for 2027, but revised noise contour forecasts will be published every 5 years. (This is referred to as the Inner Area in the PEIR. We expect this stage to be completed by 2040).	
Stage 5	New Runway opening onwards	There will be progressive roll-out of offers to homes at noise levels down to the 57dB $L_{Aeq,16hr}$ and 55dB L_{den} Action Levels as airport movements grow. Revised noise contour forecasts will be published every 5 years. (This is referred to as the Outer Area in the PEIR.)	Scheme 3

5.2 Identification of eligible buildings

5.2.1 At each stage, the relevant existing or predicted noise contour will be used to identify the properties that may be eligible for the Noise Insulation Schemes. Noise contours will be calculated based on expected air, road, rail and construction traffic movements and the modelling of construction plant noise.

5.2.2 For this consultation, preliminary noise contours are available below and in Chapter 17 of the PEIR. The aircraft noise contours have been developed based on indicative flight paths. These contours are presented to provide an indication of the scope of the Noise Insulation Schemes.

5.2.3 For the DCO application in 2020, updated noise contours will be provided in the Environmental Statement.

5.2.4 The predicted aircraft noise contours will also be updated as part of the statutory airspace flight path options consultation for an expanded Heathrow, currently planned for 2022, and further again in 2023 when the final flights paths are defined.

5.2.5 This will mean that the aircraft noise contours are expected to evolve and be updated as the Expansion scheme design and airspace change process continues to evolve and develop. This may result in some changes to the predicted future contours so that some homes indicated as being within a certain noise contour may later fall outside that contour and vice versa. The aim at each stage will be to reduce the noise impact, in line with the Airports NPS and the ICAO “balanced approach”, which would also reduce or change the homes within the contours, as far as reasonably practicable.

5.2.6 Subsequently, the current noise contours will be published every year (for the previous year), and projected noise contours will be updated every 5 years in conjunction with developments of the Noise Envelope.

5.2.7 This will mean that future eligibility for noise insulation schemes will be continually reviewed and residents will be informed if they are likely to be eligible within 5 years. Where a 5-year review identifies that a contour may reduce and properties may not be eligible in future, the scheme will remain open for at least 12 months after the property ceases to be within a relevant contour.

5.2.8 In densely developed areas such as those with terraced homes, there are likely to be adjacent properties exposed to similar noise levels with one property inside the contour whilst its neighbour outside. For this policy any residential property with any part of its curtilage within the contour will be assessed to be within the contour.

Figure 5.1 – Stage 1 – Prior to DCO Grant

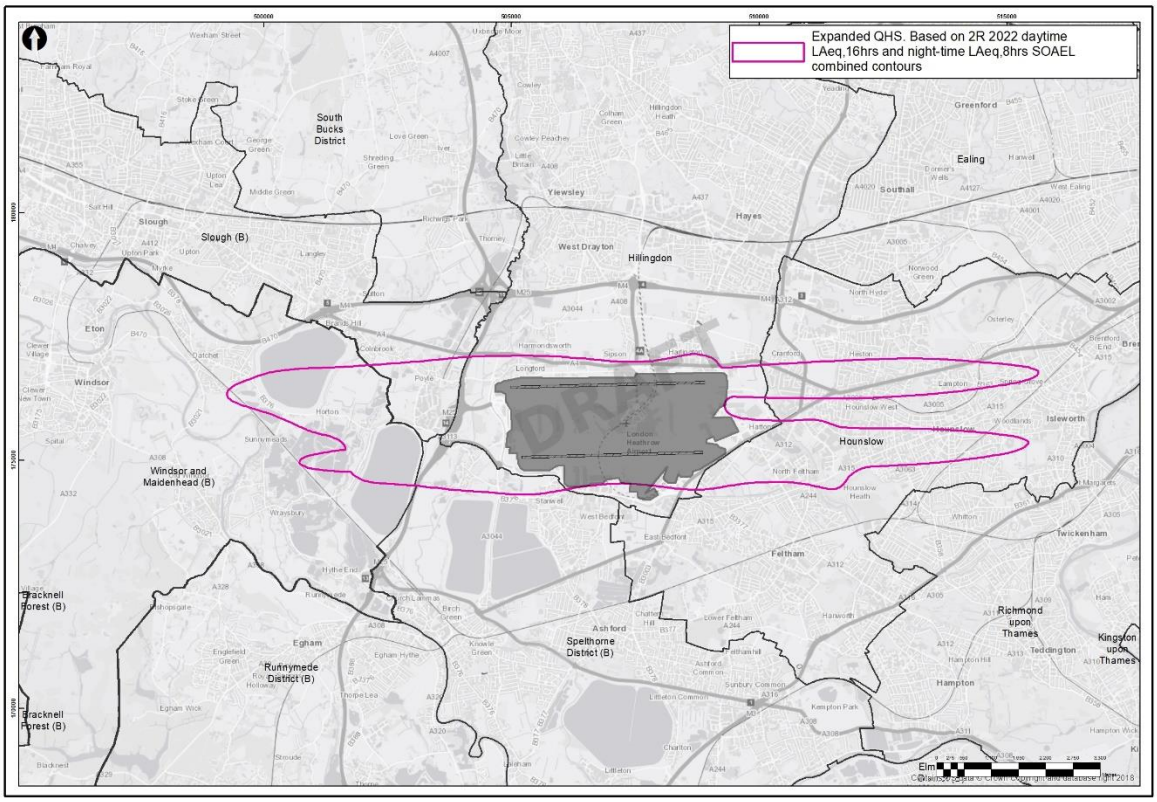


Figure 5.2 – Stage 2 – Indicative Construction Noise Study Area

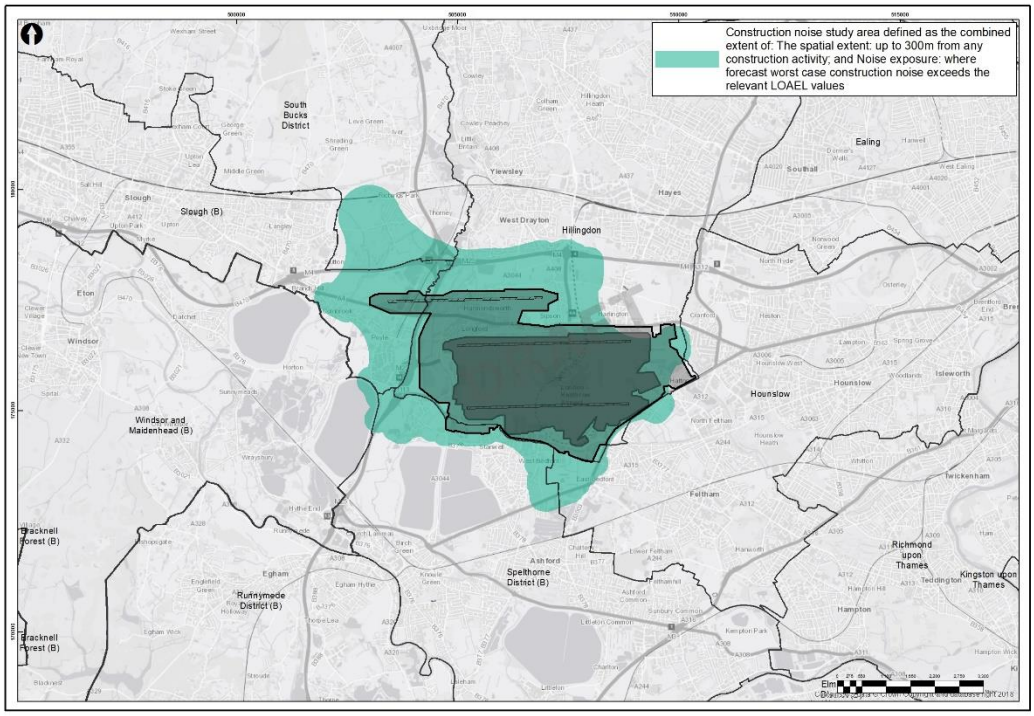
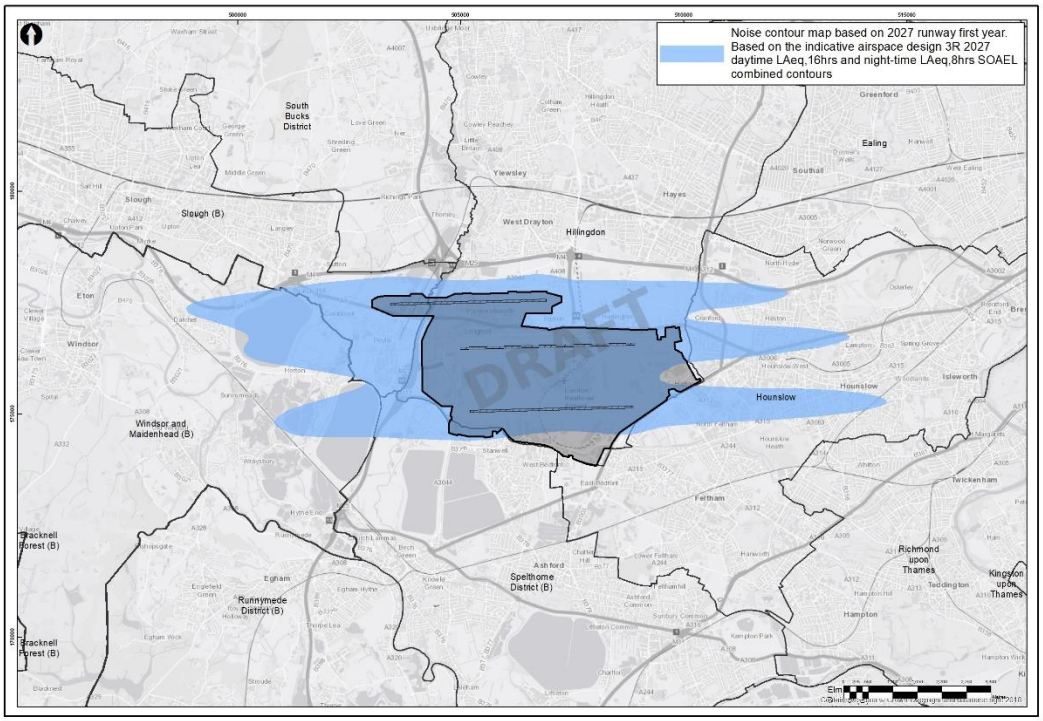


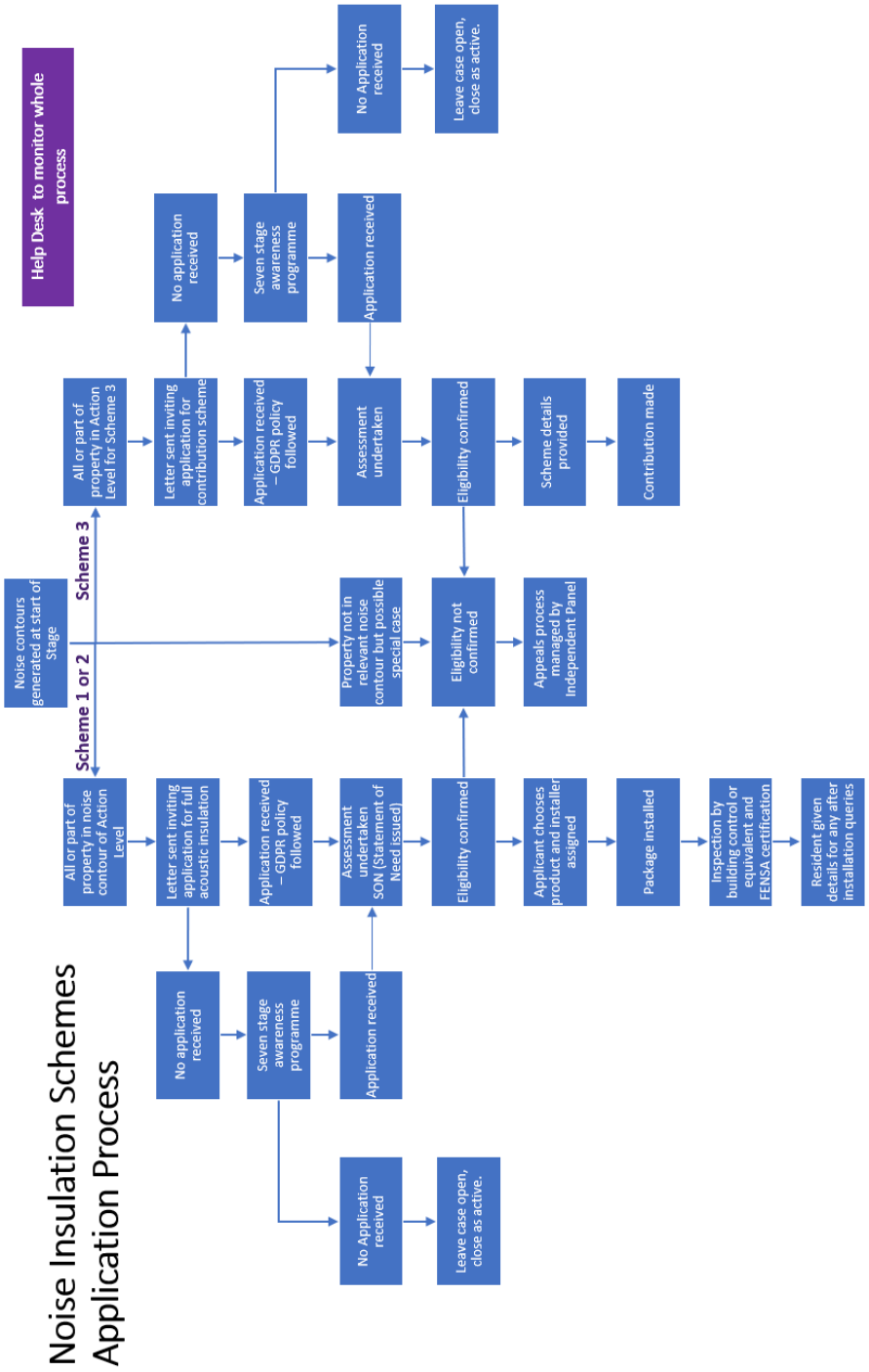
Figure 5.3 – Stage 3 – Indicative Noise contour map based on 2027 runway opening year



5.3 Application Process

5.3.1 The process for delivering the Noise Insulation Schemes is summarised in a flow chart in Figure 5.4.

Figure 5.4 – Application Process Flow Chart



5.3.2 At each stage, or at intervals within a stage, the owners of properties identified as within the relevant noise contour will be contacted by post and advised that they are eligible to apply for the scheme.

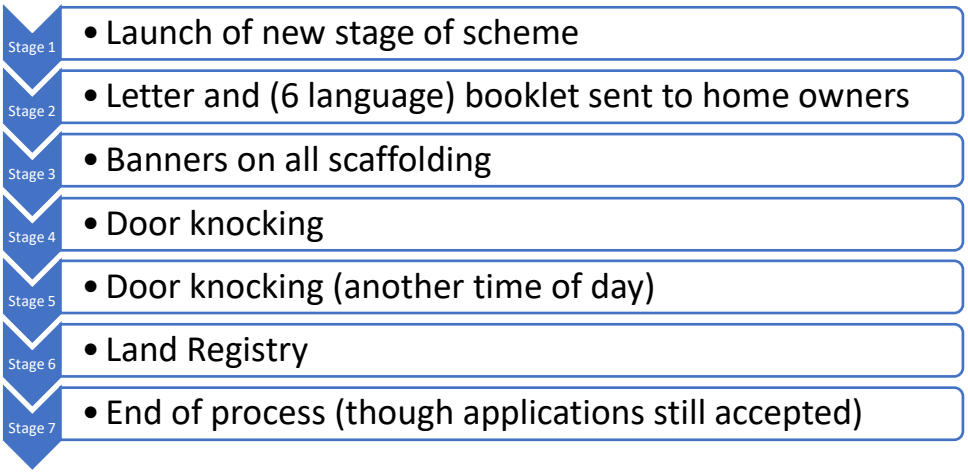
5.3.3 Where a property is rented, the tenant must obtain the permission of the property owner to apply for the scheme. This is for legal reasons.

5.3.4 Although Heathrow will seek to identify all eligible people and invite them to apply, a helpdesk will be available for people to check if they are eligible to apply.

5.3.5 The invitation to property owners will be supported by a seven-stage programme that is designed to promote awareness of the scheme and encourage applications. The seven-stages are outlined in a flow chart in Figure 5.5 and Appendix C.

5.3.6 If the homeowner does not respond during this seven-stage process, the application will be marked as dormant unless the property is within the UAEL contour. The homeowner may apply at a later date (if still eligible) but we cannot then guarantee that the insulation will be installed before the noisy activity starts.

Figure 5.5 Seven-stage awareness programme



5.3.7 Once an application has been received and a property owner has registered for the scheme, an assessment of the property will be carried out by the Assessor, a third-party organisation appointed by Heathrow. An initial desktop or drive-by assessment may be used to identify if a detailed inspection is required.

5.3.8 The initial assessment will address the following questions:

- Is the applicant entitled to apply for the property (the homeowner or appointed agent)?
- Is the property within a relevant noise contour?
- What is the relevant scheme and is there a priority for delivery?

- Has the property benefited from a previous scheme? What is the condition of the property?
- What works or options would be offered under the relevant scheme?
- Are any consents required for the works?
- Are there any special considerations?

5.3.9 Once the Assessor confirms eligibility, the property owner will be provided with scheme details and a list of approved installers or processes to enable work to take place. For Scheme 1 this will normally be summarised in a Statement of Need (SON) based on the house construction external noise levels, and priority.

5.3.10 Records will be made of all properties contacted as eligible, persons making applications under the scheme, the outcome of the assessment, and the satisfactory completion of the package, if provided.

5.3.11 Heathrow will seek to provide information to home owners, house purchasers or their agents and tenants, on request, concerning the eligibility of properties for noise insulation schemes, subject to data protection and confidentiality requirements. It is for this reason the database of information is managed by an address rather than the owner's or resident's name.

5.3.12 Properties eligible for the Scheme 3 contribution to noise insulation will be required to use a supplier approved by Heathrow to ensure suitable quality management.

5.3.13 After the completion of works, auditing will be conducted to demonstrate compliance. This will include performance inspection or tests of a sample range of properties.

5.3.14 A dedicated support team will be provided to assist applicants throughout the process, including people needing special assistance, and to investigate any complaints during and after completion. Applicants will also be able to appeal to the Independent Panel. (See Section 5.4.)

5.3.15 Reasonable time needs to be allowed for applicants to be identified, for applicants to consider and apply for the scheme, to receive applications and determine eligibility, and to carry out the works. Therefore, the Noise Insulation Schemes will open in advance of the relevant expected noise change. It is also possible that applicants may defer, perhaps hoping that they will find the noise acceptable and avoid the disruption of the works. The schemes will therefore remain open for at least a year after the relevant expected noise change occurs.

5.3.16 Where consents are required for the installations proposed by the Noise Insulation Schemes, for example, planning, listed building or conservation area consents, and building control, the appointed contractor and the Heathrow support team will

assist the applicant in obtaining the necessary consents[1]. It is normally the responsibility of the homeowner to obtain these consents, but in some circumstances support with consent applications could be provided.

5.4 Appeals and Exceptions

Applications from non-eligible properties

5.4.1 Although Heathrow will seek to identify all eligible home owners and invite them to apply, a help desk will support other people who wish to check eligibility to apply. These may be people who are not in the current stage, or who are outside the contours, or who have a special case for consideration.

Appeals

5.4.2 An independent appeal process will be available to applicants who do not accept an eligibility or Statement of Need (SON) decision. After the initial response by the Assessor, an appeal may be made to an Independent Panel who will carry out an initial review, consider if further action is appropriate and advise the complainant of their decision.

5.4.3 Heathrow will set up and fund the Independent Panel in consultation with other community and local authority stakeholders, modelled on that set up for the Thames Tideway project.

Exceptions

5.4.4 The policy and schemes described above meet or exceed the minimum requirements of the Airports NPS and NPSE, and provide sustainable and practical schemes for the majority of people and properties. However, there may be exceptional cases where a bespoke alternative performance standard to meet the requirements could be considered. Examples may be:

- a person with a specific health or disability issue associated with noise,
- a property which is not suitable for the standard schemes, such as some listed or historic buildings,
- a property exposed to very high noise levels above the UAEL of 71/66dB $L_{Aeq,16/8hr}$ for aircraft noise.

5.4.5 Bespoke assessments and schemes are inherently costly and can be disproportionate in the effort and funds required for assessment and design compared to delivery and therefore may not be considered practicable or

[1] Normally the property owner or resident will apply for the consent and retain the benefit of any permissions granted.

sustainable but can be appropriate in exceptional circumstances. The Independent Panel would review cases where bespoke assessments may be justified and recommend the most appropriate treatment options. Where substantial works are required, temporary relocation may be offered on a similar basis to that offered for construction noise.

5.4.6 For the very few properties that will be newly exposed above the UAEL, where an application is not received or an offer accepted, we may need to obtain compulsory rights to provide bespoke treatments to prevent exposure above UAEL. Such treatments may also need to include temporary rehousing to allow the work to be done to those homes. This will be addressed in the DCO application.

6. OTHER SCHEMES BEYOND THE NOISE INSULATION POLICY

In addition to the noise insulation schemes in this draft Noise Insulation Policy, Heathrow has two other existing noise and vortex related schemes that will be refreshed. These are the Home Relocation Assistance Scheme which offers financial help to eligible homeowners living in the noisiest areas around Heathrow to move away from the area if they wish; and the Vortex Protection Scheme which is designed to protect and repair homes from around the airport damaged by wind currents from aircraft wings.

Heathrow will also introduce a Temporary Rehousing Scheme for those most impacted by short term construction noise. These schemes are summarised in this section for reference.

6.1 Proposed Temporary Home Relocation Scheme

6.1.1 This section sets out a draft proposal for a Temporary Home Relocation Scheme for those most impacted by short term construction noise.

6.1.2 Where, after applying best practical means mitigation, construction noise at any residential receptor is predicted to exceed the construction noise insulation Action Levels for a temporary period, Heathrow would offer an option of temporary re-housing for the duration of the works. The Action Level will be based on the UAEL for construction noise of around 75 to 85dB $L_{Aeq,T}$, as detailed in Appendix B.

6.1.3 Heathrow will contact the owners or occupiers of properties affected before the works are due to start to allow residents to find alternative property and move before the noisy works begin. Temporary re-housing could be a similar rental property or a hotel.

6.1.4 Heathrow will provide a help desk and work with local property agents to identify suitable temporary accommodation and support applicants who choose to find their own temporary housing. Applications will be assessed for:

- Property location and eligibility
- Ownership/occupancy
- Accommodation requirements including any special needs or adaptations

6.1.5 Eligible applicants will receive a Statement of Need (SON) setting out what range of temporary accommodation will be provided within the scheme, details of local letting agents, removal and storage companies, and the Heathrow helpdesk support.

6.1.6 Subject to eligibility, Heathrow would pay the reasonable costs of:

- Equivalent temporary accommodation based on reasonable market rates,
- Packing and removal costs, and storage of personal goods if required
- Kennel/cattery or equivalent housing for pets,
- Works to secure the vacated property when empty, including disconnection and re-connection of services, and
- Additional insurance for temporary accommodation and vacated property.

6.1.7 Applicants will be able to make their own arrangements, but payments will be audited and claimants must receive approval from Heathrow of the supplier and of the costs before using suppliers not previously audited by the scheme.

6.1.8 Heathrow will usually seek to support temporary accommodation as close as practical to the vacated property, but sufficiently distant to avoid significant noise impacts. Where temporary accommodation is a significant distance from the permanent location, assistance with travel costs (e.g. workplace or school) may be provided.

6.2 Home Relocation Assistance Scheme (HRAS)

6.2.1 Since 2002, Heathrow has offered the Home Relocation Assistance Scheme to offer financial help to eligible homeowners living in the noisiest areas around Heathrow to move away from the area if they wish. It was developed in consultation with local residents, businesses, campaign groups and local authorities. People who meet the criteria can get financial assistance with the costs of moving.

6.2.2 This current HRAS scheme applies to residential properties around Heathrow that are exposed to a high level of noise defined for this scheme as lying within the 2002 69dB $L_{Aeq,16hr}$ noise contour.

6.2.3 The criteria for eligibility including the following:

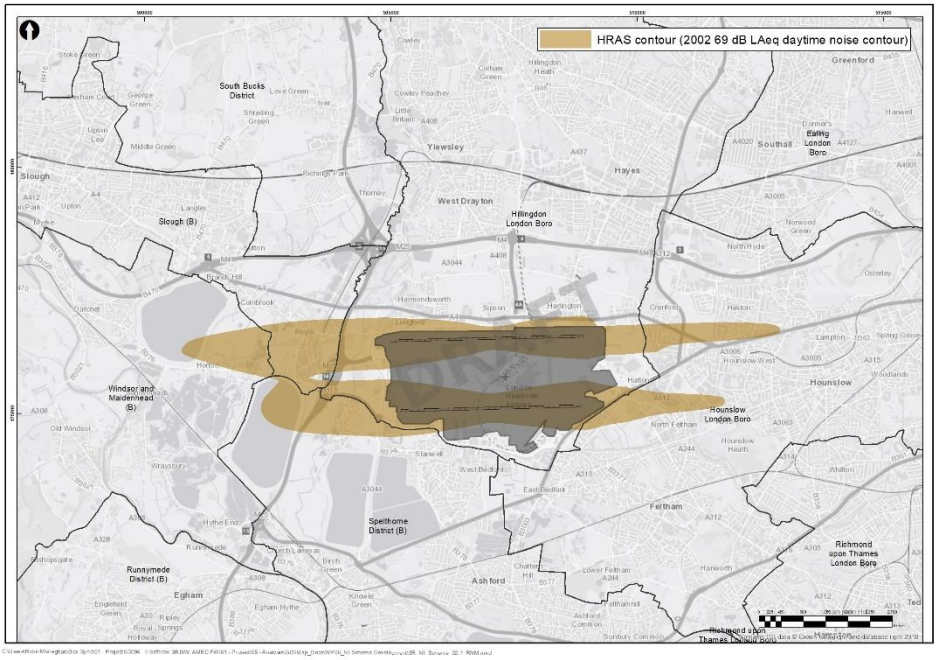
- The applicant must own the property when applying. (If the applicant lives elsewhere, it must be the only property in the UK that is owned by the applicant.)
- The applicant must be planning to move to a quieter area outside the boundaries of the scheme.
- The applicant must not retain a beneficial interest in, or right of occupation to, the property after moving.

- Residents must have owned or be living in the property prior to February 2005.
- Long-term tenants (with at least three years remaining on their lease) may also be eligible for assistance if the property they are renting is being sold. However, short-term tenants are not eligible for the scheme.

6.2.4 Homeowners receive a lump sum of £5,000, plus 1.5% of the sale price of the property (up to a maximum of £12,500). There is only one payment per property. No other assistance is provided and the property is no longer eligible for a Noise Insulation Scheme[2]. The property is sold in the open market by the owner.

6.2.5 More information on this current scheme and its eligibility criteria are provided by a Noise Helpdesk (0800 344844) or email communityschemes@heathrow.com

Figure 6.1 – Boundary for Existing HRAS



6.2.6 Heathrow is taking the opportunity to enhance the Home Relocation Assistance Scheme. The eligibility criteria will remain the same.

6.2.7 The compensation values are under review. Under the refreshed HRAS, eligible homeowners would receive the same lump sum of £5,000 and an additional 5% of the sale price of the property, up to a new higher maximum cap. There is only one payment per property.

[2] Under the "agent of change" and "caveat emptor" principles, the open market buyer of a property should consider any noise insulation requirements within their purchase price offer. For houses purchased by Heathrow, any noise insulation scheme would normally be provided before the property is returned to the market.

6.2.8 HRAS will apply to the areas to east, west and possibly south of the existing two runways based on the $L_{Aeq,16hr}$ 69dB noise contour. (See below for discussion of the year of the applicable contour.)

6.2.9 As with the Noise Insulation Schemes, HRAS eligibility will require that some part of a property lies within the relevant, calculated noise contour.

6.2.10 More information about a refreshed HRAS will be available later this year. Eligibility for HRAS will continue to be based on the 69dB $L_{Aeq,16hr}$ contour from 2002. It can be noted that since 2002, the annual noise contour at Heathrow has continually decreased is size, which means that some houses that qualified for HRAS in the past, now lie outside the current 69dB contour.

6.2.11 In 2021, if the DCO is granted and there is a decision to proceed with construction, HRAS will be based on the 69dB $L_{Aeq,16hr}$ contour for 2020 (because the 2021 contour will not be available). With expansion, however, there may be years when the noise contour could be different to the previous year. Therefore, the intention is that HRAS will be based on the noise contour for 2020 or the projected contours for 2025, whichever is larger. Subsequently, from 2026, HRAS will be based on noise contour for 2025 and the projected contours for 2030, whichever is larger.

6.2.12 In this manner, a homeowner will be able to make a decision on selling and claiming the HRAS scheme, based on the highest noise levels expected for five years.

6.2.13 If with the publication of a new HRAS contour, a property newly falls outside, previous eligibility for the scheme will be considered for 12 months.

6.3 Vortex Protection Scheme

Existing Vortex Protection Scheme

6.3.1 A vortex is a circulating current of air generated by the wings of an aircraft. It can sometimes strike and damage the roofs of houses located under a flight path. Pitched roofs with loose-laid tiles are prone to vortex damage. For many years, Heathrow has had a Vortex Protection Scheme to both repair and protect homes around the airport.

Damage Repair

6.3.2 If a home has been damaged by a vortex strike, Heathrow operates a 24-hour emergency service and will repair it. Although legal liability for vortex damage rests with the airlines, Heathrow voluntarily funds this scheme as part of its commitment to its local communities.

6.3.3 Every house, school, church or hospital affected by a vortex strike is eligible for the Vortex Protection Scheme. This includes home situated above commercial properties. However, the scheme does not cover damage to other property, such as cars, from roof tiles dislodged by a vortex.

6.3.4 An assessor will inspect a roof reported as damaged. The damage caused by vortex strikes is very specific and the assessor will quickly be able to confirm whether one has occurred. Once approved, remedial repairs to the roof are carried out at no cost to the home owner.

Vortex Protection

6.3.5 If a roof is repaired under the Vortex Protection Scheme, the property is eligible for permanent protection. This involves strengthening the roof by fixing down tiles with metal clips that have passed stringent wind tunnel tests – this has proven to be the most effective way to protect roofs from vortex damage. This work will be completed as soon as possible and free of charge.

6.3.6 Because the majority of vortex strikes are concentrated in small areas near the end of runways, Heathrow offers blanket vortex protection for homes in these high-risk areas. This currently includes streets where 50% of the homes on a given road have been struck, where all of the homes are invited to register under a blanket scheme.

6.3.7 To date, no further vortex damage has been recorded at any home that has had its roof strengthened under the Vortex Protection Scheme.

6.4 Expanded Vortex Protection Scheme

6.4.1 For the Project, a new blanket area based on the new runway layout has been defined that identifies homes where vortex damage may occur. After granting of the DCO and a decision to proceed, Heathrow will undertake vortex protection of all of the roofs in the defined area that are eligible within a blanket roll out.

6.4.2 After opening of the new runway expected in 2026, the Vortex Protection Scheme will continue as it does today. We will respond to reports of vortex damage, and areas with many confirmed reports of damage will be considered for blanket protective treatments.

APPENDIX A: GLOSSARY

Term	Definition
Airports NPS (or ANPS)	Airports Noise Policy Statement (2018)
APF	Airports Policy Framework
BS 5228	British Standard 5228 (2014): Code of practice for noise and vibration control on construction and open sites Part 1: Noise.
BS8233	British Standard 8233 (2014): Guidance on sound insulation and noise reduction for buildings
CAA	Civil Aviation Authority
CoCP	The Draft Code of Construction Practice included in the current consultation documents.
CRTN	Calculation of Road Traffic Noise – a guidance document for road noise referred to in the Noise Insulation Regulations
CRN	Calculation of Railway Noise – a guidance document for rail noise referred to in the Noise Insulation Regulations
dB (or dBA)	Decibel (usually A-weighted to approximate the response of the human ear.) is used to measure noise level on logarithmic scale (relative to a standard reference.)
DCO	Development Consent Order
DfT	Department for Transport
Double glazing	This is a window pane with two sheets of glass giving better noise insulation (and thermal insulation) performance than a pane of single glazing. The double glass units are factory sealed and installation will usually require the removal of the existing windows and frames. Acoustic double glazing, for example using laminated glass, can provide better noise reduction than standard thermal double glazing.
ENG	Environmental Noise Guidelines for the European Region (2018)
GCN	Guidelines for Community Noise (WHO 1999)
The Project	Heathrow Expansion Programme
HRAS	Home Relocation Assistance Scheme
ICCAN	Independent Commission on Civil Aviation Noise
L_{A10} or L_{10}	The noise level exceeded for 10% of a measurement period. This is traditionally used to measure road traffic noise.
$L_{Aeq,16hr}$	The noise level averaged over the 16-hour day period (07:00-23:00) and over the 92-day summer period. This day time aircraft noise metric has been used in the UK since the 1980's.
$L_{Aeq,8hr}$	The noise level averaged over the 8-hour night period (23:00-07:00) and over the 92-day summer period. This night time aircraft noise metric has been used in the UK since the 1980's.
$L_{Aeq,T}$ or $L_{eq,T}$	The energy equivalent noise level over a specified period, T, and A-weighted to approximate the response of the human ear.
L_{den}	The annual average energy equivalent noise level, A weighted to approximate the frequency response of the human ear and time weighted for day, evening and night time periods. This annual aircraft noise metric was adopted as the standard noise metric in the EU in 2002.

L_{Amax} or L_{max}	The maximum noise level occurring during a measurement period, A weighted to approximate the frequency response of the human ear.
L_{night}	The A-weighted noise level averaged over the 8-hour night period (23:00-07:00) and over the calendar year.
LOAEL	Lowest Observable Adverse Effect Level
NNG	Night Noise Guidelines (WHO 2009)
Noise Insulation Policy	The policy set out in this document to address the Airports NPS requirements for the Heathrow Expansion Programme, The Project.
Noise Insulation Regulations	Noise Insulation Regulations (1974) as amended by Noise Insulation Regulations (Amended) 1988 and The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996
Noise Insulation Schemes	The 3 schemes or levels of acoustic treatment for aircraft, road, rail and construction noise set out in this Policy.
Noise Insulation Strategy	Heathrow's wider and long-term approach to the insulation of homes and community buildings for existing activities, airspace changes and the Expansion Project.
NPPF	National Planning Policy Framework (2019)
NPSE	Noise Policy Statement for England
PPG or PPGN	Planning Practice Guidance-Noise (2014)
The Project	The Heathrow Expansion Programme
Secondary glazing	This is an upgrade of the acoustic performance of an existing window, by the installation an addition glazing pane in its own frame on the existing sill of the window.
SOAEL	Significant Observable Adverse Effect Level
SON	Statement of Need
UAEL	Unacceptable Adverse Effect Level
WHO	World Health Organisation

APPENDIX B: NOISE METRICS AND ACTION LEVELS

Aircraft Noise [92-day summer average levels unless noted otherwise]				
Level	Daytime dB $L_{Aeq,16\ hr}$	Night time dB $L_{Aeq,8\ hr}$	Event dB L_{Amax}	Policy Source
"*approximate onset of significant community annoyance*"	54			APF (2013) as amended by Consultation Response on UK Airspace Policy (2017)
LOAEL	51	45		Air Navigation Guidance (2017) and PEIR
Financial assistance toward insulating homes and schools	63			Consultation Response on UK Airspace Policy (2017)
SOAEL	63	55	One additional awakening per person, per night	PEIR
Proposed new expectation for financial assistance toward insulating homes and schools	60			Draft Aviation Strategy 2018
UAEL	71	66		PEIR
Action Level for Scheme 1	The full single mode easterly and westerly 60dB $L_{Aeq,16hr}$ noise contour of an expanded airport		One additional awakening per night	
Action Levels for Scheme 3	The full single mode easterly and westerly 57dB $L_{Aeq\ 16hr}$ or the full 55dB L_{den} noise contours of an expanded airport, whichever is the bigger		One Additional awakening per night	Airports NPS (5.245)
Proposed Govt new expectation for financial assistance toward insulating homes	An increase of 3dB compared to before expansion which leaves a household in the 54dB $L_{Aeq,16hr}$ contour			Draft Aviation Strategy 2018

Road Noise				
Level	Daytime $L_{Aeq,16\ hr}$	Night time $L_{Aeq,8\ hr}$	Event	Source
LOAEL	50	40		PEIR
SOAEL	63	55		PEIR
UAEL	71	66		PEIR
Action Levels for Scheme 2	63/55dB $L_{Aeq\ 16/8\ hr}$ (and a change of at least 1dB from before expansion)			PEIR and Noise Insulation Regulations
Rail Noise				
Level	Daytime $L_{Aeq,16\ hr}$	Night time $L_{Aeq,8\ hr}$	Event L_{Amax}	Source
LOAEL	50	40	60	PEIR
SOAEL	65	55	80 (>20 events) or 85 (<20 events)	PEIR
UAEL	71	66		PEIR
Action Levels for Scheme 2	65/55dB $L_{Aeq\ 16/8\ hr}$ (and a change of at least 1dB from before expansion)			PEIR and Noise Insulation Regulations

Construction Noise

In line with Section 11 of the draft CoCP, to be eligible the dwelling must be one in which the predicted or actual noise exceeds any of the relevant thresholds in CoCP Table 11.1 for:

- A period of 10 or more days of working in any 15 consecutive days during construction, or
- A total of 40 days or more in any 6 consecutive months during construction

The noise thresholds for both construction and noise insulation are set out in the Table below:

Day	Time (hours)	Averaging Period, T	Noise Insulation Action Level $L_{Aeq,T}$ (dB)*	Construction Temporary Rehousing Action Level $L_{Aeq,T}$ (dB) *
Monday to Friday	0700 – 0800	1 hour	70	80
	0800 – 1800	10 hours	75	85
	1800 – 1900	1 hour	70	80
	1900 – 2200	1 hour	65	75
Saturday	0700 – 0800	1 hour	70	80
	0800 – 1300	5 hours	75	85
	1300 – 1400	1 hour	70	80
	1400 – 2200	1 hour	65	75
Sunday & Public Holiday	0700 – 2200	1 hour	65	75
Any night	2200 – 0700	1 hour	55	65

*	DCO Project construction noise only. Trigger levels are defined as 1m in front of the closest façade of a habitable room. Where measurements are used, they will be taken either at the façade or in free-field. A façade correction will be applied to any free-field measurements to establish the façade level.
*	Where the current ambient noise level is greater than the noise insulation trigger level: 1. the ambient noise level will be used as the noise insulation trigger level 2. the temporary rehousing trigger level will be the ambient noise level +10dB.

APPENDIX C: SEVEN-STAGE AWARENESS PROGRAMME TO INFORM AND ENCOURAGE APPLICANTS

Stage 1: Launch of New Stage

Public awareness of the launch of a new stage of noise insulation will be driven through notices posted at the following – Community Centres, Churches, Local MP's and Schools.

Stage 2: How individual residents are made aware of Heathrow's Noise Insulation Scheme

All property owners that qualify for Heathrow's current stage are individually written to explaining the scheme in detail. A comprehensive booklet written in six languages will be sent to all homes identified within the relevant contour – English, Arabic, Hindi, Polish, Punjabi and Urdu.

Every effort is made to ensure that qualifying residents are able to understand the booklets that outline the scheme, key facts, explain proposed works and most importantly who to contact should further information be required to clarify what is in the booklet and answer any questions.

Stage 3: Banners on all scaffolding

During works on a property, scaffolding set up at a home being fitted out will include a banner displaying. Neighbouring properties will be able to that it is a Heathrow related scheme and neighbours will be encouraged to phone up, investigate their eligibility and register for the scheme.

Stage 4: Door knocking

Staff 'door knock' resident's properties that are eligible for the scheme to speak directly with them and hand over another booklet that explains the scheme in detail. This will give the residents the opportunity to ask any questions that they may have as a result of the scheme being discussed. In the event that there is nobody home at the time of the visit, another booklet will be posted to drive awareness of the Noise Insulation Scheme.

Stage 5: Door knocking

Stage 4 is repeated at a different time of day. If, for example, a property was originally visited in the morning then the second visit would be in the afternoon to make every effort to speak with the resident.

Stage 6: Land Registry

Heathrow contact the Land Registry with a view to contacting landlords whose homes qualify for NIS. A comprehensive booklet will be posted to further drive awareness of NIS to help drive registrations.

Stage 7: End of process

Make a record that all awareness processes have been completed. The residents/ landlords still have the opportunity to come forward as long as they are still within the specified noise contour. The purpose of documenting is to demonstrate that all seven stages have been processed.

There are lots of ways you can contact us or find out more

Find all the consultation information on our website aec.heathrowconsultation.com

Email any questions about the consultation to info@heathrowconsultation.com

Follow @LHRconsultation to stay up to date on event details

Call our freephone number 0800 307 7996 (open Monday to Friday, 9am-6pm)

If you would like a large text or alternative format of this document, please contact 0800 307 7996 or email info@heathrowconsultation.com

AIRPORT EXPANSION CONSULTATION

Heathrow

YOUR LONDON AIRPORT
Gatwick

GATWICK AIRPORT LIMITED

Environmental Noise Directive

Noise Action Plan 2019–2024

Annex Document

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GLOSSARY OF TERMS

AAL	Above Aerodrome Level
AMSL	Above Mean Sea Level
ACARE	Advisory Council for Aeronautical Research in Europe
ACOP	Arrivals Code of Practice
ACP	Airspace Change Proposal
AEF	Aviation Environment Federation
AIP	Aeronautical Information Publication
ANASE	Attitudes to Noise from Aviation Sources in England
ANEG	Airspace and Noise Engagement Group
ANMAC	Aircraft Noise Monitoring Advisory Committee. The committee is chaired by the Department for Transport and comprises, among others, representatives of the airlines, Heathrow, Gatwick and Stansted airports and airport consultative committees at these airports.
ANS	Air Navigation Solutions Ltd
AONB	Area of Outstanding Natural Beauty
APU	Auxiliary Power Unit. A power unit located on the aircraft.
APF	Aviation Policy Framework
ATC	Air Traffic Control
ATWP	Air Transport White Paper
BAA	BAA Ltd, the company which previously owned Gatwick, Stansted and Edinburgh airports. Now known as Heathrow Airport Holdings Ltd.
CAA	Civil Aviation Authority
CDO	Continuous Descent Operations
CNG	Community Noise Group (attends the Noise Management Board)
dB (A)	A unit of sound pressure level, adjusted in accordance with the A weighting scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Decibel (dB)	The decibel (dB) is a logarithmic unit of measurement that expresses the magnitude of a physical quantity relative to a specified or implied reference level. Its logarithmic nature allows very large or very small ratios to be represented by a convenient number. Being a ratio, it is a dimensionless unit. Decibels are used for a wide variety of measurements including acoustics, and for audible sound A-weighted decibels (dB (A)) are commonly used.
DEFRA	Department for Environment Food and Rural Affairs (UK Government)
DfT	Department for Transport (UK Government)
ECAC	European Civil Aviation Conference
EHSOR	Environment, Health, Safety and Operational Resilience (committee)

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ANNEX ONE

GLOSSARY OF TERMS

EMB	Executive Management Board (of Gatwick Airport)
END	Environmental Noise Directive
EPNdb	Effective Perceived Noise Decibels (EPNdB). It refers to the metric 'EPNL' (Effective Perceived Noise Level) which is used for noise certification and takes account of tones and duration.
ERCD	Environmental Research and Consultancy Department of the Civil Aviation Authority
FAS	Future Airspace Strategy
EHO	Environmental Health Officer
FEGP	Fixed Electrical Ground Power
FLOPSC	Flight Operations Performance & Safety Committee
FPT	Flight Performance Team (previously known as the Flight Evaluation Unit)
GAL	Gatwick Airport Limited, the owner and operator of London Gatwick Airport
GATCOM	Gatwick Airport Consultative Committee
GNC	Ground Noise Committee
GNMG	Gatwick Noise Monitoring Group
GPU	Ground Power Unit
ICAO	International Civil Aviation Organization
ILS	Instrument Landing System
LAMP	London Airspace Management Programme
LOAEL	Lowest Observable Adverse Effect Level
LP/LP	Low Power / Loew Drag
L_{A90}	A-weighted sound level exceeded for 90% of the time
$L_{Aeq,\ 16h}$	The A-weighted average sound level over the 16 hour period of 07:00 – 23:00
$L_{Aeq,T}$	The notional A-weighted equivalent continuous sound level which, if it occurred over the same time period, would give the same noise level as the actual varying sound level. The T denotes the time period over which the average is taken, for example LAeq,8h is the equivalent continuous noise level over an 8 hour period.
L_{day}	The A-weighted average sound level over the 12 hour day period of 07:00 - 19:00
L_{den}	The day, evening, night level, Lden is a logarithmic composite of the Lday, Levening, and Lnight levels but with 5 dB(A) being added to the Levening value and 10 dB(A) being added to the Lnight value.
L_{eq}	Equivalent sound level of aircraft noise in dB(A), often called equivalent continuous sound level. For conventional historical contours this is based on the daily average movements that take place in the 16 hour period (07:00 - 23:00 LT) during the 92 day period 16 June to 15 September inclusive.
$L_{evening}$	The A-weighted average sound level over the 4 hour evening period of 19:00 - 23:00

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L_{night}	The A-weighted average sound level over the 8 hour night period of 2300 – 0700
MCR	Managing Corporate Responsibility (committee)
NADP	Noise Abatement Departure Procedure
NAP	Noise Action Plan
NATMAG	Noise and Track Monitoring Advisory Group
NATS	Formerly known as National Air Traffic Services Ltd. NATS is licensed to provide en-route air traffic control for the UK and the Eastern part of the North Atlantic, and also provides air traffic control services under contract at several major UK airports.
Noise Contour	Map contour line indicating noise exposure in dB for the area that it encloses
NM	Nautical mile
NMB	Noise Management Board
NOAEL	No Observable Adverse Effect Level
NPR	Noise Preferential Route
NPS	National Policy Statement
NTK	Noise and Track Keeping monitoring system. The system associates radar data from air traffic control radar with related data from noise monitors at prescribed positions on the ground.
PNdB	Perceived Noise Level, measured in PNdB. Its measurement involves analyses of the frequency spectra of noise events as well as the maximum level.
QC	Quota Count - the basis of the London airports Night Restrictions regime.
QNH	Barometric altimeter setting which will cause the altimeter to read altitude above mean sea level.
SA	Sustainable Aviation - a UK aviation industry initiative aiming to set out a long term strategy for the industry to address it sustainability issues.
SOAEL	Significant Observed Adverse Effect Level - this is the level above which significant adverse effects on health and quality of life occur.
S.106	Section 106 (S106) Agreements are legal agreements between Local Authorities and developers; these are linked to planning permissions and can also be known as planning obligations.
WHO	World Health Organisation

EXTRACT FROM THE GUIDANCE FOR AIRPORT OPERATORS BY DEFRA

WHAT NEEDS TO BE INCLUDED IN AN ACTION PLAN?

An Action Plan must be drawn up for places near the airport which are affected by noise from airport operations as shown by the results of the noise mapping and meet a number of requirements set out in the Regulations:

- a description of the airport and any other noise sources taken into account;
- the authority responsible;
- legal context;
- any limit values in place;
- a summary of the results of the noise mapping, including an evaluation of the estimated number of people exposed to noise;
- identification of problems and situations that need to be improved;
- a record of the public consultations that have taken place;
- any noise reduction measures already in force and any projects in preparation;
- long term strategy;
- actions which the airport operator intends to take in the next five years, including measures to preserve quiet areas;
- financial information (if available): budgets, cost-effectiveness assessment, cost-benefit assessment;
- provisions envisaged for evaluating the implementation and the results of the Action Plan; and
- estimates in terms of the reduction of the number of people affected (annoyed, sleep-disturbed, or other).

REVISING AN EXISTING ACTION PLAN

The current plan should be reviewed and revised to include, as necessary:

- updated details about the airport and its operation;
- the results of the noise mapping completed in 2017;
- the progress made against the actions described in the current Action Plan;
- updated information about relevant legislation and standards;
- updated relevant national and local policies;
- information about on-going actions; and
- information about any proposed new actions.

It is envisaged that once the plan has been revised it will be presented to the Airport's Consultative Committee for comment, and any other appropriate bodies depending on the extent and nature of the revisions. The Airport Operator should summarise the comments received in the revised plan together with their response to the issues raised.

SUBMITTING AN ACTION PLAN FOR FORMAL ADOPTION

Once the plan has been updated and finalised, the Regulations require that it be sent to the Secretary of State for DEFRA for formal "adoption". This document can be sent to DEFRA via the noise@DEFRA.gsi.gov.uk email address and must include prominently displayed wording identifying it as a draft subject to formal adoption and approval.

The Secretary of State for DEFRA, in liaison with the Department for Transport, will form a view regarding whether or not the submitted revised plan meets the requirements of the Regulations and, therefore, whether or not the plan is appropriate for adoption.

- If the Secretary of State for DEFRA considers that the

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EXTRACT FROM THE GUIDANCE FOR AIRPORT OPERATORS BY DEFRA

requirements set out in the Regulations are met, they will notify the airport accordingly that the Action Plan has been adopted. The Action Plan should then be published by the Airport Operator as a public document in an electronic format within 28 days.

- If the requirements set out in the Regulations are not met, the airport operator will be required to make the necessary changes to the plan. Following revision, the revised plan will need to be resubmitted to the Secretary of State for DEFRA by an agreed date for further consideration.

ONGOING REQUIREMENT TO REVIEW NOISE ACTION PLANS

The Regulations contain a continuing obligation on Airport Operators to review (and revise, if necessary) the Noise Action Plan every 5 years or sooner where a major development occurs.

Airport Operators may wish to agree to carry out an informal review of the progress being made on the implementation of the Action Plan as part of their continuing engagement with the local airport consultative committee or other stakeholders. The process and timing for any informal review should be jointly agreed between the Airport Operator and the committee, or other stakeholders, as appropriate. Such reviews could form part of any regular environmental reporting that is already undertaken.

It should be noted that the Regulations give the Secretary of State the power to take action should they believe that a requirement of these Regulations is not being met due to any act or omission by the Airport Operator.

UPDATE FROM DEFRA AND DFT

On 9 February 2018, Gatwick Airport Ltd received an update from DEFRA and the DfT in light of queries raised of those departments and also changes to Government's aviation noise policy.

The following is extracted from the update from DEFRA and DfT:

The purpose of this is to highlight these changes [to the Government's aviation noise policy] and draw your attention to some other points that have been raised in discussion and should be taken into account in preparing Action Plans.

On 24 October 2017, the Department for Transport published its Consultation Response on UK Airspace Policy: A framework for balanced decisions on the design and use of airspace. You should consider how these changes to government policy need to be reflected in your Noise Action Plans.

Key changes in the policy to consider are:

- The creation of an Independent Commission on Civil Aviation Noise (ICCAN) – This body will be established this spring to help ensure that the noise impacts of airspace changes are properly considered and give communities a greater stake in noise management. ICCAN may issue best practice guidance in relation to noise management, and you should consider the process through which this will be taken into account in your Action Plan.
- Important changes to aviation noise compensation policy, to improve fairness and transparency. Airspace changes have been incorporated into the existing compensation policy so that compensation policy is the same for all changes which affect noise impacts, regardless of whether they are a result of infrastructure change or airspace change.
- A new requirement for options analysis in airspace change, to enable communities to engage with a transparent airspace change process and ensure options such as multiple routes are considered. The Civil Aviation Authority's airspace change process has been revised to take account of this change.

EXTRACT FROM THE GUIDANCE FOR AIRPORT OPERATORS BY DEFRA

- New metrics and appraisal guidance to assess noise impacts and their impacts on health and quality of life. In particular this will ensure noise impacts are considered much further away from airports than at present. These adverse effects should be assessed using a risk-based approach above the lowest-observed adverse-effect level (LOAEL), using the DfT's transport appraisal guidance WebTAG. Supplementing this risk-based approach with frequency-based noise metrics will ensure that aircraft noise and its impacts can be accurately factored into decisions.

Over the past six months DEFRA has also held a number of discussions about the action planning process with individual airport operators and community groups. In the light of issues raised in those discussions, DEFRA would like to draw to your attention that, when reviewing the Plans submitted for adoption, the Government will pay particular attention to the following aspects set out in the previously circulated guidance:

- "A record of the public consultations that have taken place" (page 11). Some airports have already been in touch with DEFRA to highlight other engagement work that is taking place in parallel to their Noise Action Plan consultations. It is important that the Action Plan process does not contribute to an "overload" in community engagement, and that the consultation is sufficiently long for interested parties to formulate their responses, taking account of other consultations which may be taking place over the same time period and placing a burden on consultees' resources. It is also important that the issues raised by consultees are demonstrably given thorough consideration by airport operators. We shall be looking for evidence of how you have ensured this is the case in your submitted Plans.
- "Estimates in terms of the reduction of the number of people affected (annoyed, sleep disturbed, or other)… as a result of [the measures in] this Action Plan" (p13). Your plans should include evidence that the measures are challenging, objective, quantified (where reasonably practicable), subject to specific timescales, and have taken full account of the views of local communities.
- Where noise reduction measures need the support and active participation of other parties (such as NATS & CAA), please include information on how the airport intends to achieve such co-operation.

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STRATEGIC NOISE MAPS 2016

Figure 1: DEFRA Strategic noise maps, L_{den} 2016

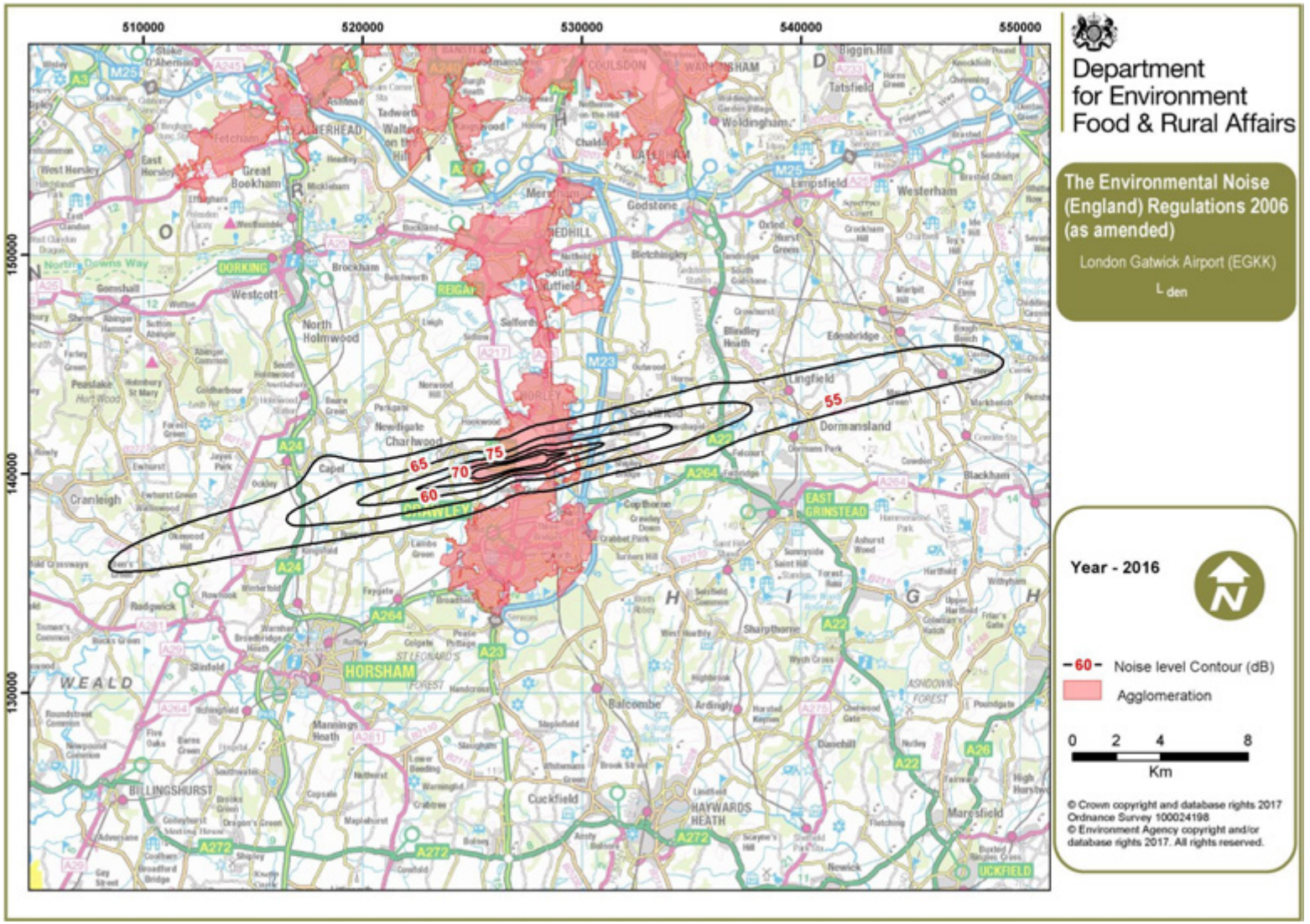
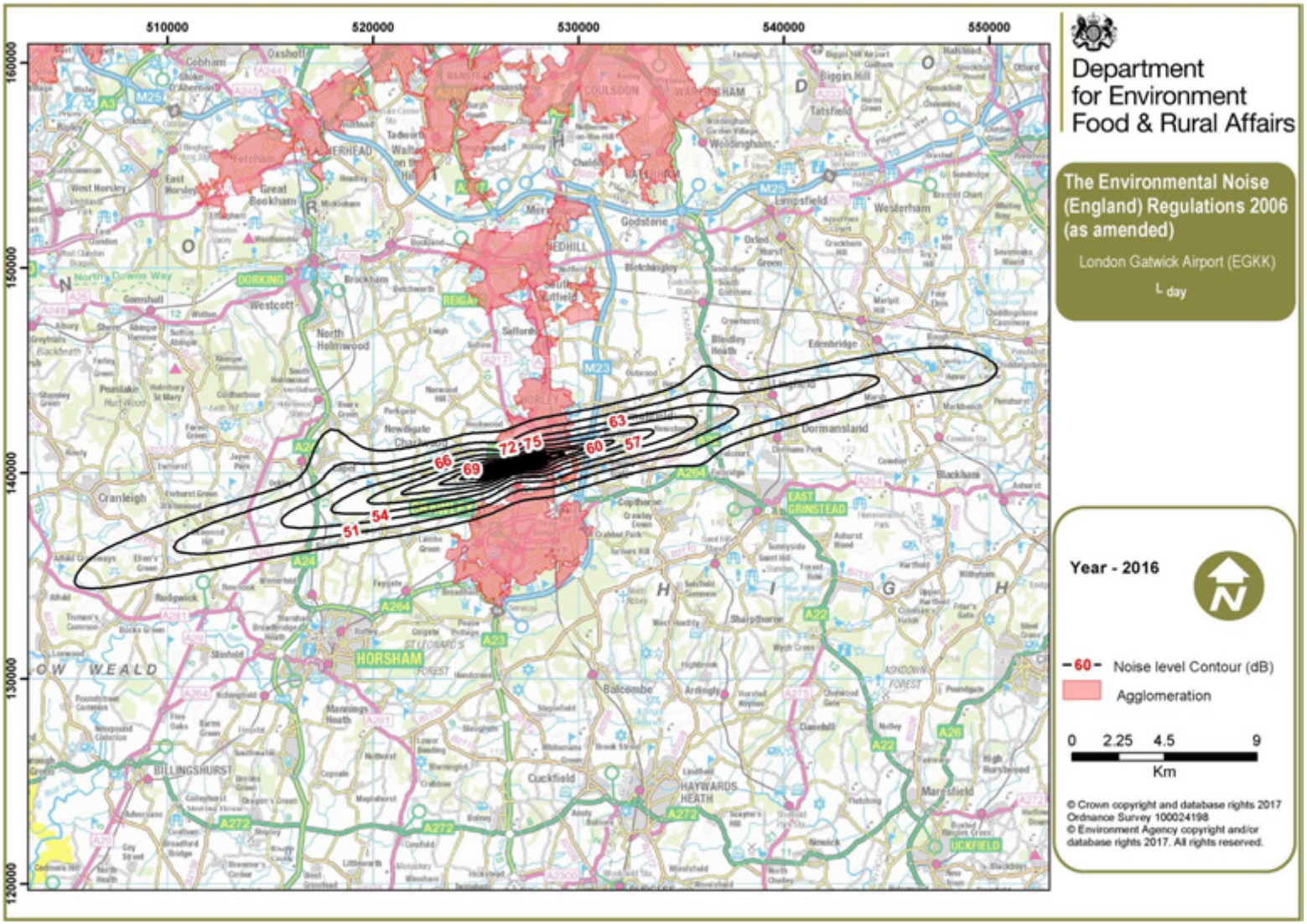


Figure 2: DEFRA Strategic noise maps, L_{day} 2016



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STRATEGIC NOISE MAPS 2016

Figure 3: DEFRA Strategic noise maps, $L_{evening}$ 2016

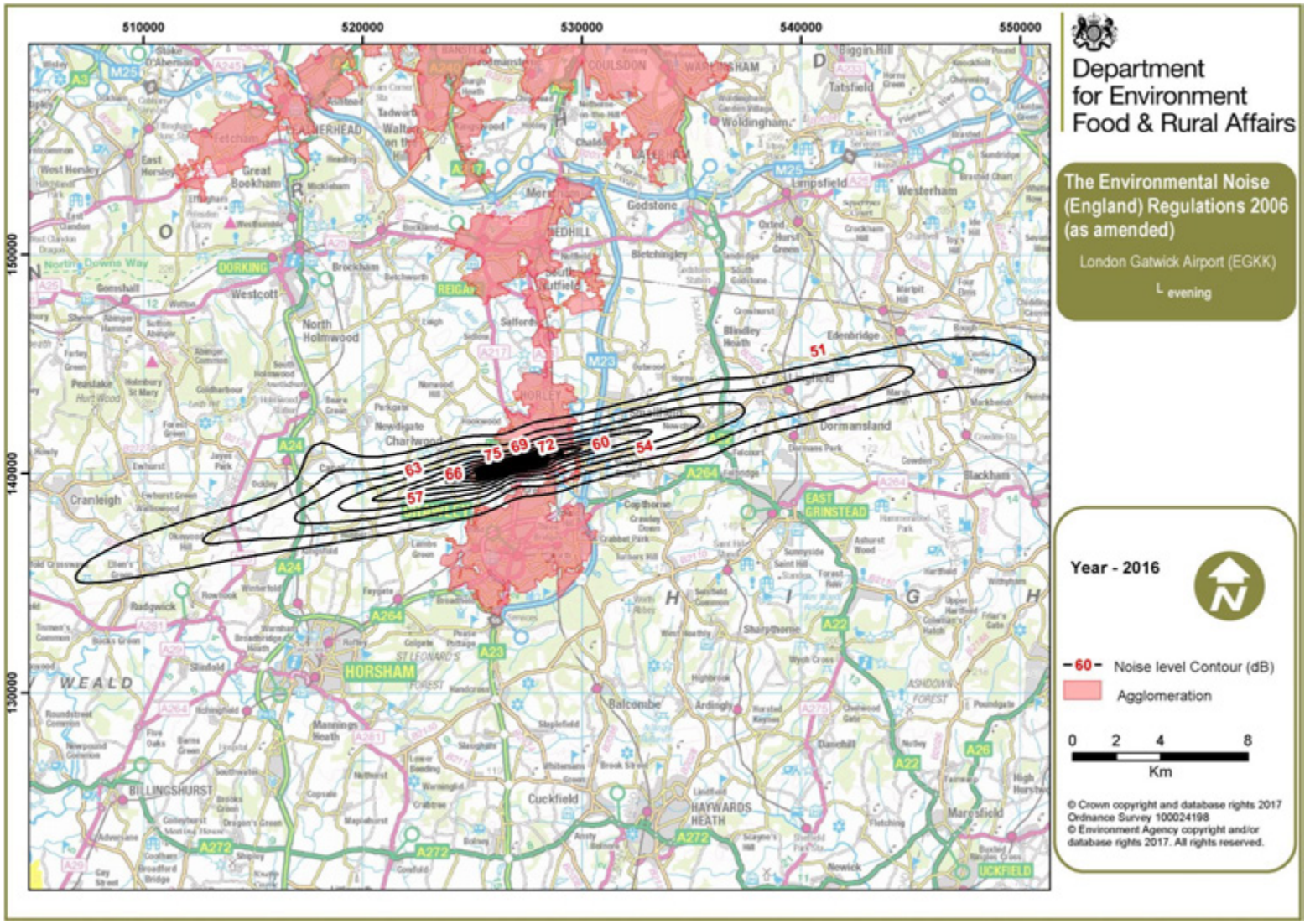
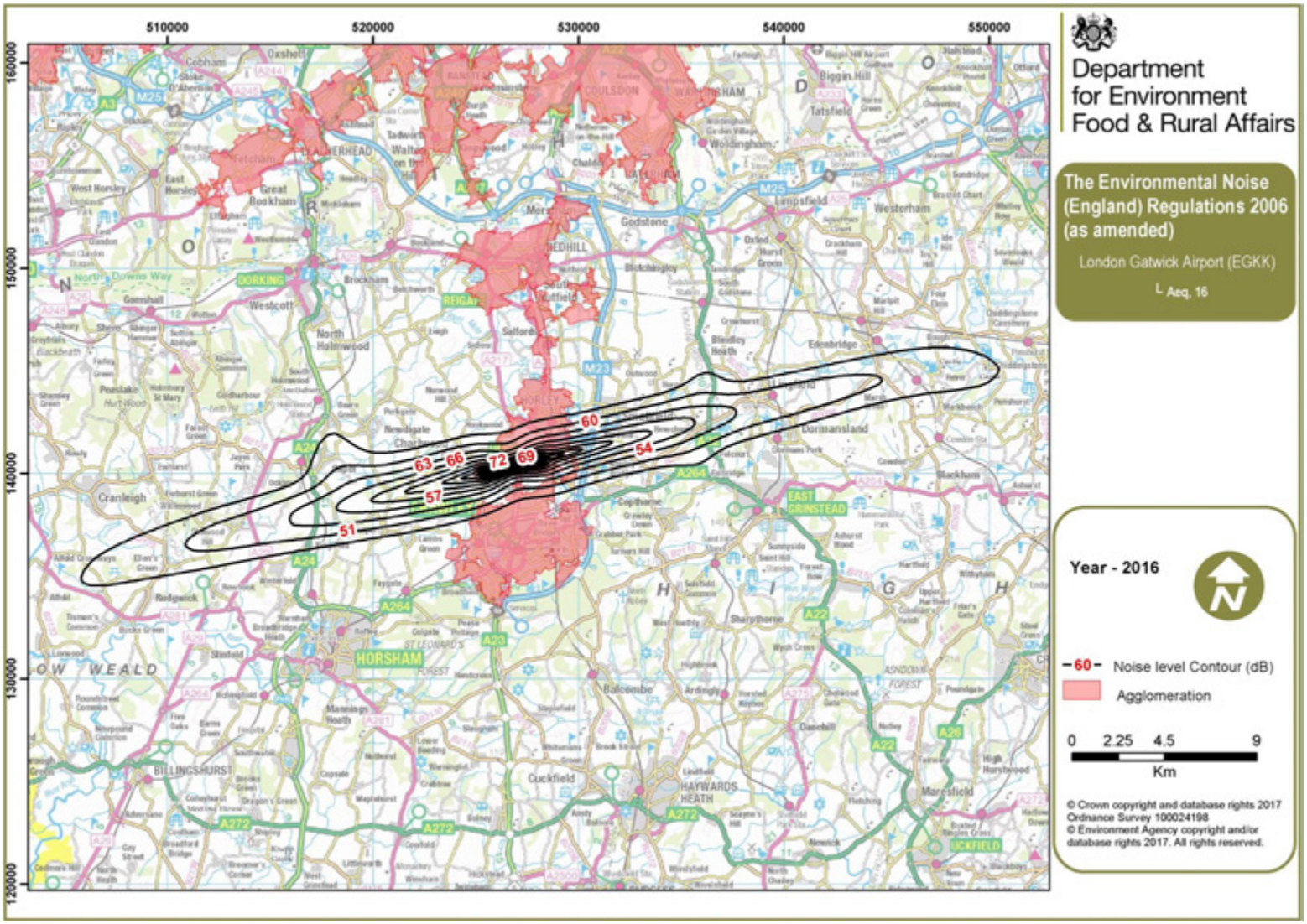


Figure 4: DEFRA Strategic noise maps, $L_{Aeq\ 16}$ 2016



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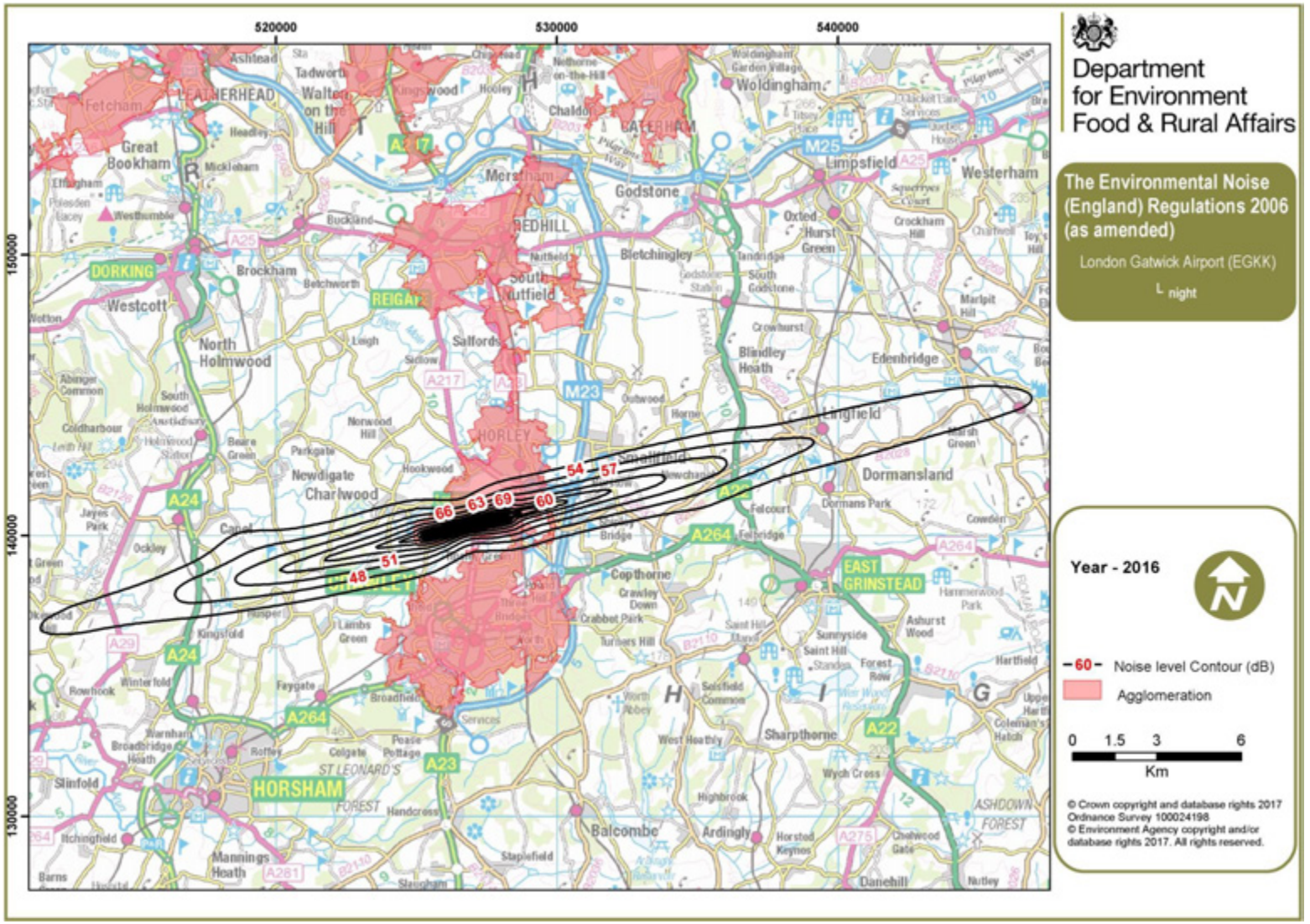
STRATEGIC NOISE MAPS 2016

Figure 5: DEFRA Strategic noise maps, L_{night} 2016

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STATISTICAL INFORMATION

Figure 6: Statistical information in support of the Noise Action Plan

NOISE MITIGATION MEASURES	2010	2011	2012	2013	2014	2015	2016	2017
Aircraft runway movements	240,462	251,019	246,792	250,527	259,974	267,777	280,089	286,271
West/east runway split	64/36	67/33	71/29	63/37	67/33	70/30	67/33	78/22
Standby runway movements	1,012	2,444	14,836	4,473	1,496	2,498	2,567	3,722
Track keeping performance	96.98%	97.42%	97.63%	98.04%	99.28%	99.71%	98.56%*	98.06%
24 hour CDO performance	89.73%	90.49%	88.56%	91.37%	92.61%	89.75%	88.58%**	90.48%
Day/shoulder CDO performance	89.31%	90.38%	88.72%	91.13%	92.43%	89.21%	88.18%**	90.56%
Core night CDO performance	93.94%	93.96%	85.27%	94.04%	95.25%	95.32%	92.90%**	89.60%
1,000ft infringements	6	3	2	0	0	0	0	0
Departure day noise infringements	0	0	0	0	0	0	0	0
Departure night & shoulder noise infringements	0	4	0	0	0	0	1	2
% Night arrivals joining below 3,000ft (2,598ft)	0.15%	0.13%	0.65%	0.46%	0.16%	0.14%	0.21%	0.14%
% Night arrivals joining below 3,000ft (2,798ft)	6.35%	7.41%	16.12%	4.61%	3.08%	2.42%	2.57%	2.60%
Total night arrivals joining at less than 10nm	3.04%	2.86%	5.87%	2.17%	2.46%	1.91%	4.25%	7.39%
% of arrivals performing go-arounds	0.30%	0.31%	0.42%	0.38%	0.39%	0.39%	0.46%	0.43%

NOISE MITIGATION MEASURES	2010	2011	2012	2013	2014	2015	2016	2017
Night jet movements used (Summer)	9,875	9,859	9,837	10,003	11,147	11,149	11,303	11,070
Night jet movements used (Winter)	2,251	1,473	1,656	1,510	1,756	1,872	2,022	1,939
Night jet quota count used (Summer)	4,824	4,998.5	4,993.5	4,821.5	4,943.75	4,765.5	4,912.75	4,527.75
Night jet quota count used (Winter)	1,280.75	920.25	1,044	828.5	852.75	953	1,198.25	1,052.25
Dispensations granted	257	0	0	22	155	435	648	495
Use of 26 WIZAD during night period	1	1	0	0	0	4	0	0
Percentage of Chapter 4 aircraft	98%	96%	99%	99%	99%	99%	99%	99%
57Leq day noise contour area (km²) (actual)	39.6	40.4	41.2	40.9	42.2	42.8	44.2	42.7
57Leq day noise contour population affected (actual)	2,850	3,050	3,650	3,250	3,300	3,650	4,150	4,050
57Leq day noise contour households affected (actual)	1,250	1,350	1,600	1,350	1,350	1,450	1,700	1,650

* Track Keeping performance monitoring changed on 26th May 2016 to include all SIDs.
** The point at which CDO performance measurement commenced changed on the 1st August 2016 from 6,000ft to 7,000ft.

05 | ANNEX FIVE
COMPLAINT DATA

Airports bring positive economic and social benefits as well as environmental impacts. They are important to the economy, providing jobs, encouraging inward investment, and boosting local tourism. However, they can also have an impact for those communities that exist around airports. Noise remains a significant issue for people living or working close to airports or under flight paths. Complaint statistics can be extremely difficult to interpret as a large proportion of all our complaints originate from a very small group of individuals.

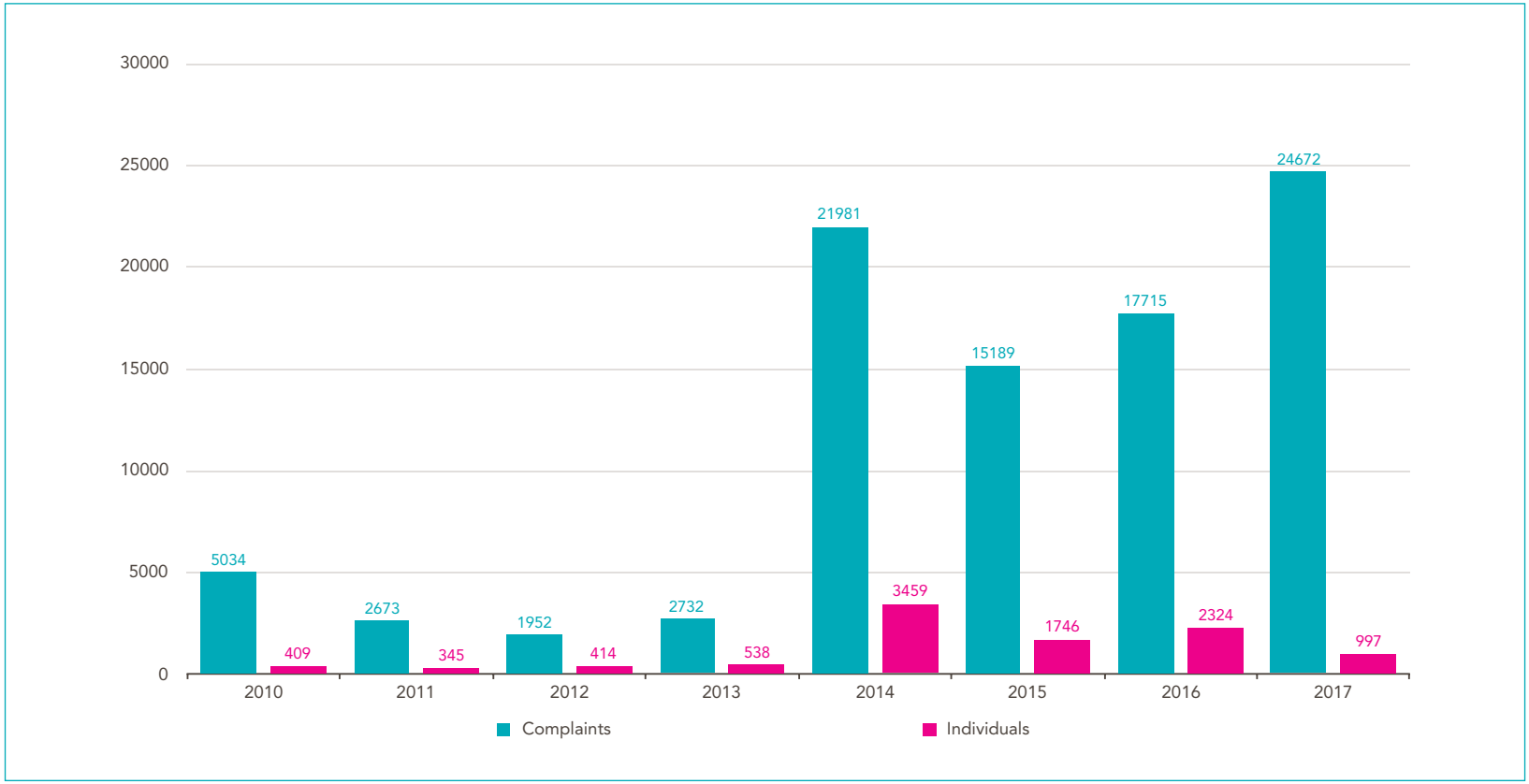
The last UK study on aviation noise Attitudes to Noise from Aviation Sources in England (ANASE) concluded that:

> *"There is common agreement that people today have higher expectations of a peaceful living environment, are less tolerant of environmental intrusion, and might consequently be less accepting of aircraft noise. This view is supported by social trend data. While both income and taste effects are likely to be important, it is not possible to identify their relative strength from [the ANANSE] research: they are, of course, closely correlated."*

All aircraft noise complaints and enquiries are handled by the Flight Performance Team at Gatwick Airport. This team is responsible for recording, investigating and where applicable responding to aircraft noise complaints and to do so, a specialised complaint handling system is used, combining a database, mapping system and flight and noise records from the Airport Noise and Track Keeping system.

Figure 7 below shows the number of individual callers compared to the number of complaints made between 2010 and 2017. This illustrates one of the difficulties in studying the effects of noise, as people's tolerance of noise and their perception of what causes annoyance varies widely. It is highly subjective and differs not only between neighbours, but also between socio-economic groups.

Figure 7: The Number of Individual Complainants and Recorded Complaint Numbers in 2017



ANNEX FIVE

COMPLAINT DATA

Figure 8: The Top 20 Locations for Complaints In 2017

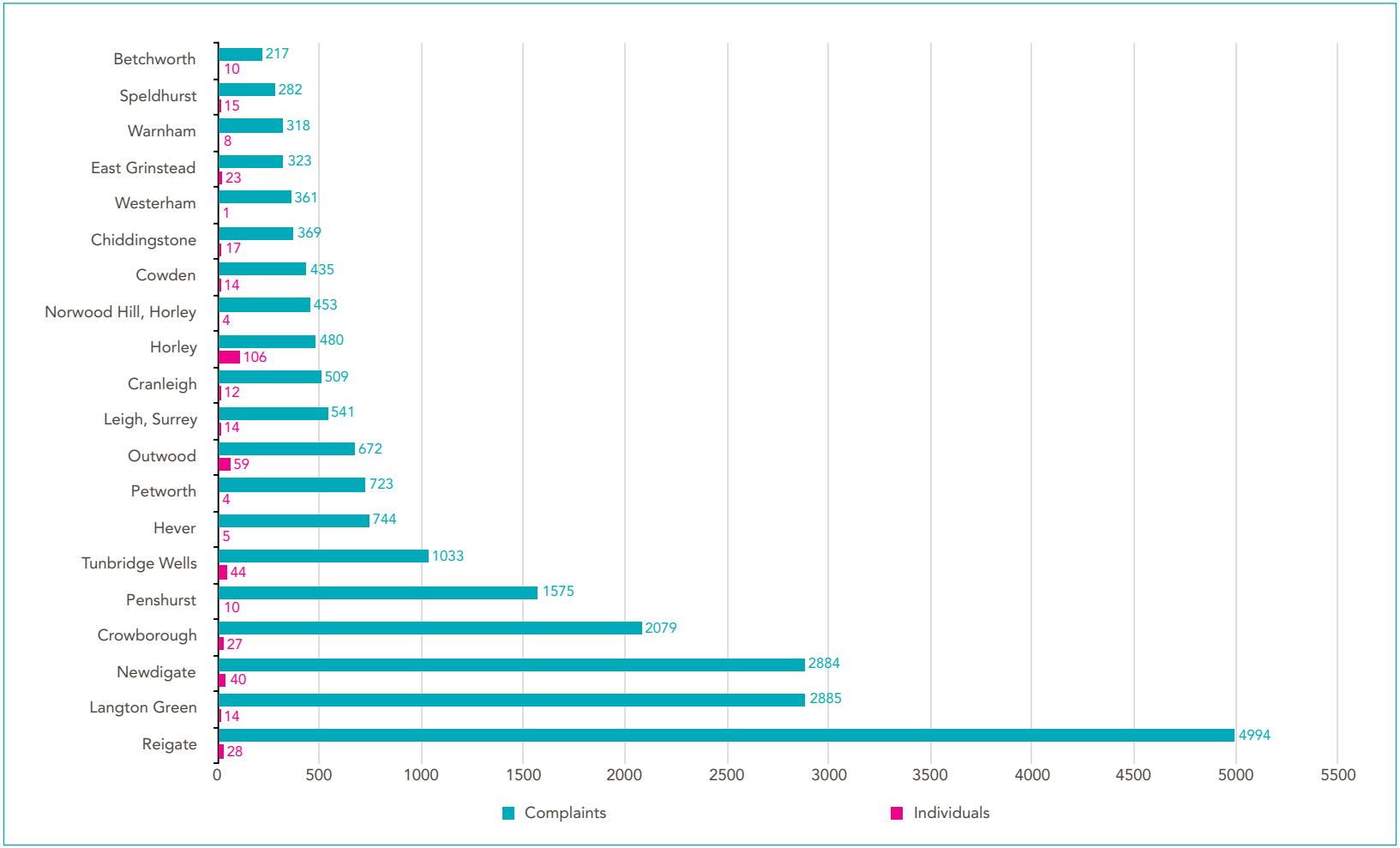


Figure 9: The Analysis of the Distribution of Complaints against Aircraft Types Compared to Total Movements 2017

Our Noise and Track Keeping System has the ability to can also automatically assign a specific aircraft noise complaint with a Gatwick Airport related air traffic movement and therefore enables the airport to provide statistics on the various stages of flight that are the cause for complaint.

The system also categorises the aircraft types that result in the majority of aircraft noise complaints as illustrated in the figure overleaf.

Study of these figures would suggest that aircraft noise is not always the primary issue as it appears it is the frequency of the aircraft that provokes more complaints. The most common aircraft types operating at Gatwick receive the most complaints.

Figure 10 overleaf shows aircraft types classified by their comparable size and the percentage of complaints received per movement.

TYPE	TOTAL NUMBER OF MOVEMENTS	TOTAL COMPLAINTS	% OF MOVEMENTS PER TYPE	% COMPLAINTS PER TYPE
Airbus A320	94,363	2,876	33.00%	24.70%
Airbus A319	87,821	2,686	30.71%	23.07%
Boeing 737	47,074	1,995	16.46%	17.13%
Airbus A380	2,094	801	0.73%	6.88%
Boeing 747	3,159	632	1.10%	5.43%
Airbus A321	13,650	570	4.77%	4.89%
Boeing 777	8,232	563	2.88%	4.83%
Airbus A330	3,907	414	1.37%	3.56%
Boeing 757	6,433	190	2.25%	1.63%
Other Light Aircraft	241	175	0.08%	1.50%
Boeing 787	6,738	155	2.36%	1.33%
Boeing 767	2,170	152	0.76%	1.31%
Embraer	6,308	139	2.21%	1.19%
Helicopter	38	130	0.01%	1.12%
Airbus A310	440	44	0.15%	0.38%
Cessna Citation	168	42	0.06%	0.36%
ATR	1,362	20	0.48%	0.17%
Airbus A340	16	11	0.01%	0.09%
McDonnel Douglas	82	10	0.03%	0.09%
Airbus A350	618	9	0.22%	0.08%
Lockheed	6	9	0.00%	0.08%
Beechcraft Jet	16	8	0.01%	0.07%
Gulfstream	108	5	0.04%	0.04%
Dash 8 Prop	8	3	0.00%	0.03%
Airbus A318	15	2	0.01%	0.02%
Dassault Falcon	70	2	0.02%	0.02%
Canadair Regional Jet	28	1	0.01%	0.01%
Bombardier	766	1	0.27%	0.01%
Fokker 100	26	0	0.01%	0.00%

05 ANNEX FIVE
COMPLAINT DATA

Figure 10: The Analysis of Complaints against Aircraft Type by Comparative Size 2017

CLASS	TYPE	TOTAL NUMBER OF MOVEMENTS	TOTAL COMPLAINTS	% OF COMPLAINTS PER CLASS	% OF MOVEMENTS PER CLASS
Medium	Airbus A320	94,363	2,876	25.15%	33.07%
Medium	Airbus A319	87,821	2,686	23.49%	30.78%
Medium	Boeing 737	47,074	1,995	17.44%	16.50%
Large	Airbus A380	2,094	801	7.00%	0.73%
Large	Boeing 747	3,159	632	5.53%	1.11%
Medium	Airbus A321	13,650	570	4.98%	4.78%
Large	Boeing 777	8,232	563	4.92%	2.88%
Large	Airbus A330	3,907	414	3.62%	1.37%
Medium	Boeing 757	6,433	190	1.66%	2.25%
Small	Other light aircraft	241	175	1.53%	0.08%
Large	Boeing 787	6,738	155	1.36%	2.36%
Large	Boeing 767	2,170	152	1.33%	0.76%
Small	Embraer	6,308	139	1.22%	2.21%
Small	Cessna Citation	168	42	0.37%	0.06%
Small	ATR	1,362	20	0.17%	0.48%
Small	McDonnell Douglas	82	10	0.09%	0.03%
Large	Airbus A350	618	9	0.08%	0.22%
Small	Gulfstream	108	5	0.04%	0.04%
Small	Dassault Falcon	70	2	0.02%	0.02%
Medium	Bombardier	766	1	0.01%	0.27%

This figure also confirms that there are more complaints for the more common aircraft types at Gatwick Airport rather than related to the size of the aircraft. The aircraft with the greatest numbers of movements are classed as medium sized aircraft and these appear to have the greatest number of complaints.

We should point out that helicopters are also a source of complaint, however very few operate from Gatwick, and the majority of our complaints on this subject relate to either police/air ambulance flights from Redhill Aerodrome or military flights.

Gatwick Airport remains dedicated to reducing the noise impact of its operations on local communities. In line with current Government guidance, we are actively looking at new innovative ways of reducing the number of people impacted by Gatwick traffic.

To this end, we will continue to work with our airlines, Air Traffic Control and local community representatives to continue to improve the noise environment in and around the airport.

Complaint location maps are included in Annex 7 – General Maps.

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ANNEX SIX

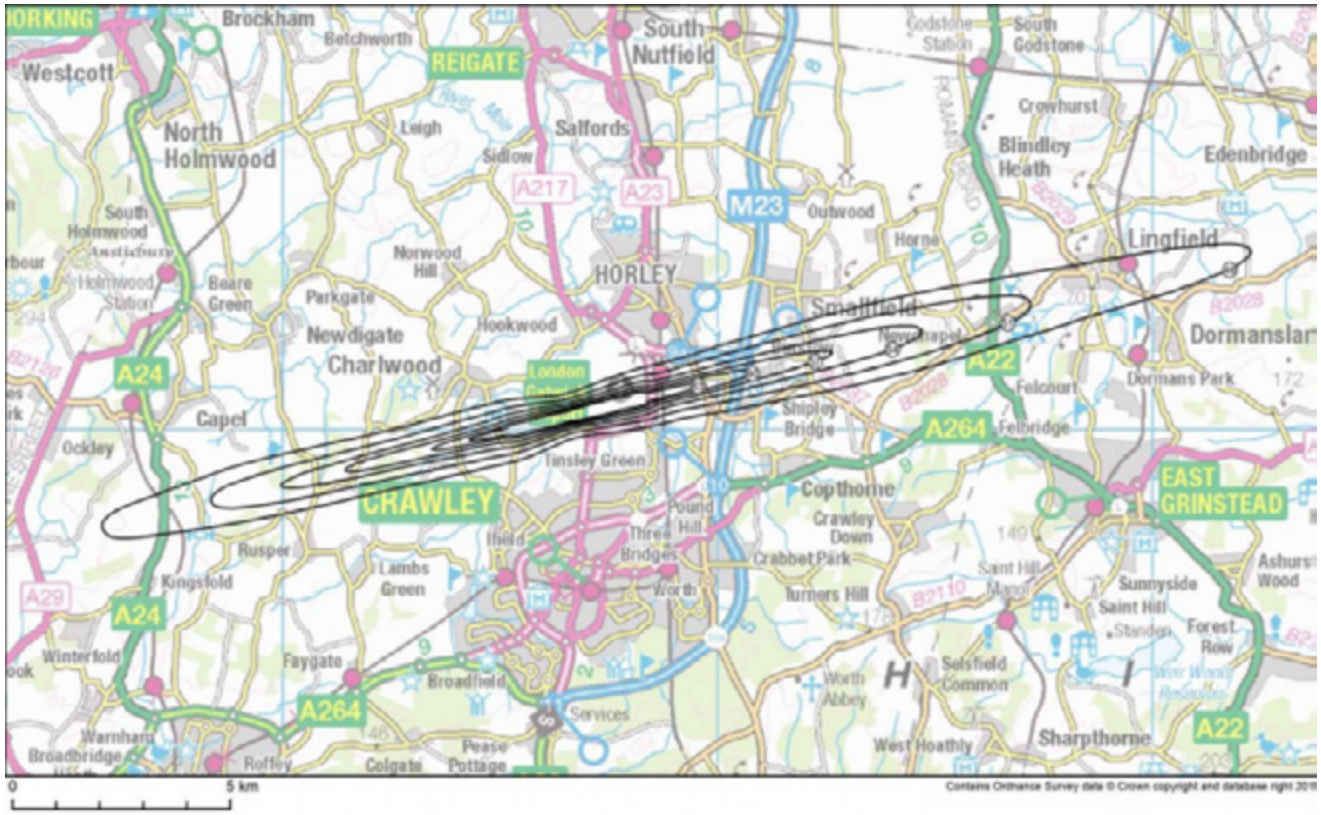
SUMMARY OF LIMIT VALUES IN PLACE

LOCAL AUTHORITY PLANNING CONDITIONS

Limit the 6.5 hour, 48 dB(A) L_{eq} contour (for the winter and summer seasons combined) to 47km² by 2011/2012. At Gatwick in 2011/2012 the 6.5 hour 48dBA L_{eq} contour (for the winter and summer seasons combined) was 34.1 km². In 2002-2003 it was 41.3 km².

The contours below have been calculated using data recorded between March 2015 and March 2016 (a full summer and winter season as described in the current night restrictions regime). The areas, population and household data are also provided for each contour level, on a cumulative basis, in accordance with normal practice. Night Movement and Quota Count Restrictions between 23:00 and 06:00 local.

Figure 11: Gatwick Summer 2015 and Winter 2016/17 $L_{Aeq\ 6.5\ hr}$ night contours and supporting population/household count.



SUMMARY OF LIMIT VALUES IN PLACE

	Gatwick 2015-16 $L_{Aeq\ 6.5hr}$ night (actual usage)		
CONTOUR (dBA)	AREA (sq km)	POPULATION (1000s)	HOUSEHOLDS (1000s)
48	35.2	4.3	1.6
51	18.0	1.3	0.5
54	9.0	0.5	0.1
57	4.6	0.3	0.1
60	2.3	0.1	<0.1
63	1.2	0.0	0.0

NIGHT QUOTA COUNT AND AIR TRAFFIC MOVEMENTS LIMITS

Figure 12: Historic and current Night Quota and air traffic movement limits for the summer and winter

WINTER	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Movements limits	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250
Quota points	2,060	2,000	2,000	2,000	2,000	2,000	2,000	2,000

SUMMER	2010	2011	2012	2013	2014	2015	2016	2017
Movements limits	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,200
Quota points	6,400	6,300	6,200	6,200	6,200	6,200	6,200	6,200

The Night flying restrictions[1] at Gatwick Airport are set by the Department for Transport, with the current restrictions due to expire in October 2017. The Government published its decision on the next night flights regime for Gatwick in July 2017 and this will be in place for the period October 2017 to October 2022.

[1] Department for Transport Night Flight Restrictions at the time the 2019-2024 Noise Action Plan was revised

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ANNEX SIX

SUMMARY OF LIMIT VALUES IN PLACE

The movements limit remains unchanged however the night quota limit will be reduced. This is summarised in the table below:

Figure 13: The DfT's new night flight regime limits

WINTER	2017/18	2018/19 TO 2021/2022
Movements limits	3,250	3,250
Quota points	2,000	1,785

SUMMER	2018	2022
Movements limits	11,200	11,200
Quota points	6,200	5,150

In addition, a new quota count of 0.125 has been introduced for aircraft with an EPNdB of between 81 and 83.9. The combination of the new limits and this new QC category will further incentivise the use of quieter aircraft by encouraging industry to plan its operations with sufficient headroom to ensure the limits can still be complied with in the event of unplanned disruption or changes to their schedules.

DEPARTURE NOISE LIMITS FROM THE UK AIP

The noise abatement procedures contained within the UK AIP (see Section 7):

- Daytime (07:00-23:00) departure noise limit of 94dB(A) L_{max} at 6.5km from start of roll.
- Night Shoulder (23:00-23:30 & 06:00-07:00) departure noise limit of 89dB(A) L_{max} at 6.5km from start of roll.
- Night (23:30-06:00) departure noise limit of 87dB(A) L_{max} at 6.5km from start of roll.

Figure 14: 24 Hour Period Of Easterly Operations (Runway 08R) Illustrating Arriving Aircraft (Red Tracks) and Departing Aircraft (Green Tracks) Only

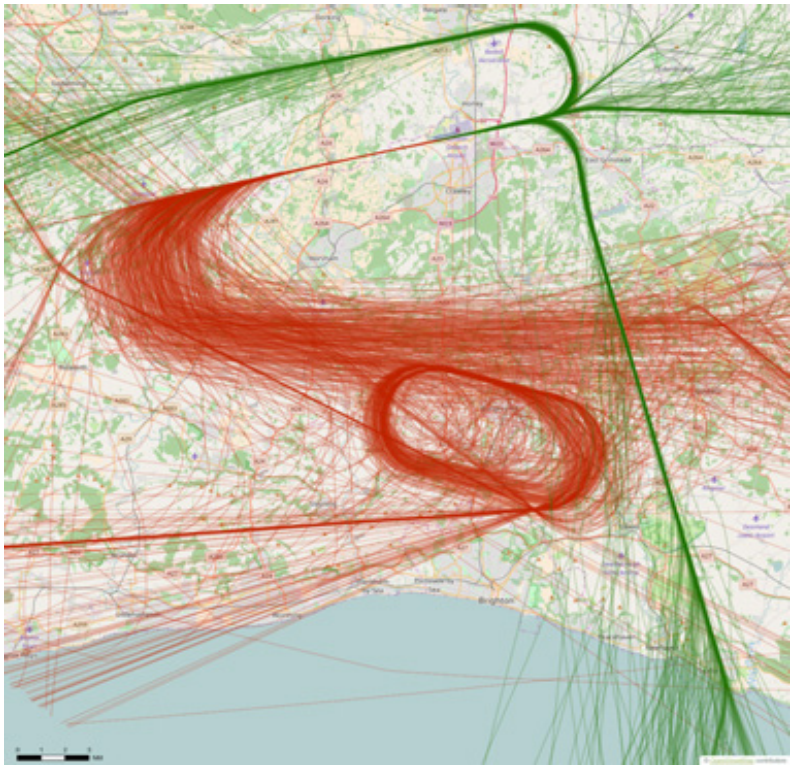
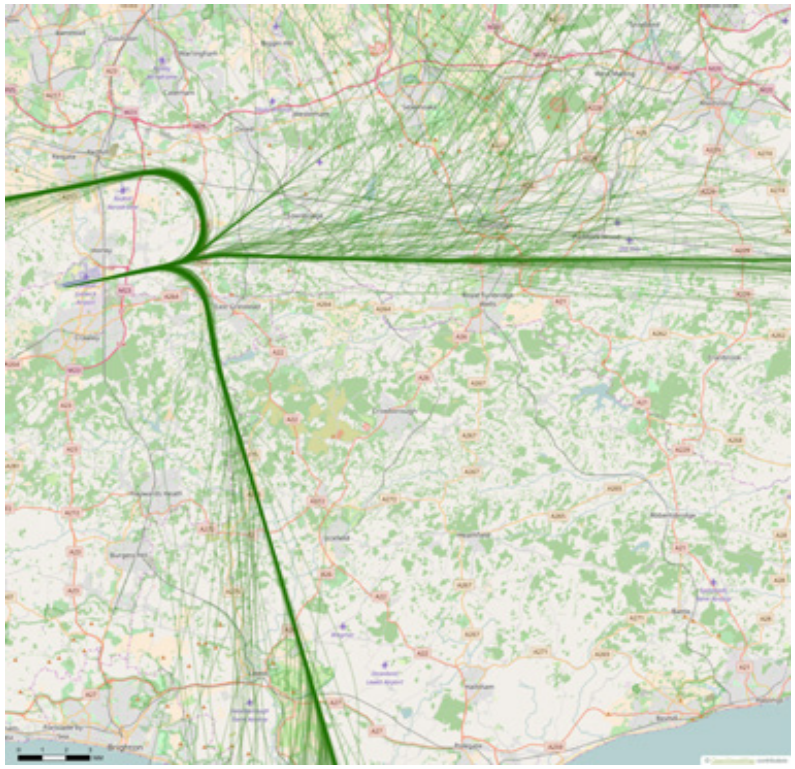


Figure 15: 24 Hour Period Of Easterly Operations (Runway 08R) Showing Departures Only – Map 1 of 2



ANNEX SEVEN

GENERAL MAPS

Figure 16: 24 Hour Period Of Easterly Operations (Runway 08R) Showing Departures Only – Map 2 of 2

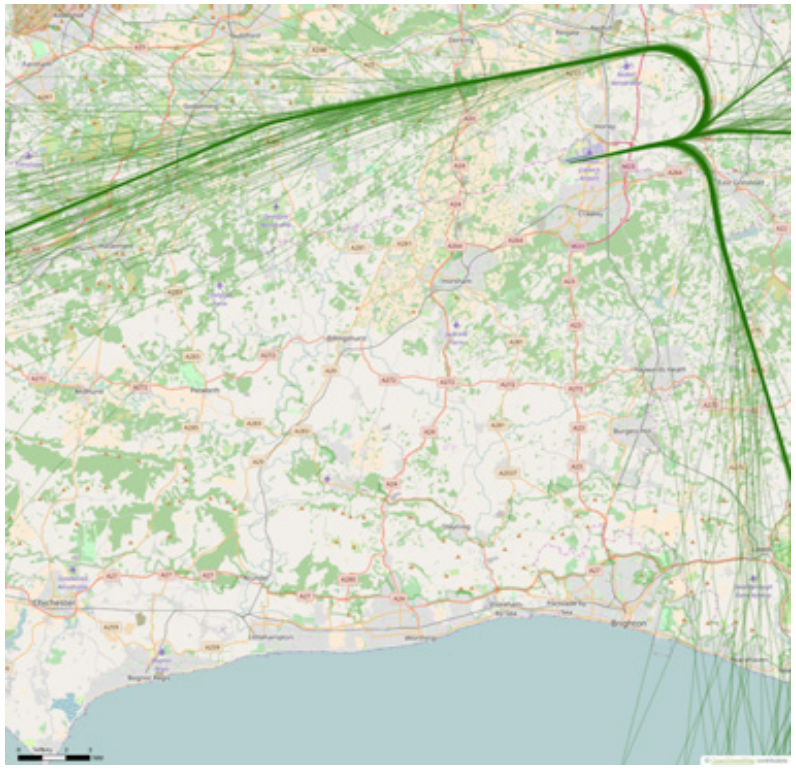


Figure 17: 24 Hour Period Of Easterly Operations (Runway 08R) Showing Arrivals Only - Map 1 of 2

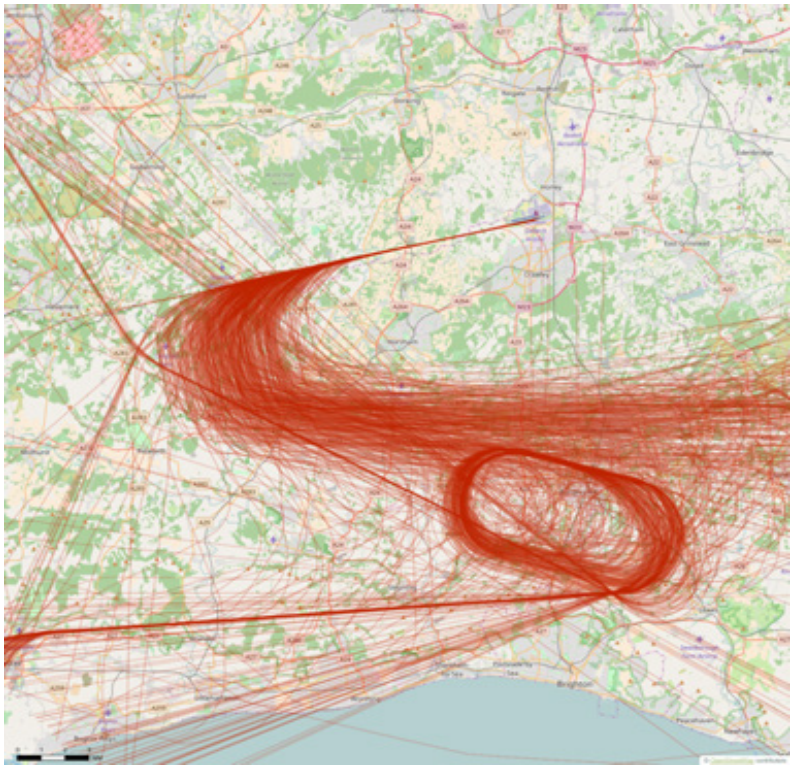


Figure 18: 24 Hour Period Of Easterly Operations (Runway 08R) Showing Arrivals Only - Map 2 of 2

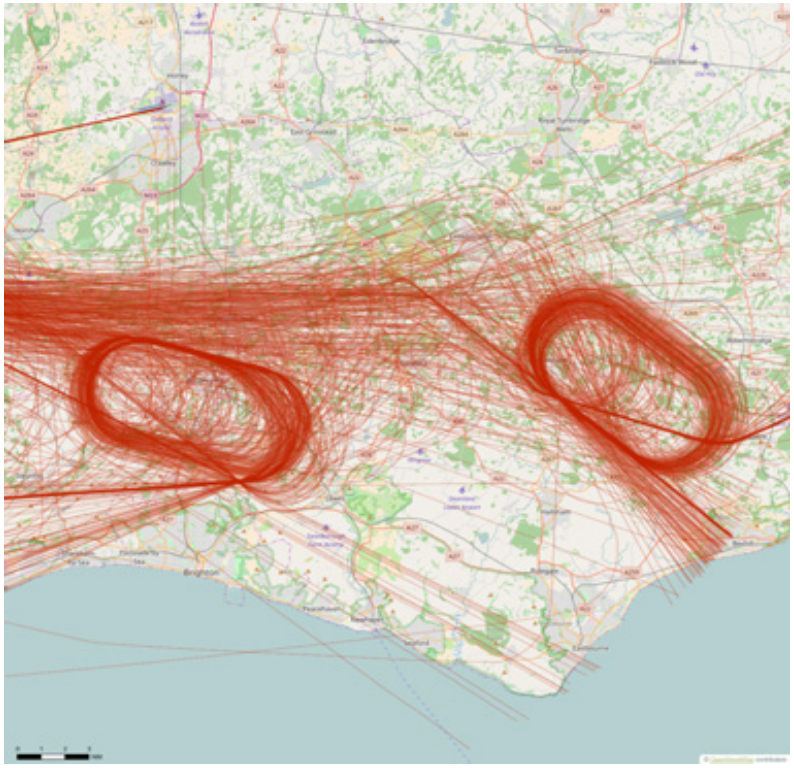
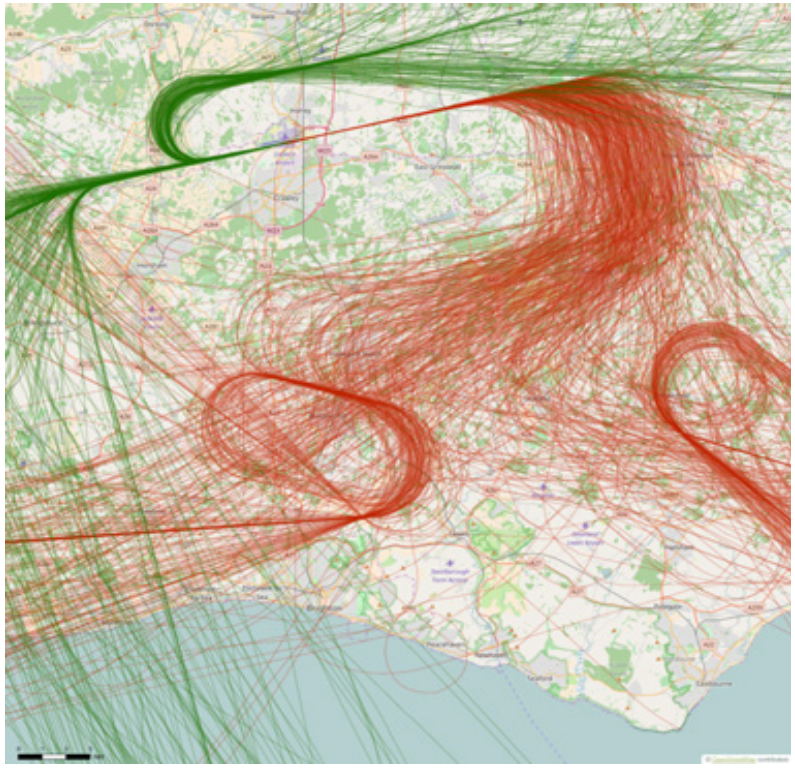


Figure 19: 24 Hour Period Of Westerly Operations (Runway 26L) Illustrating Arriving Aircraft (Red Tracks) and Departing Aircraft (Green Tracks) Only



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ANNEX SEVEN

GENERAL MAPS

Figure 20: 24 Hour Period Of Westerly Operations (Runway 26L) Showing Departures Only – Map 1 of 2

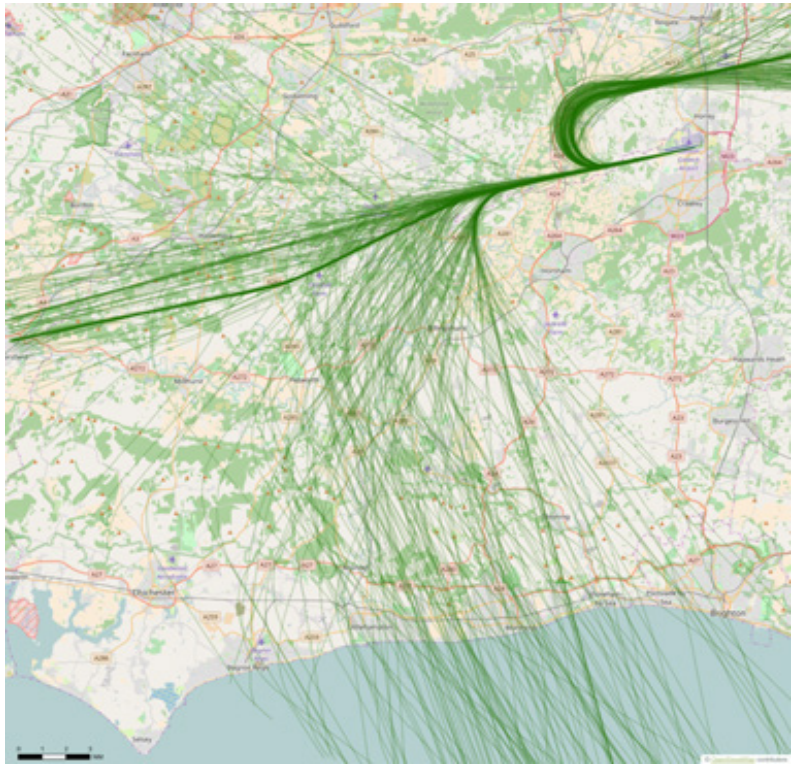


Figure 21: 24 Hour Period Of Westerly Operations (Runway 26L) Showing Departures Only – Map 2 of 2

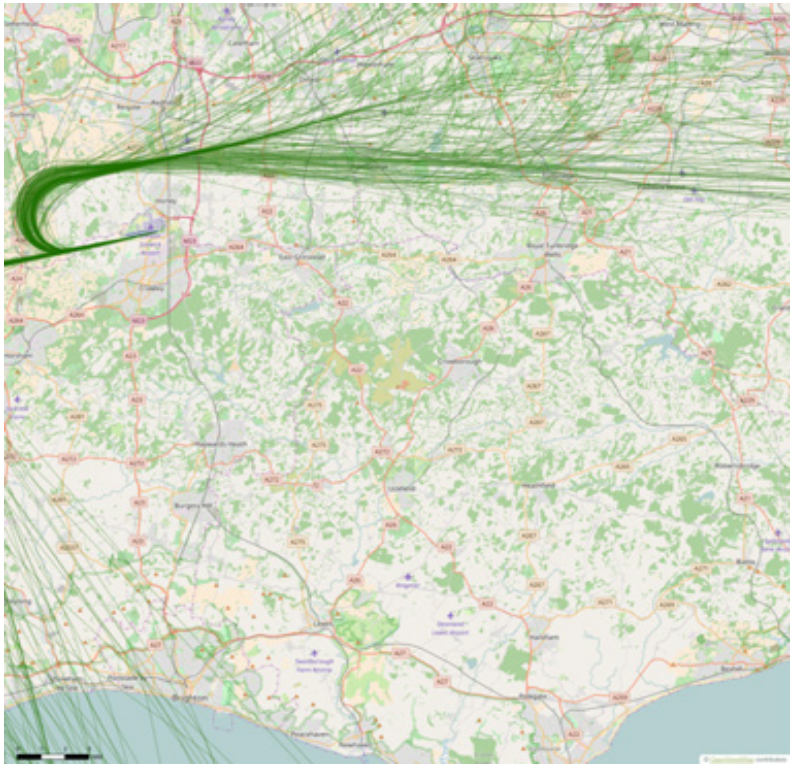


Figure 22: 24 Hour Period Of Westerly Operations (Runway 26L) Showing Arrivals Only – Map 1 of 2

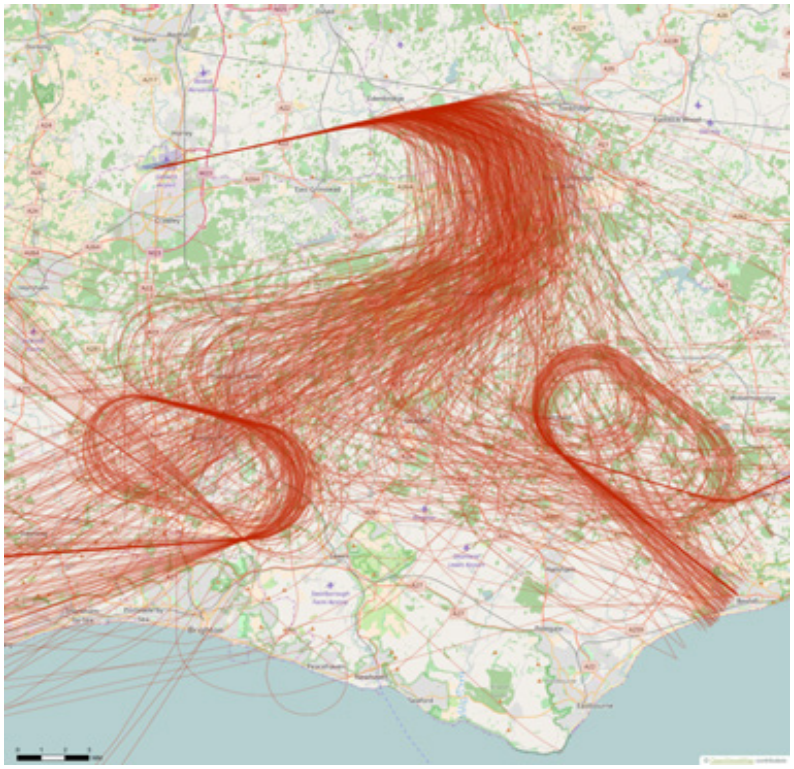


Figure 23: 24 Hour Period Of Westerly Operations (Runway 26L) Showing Arrivals Only – Map 2 of 2

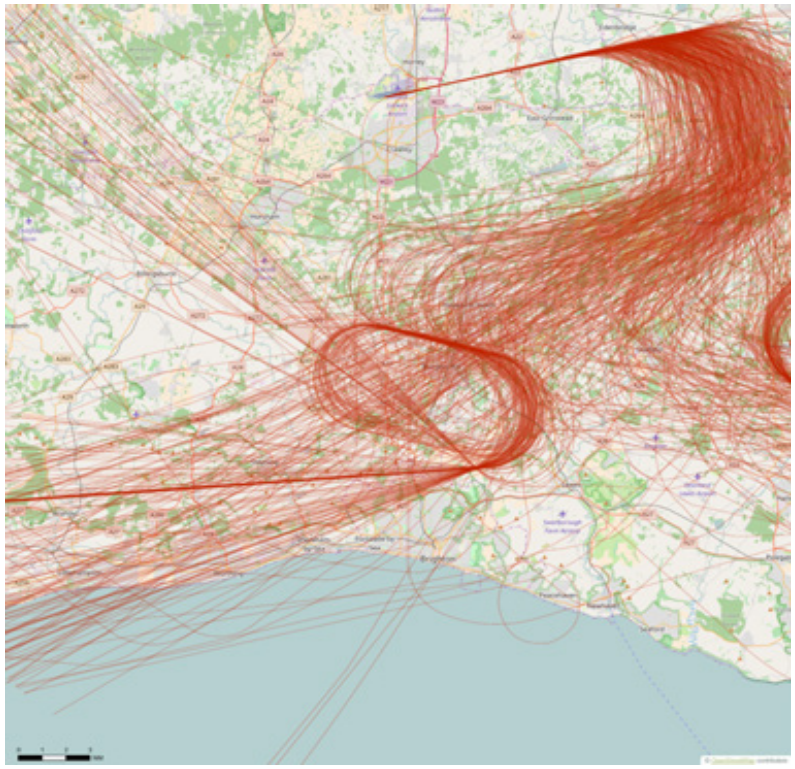


Figure 24: Map Illustrating the Location of the Noise Preferential Routes, the associated Standard Instrument Departure route and the vectoring altitude at London Gatwick

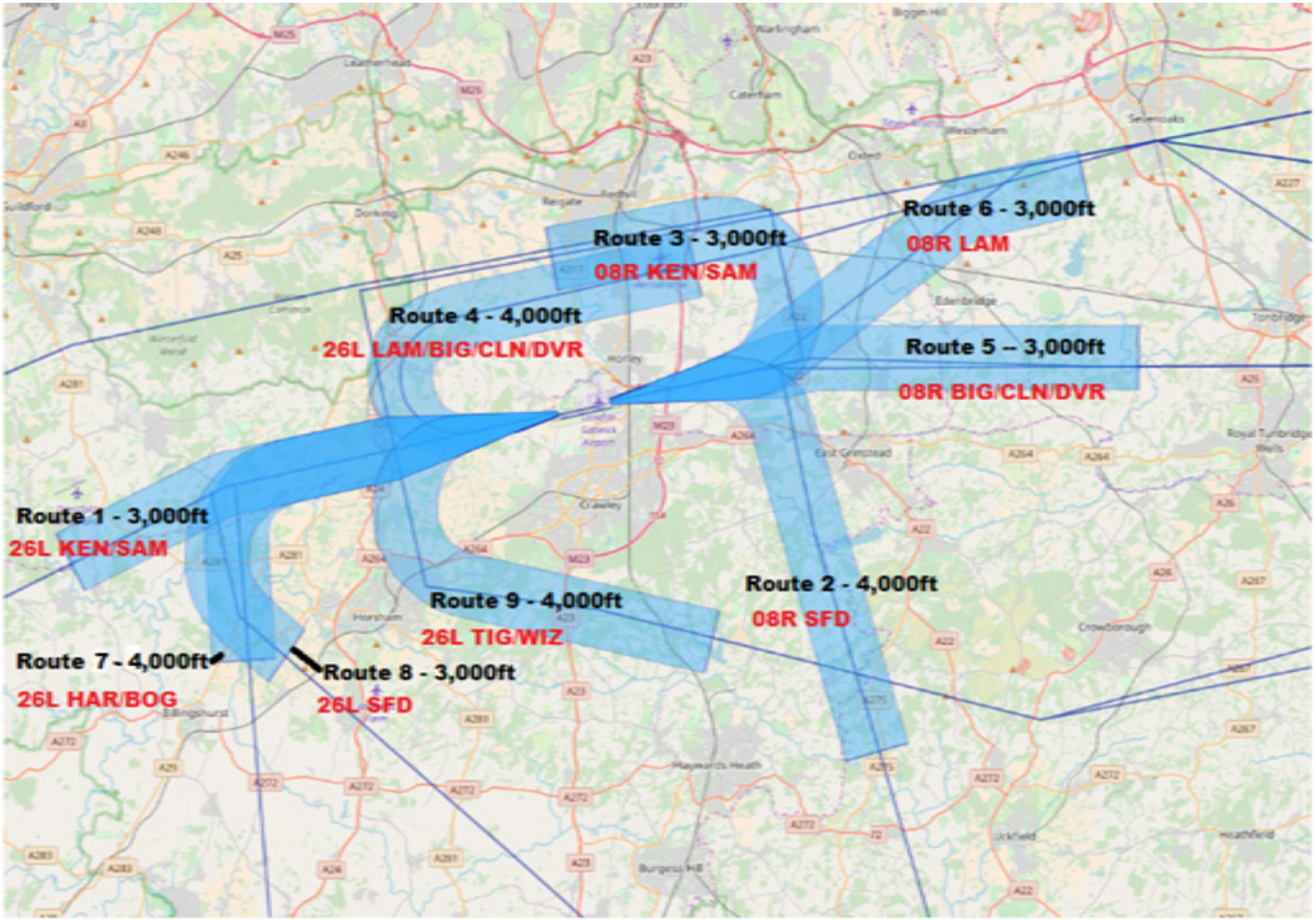


Figure 25: Map Illustrating the Postcode Location of Aircraft Noise Complaints Received for the Period 1 January 2017 to 31 December 2017 - Map 1 of 4

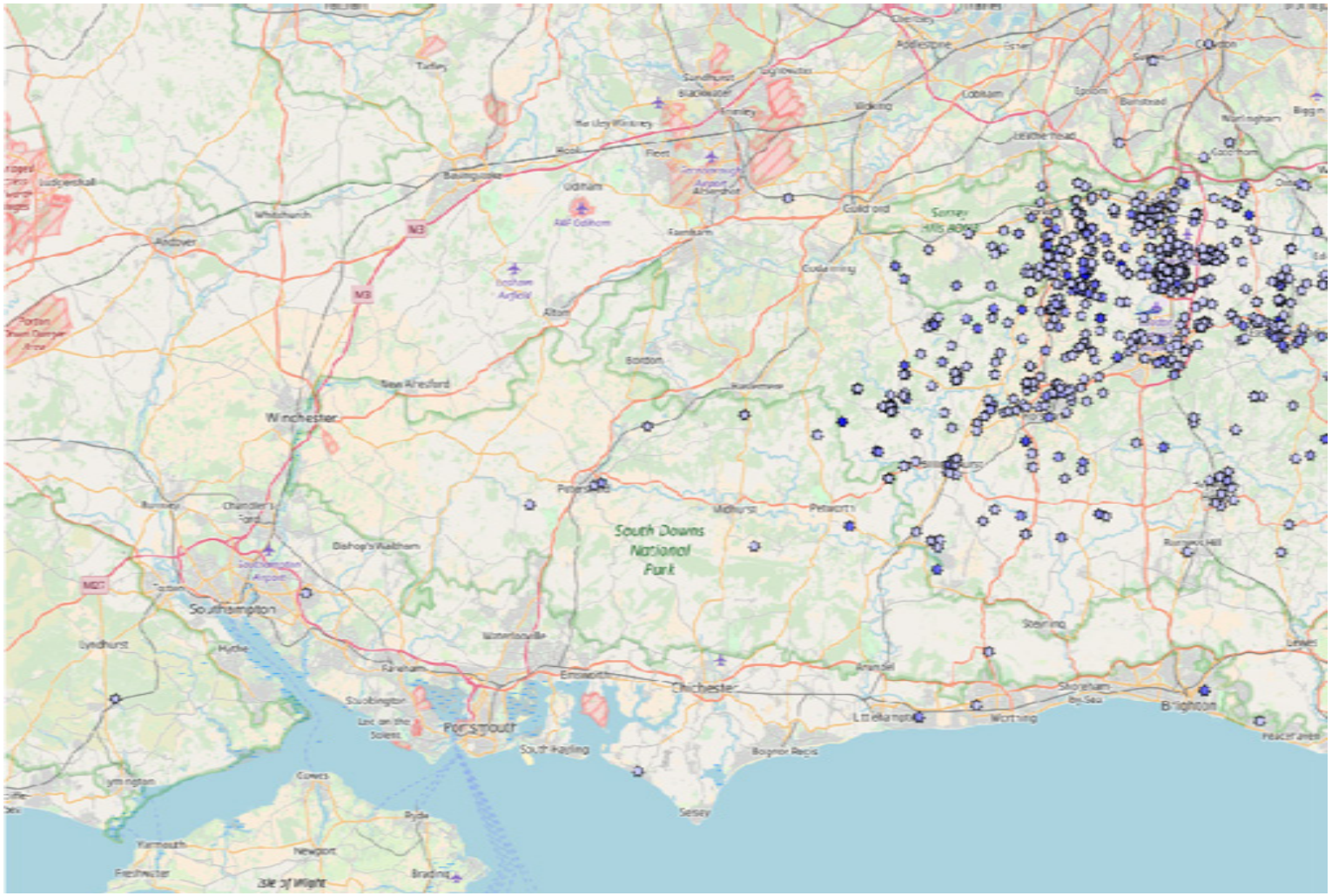


Figure 26: Map Illustrating the Postcode Location of Aircraft Noise Complaints Received for the Period 1 January 2017 to 31 December 2017 - Map 2 of 4

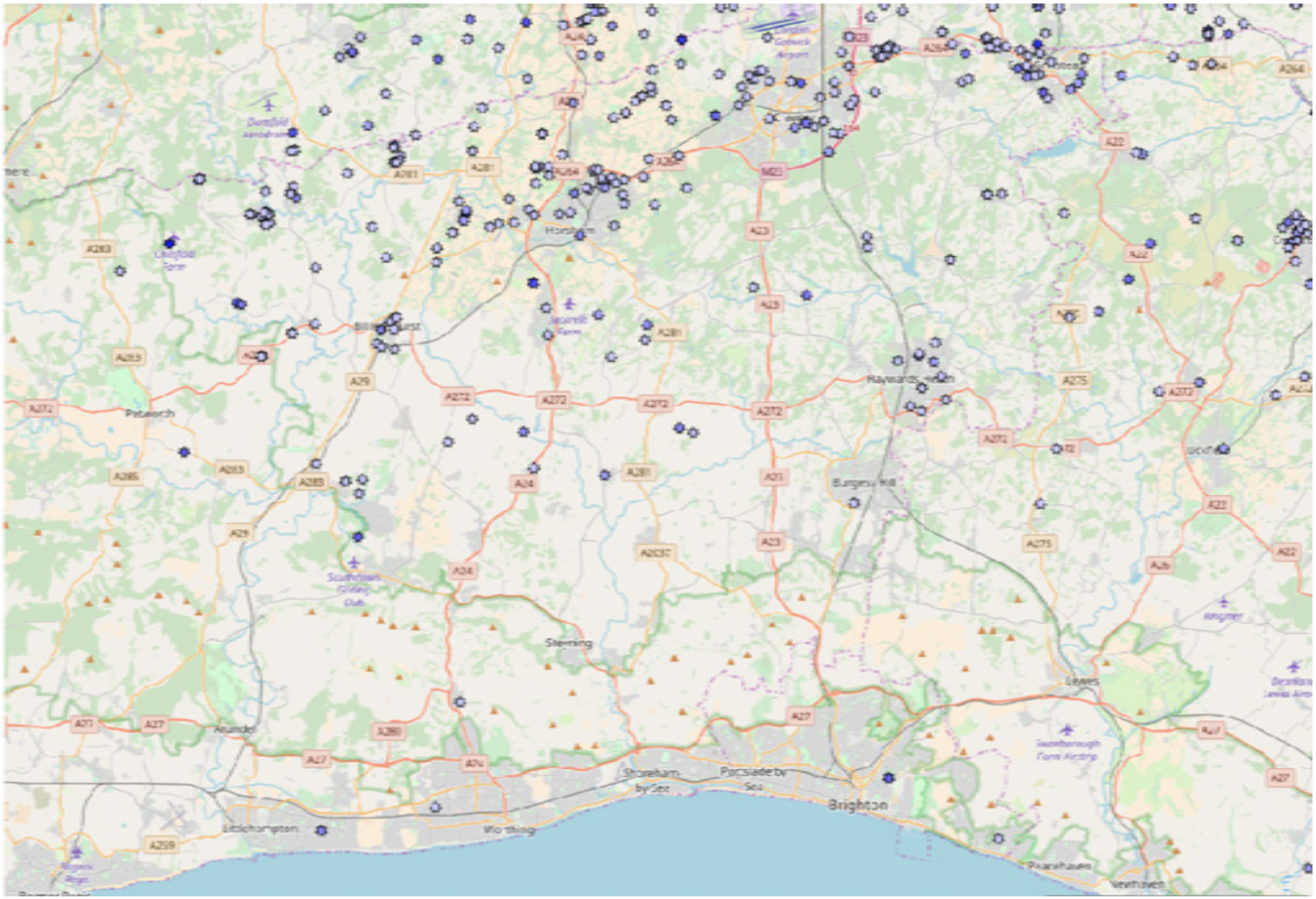


Figure 27: Map Illustrating the Postcode Location of Aircraft Noise Complaints Received for the Period 1 January 2017 to 31 December 2017 - Map 3 of 4

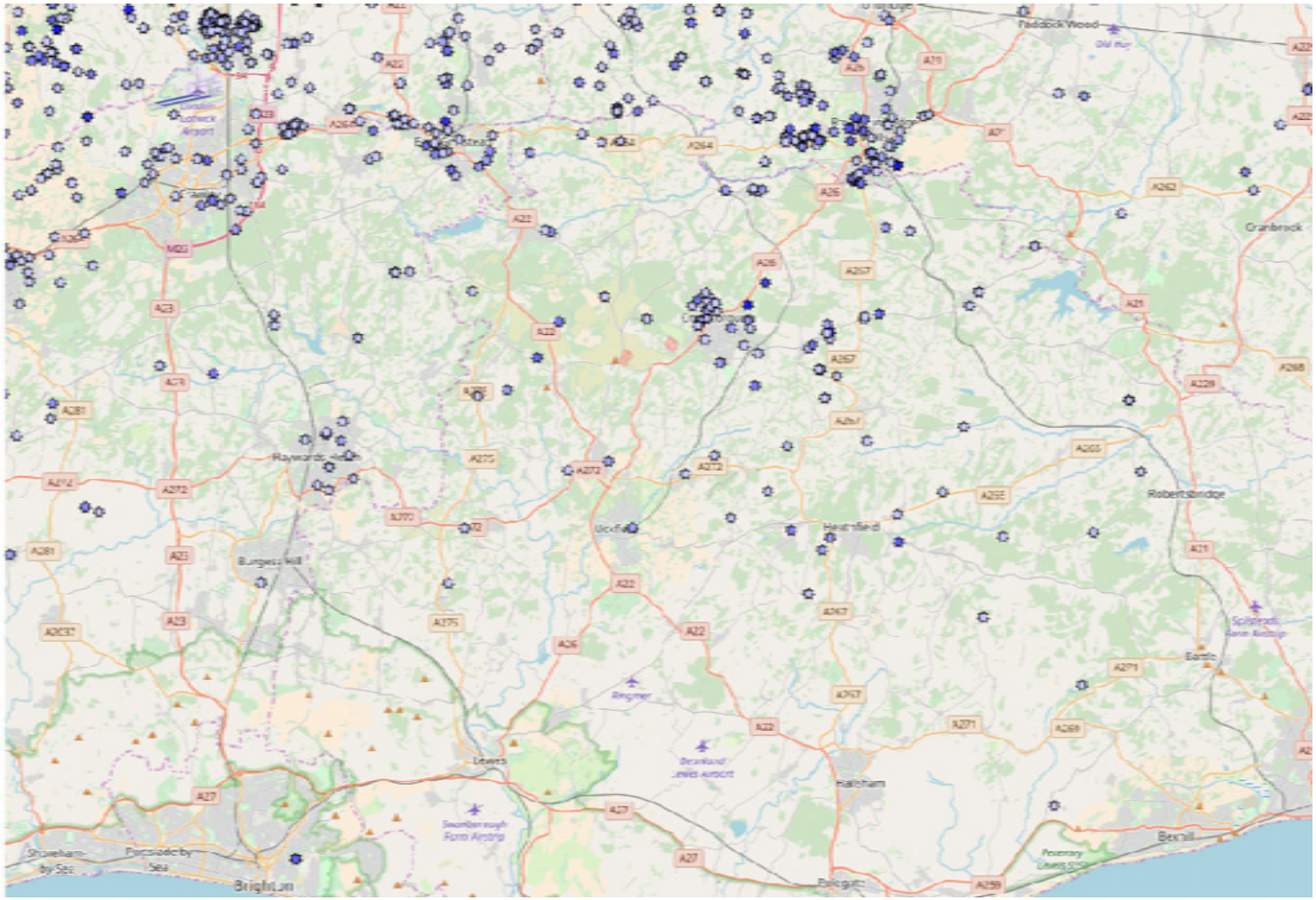


Figure 28: Map Illustrating the Postcode Location of Aircraft Noise Complaints Received for the 1 January 2017 to 31 December 2017 - Map 4 of 4

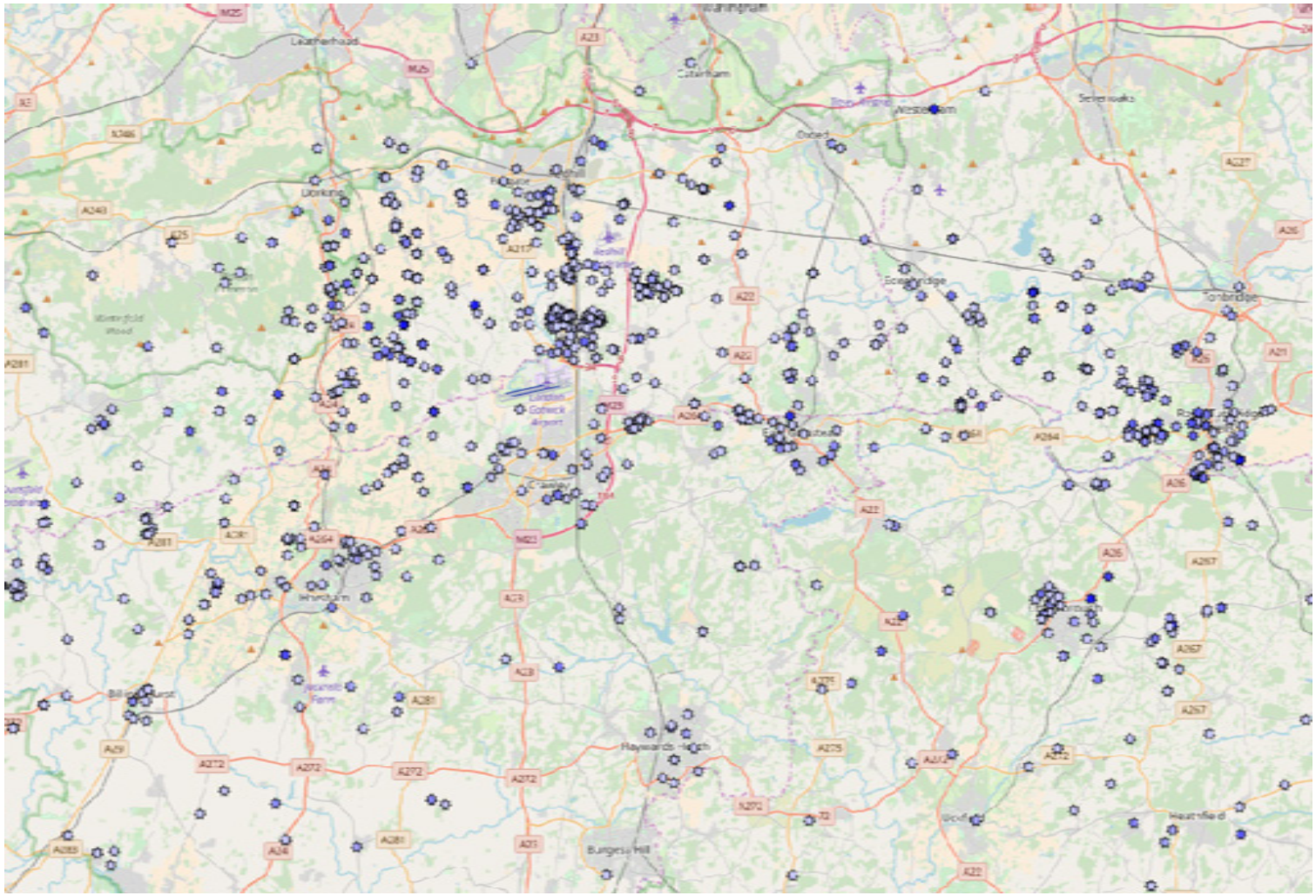
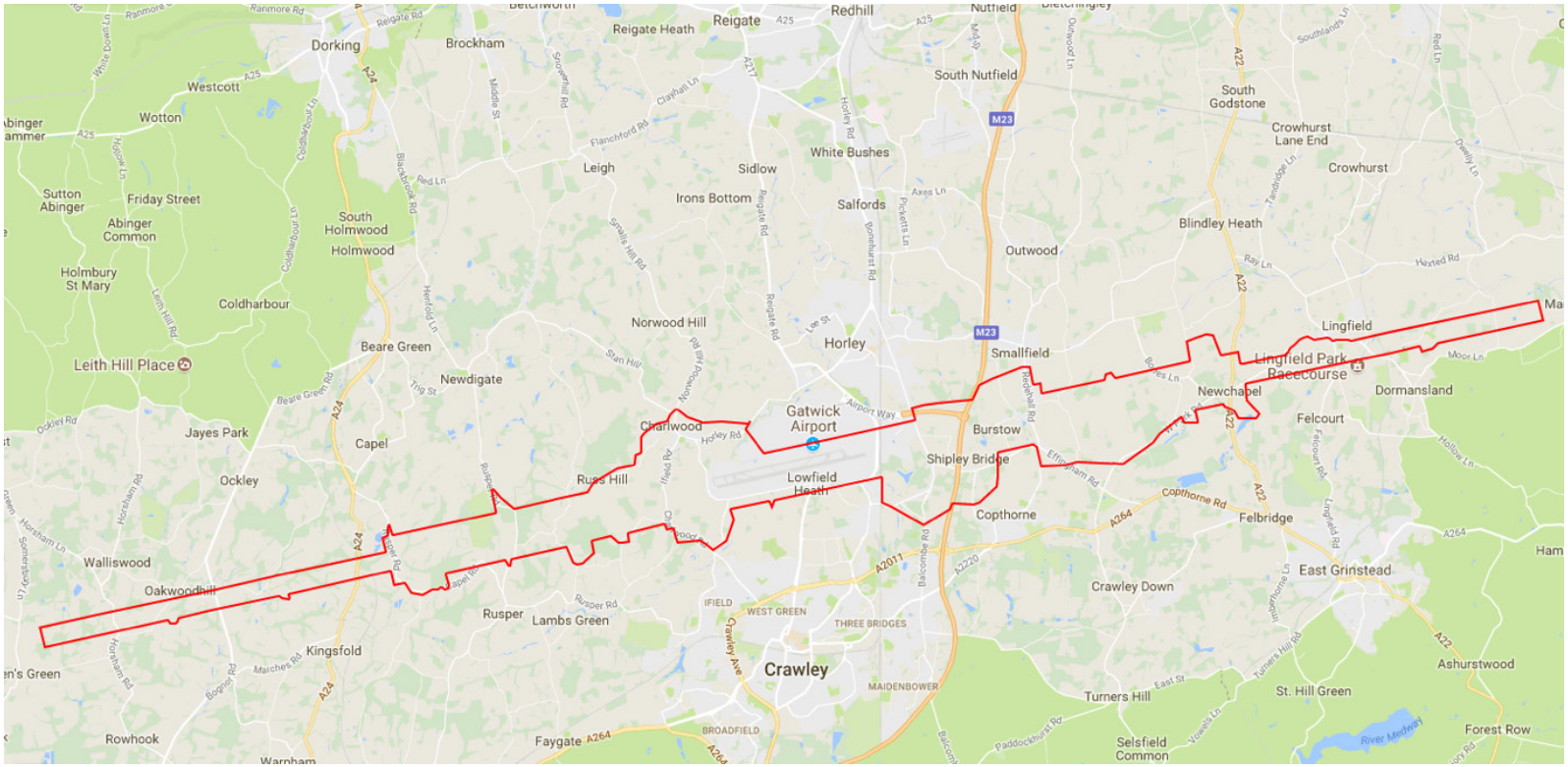


Figure 29: Map Illustrating the Boundary of the Gatwick Airport Noise Insulation Scheme



ANNEX SEVEN

GENERAL MAPS

Figure 30: Gatwick Airport Ltd Home Owner Support Scheme Boundary

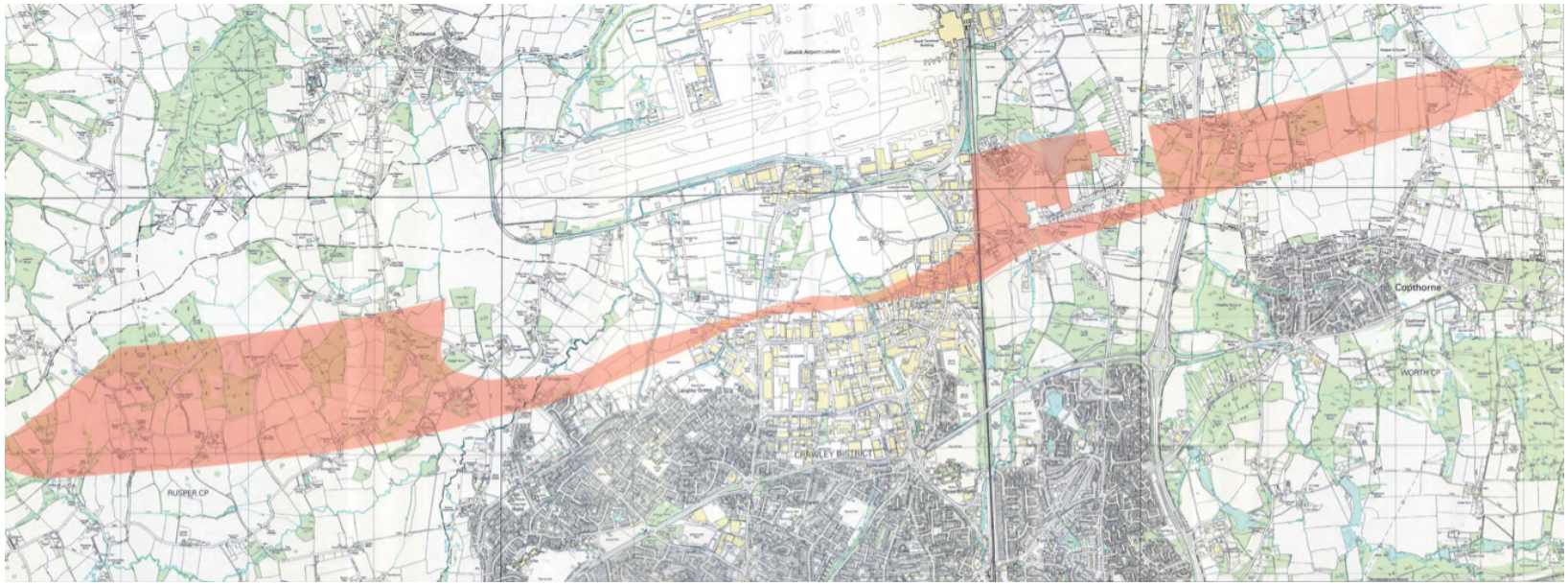


Figure 31: Gatwick Airport Ltd Property Market Support Bond Scheme Boundary

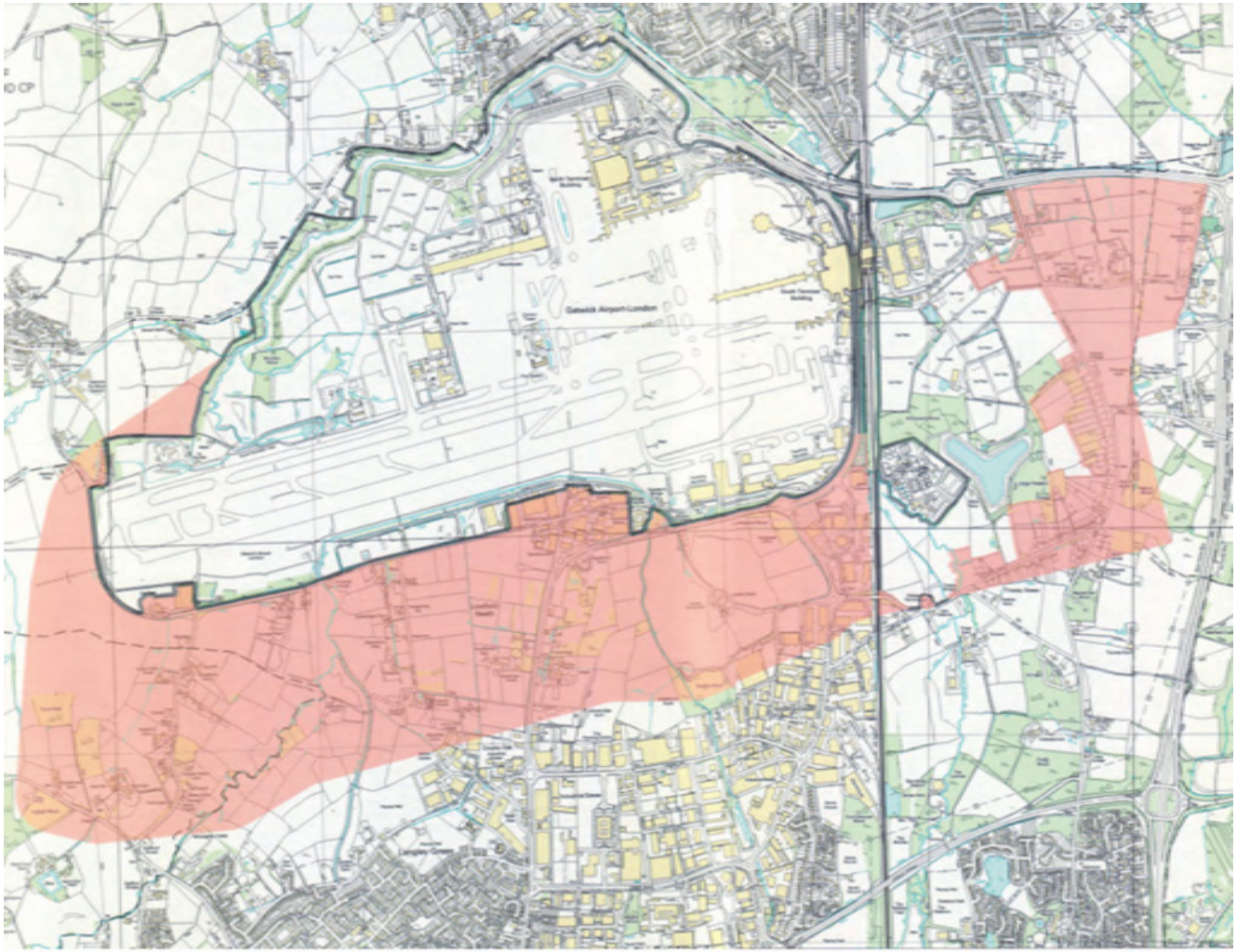


Figure 32: Gatwick Summer 2015/Winter 2015-16 L_{Aeq} 6.5hr Night 55dBa Contour

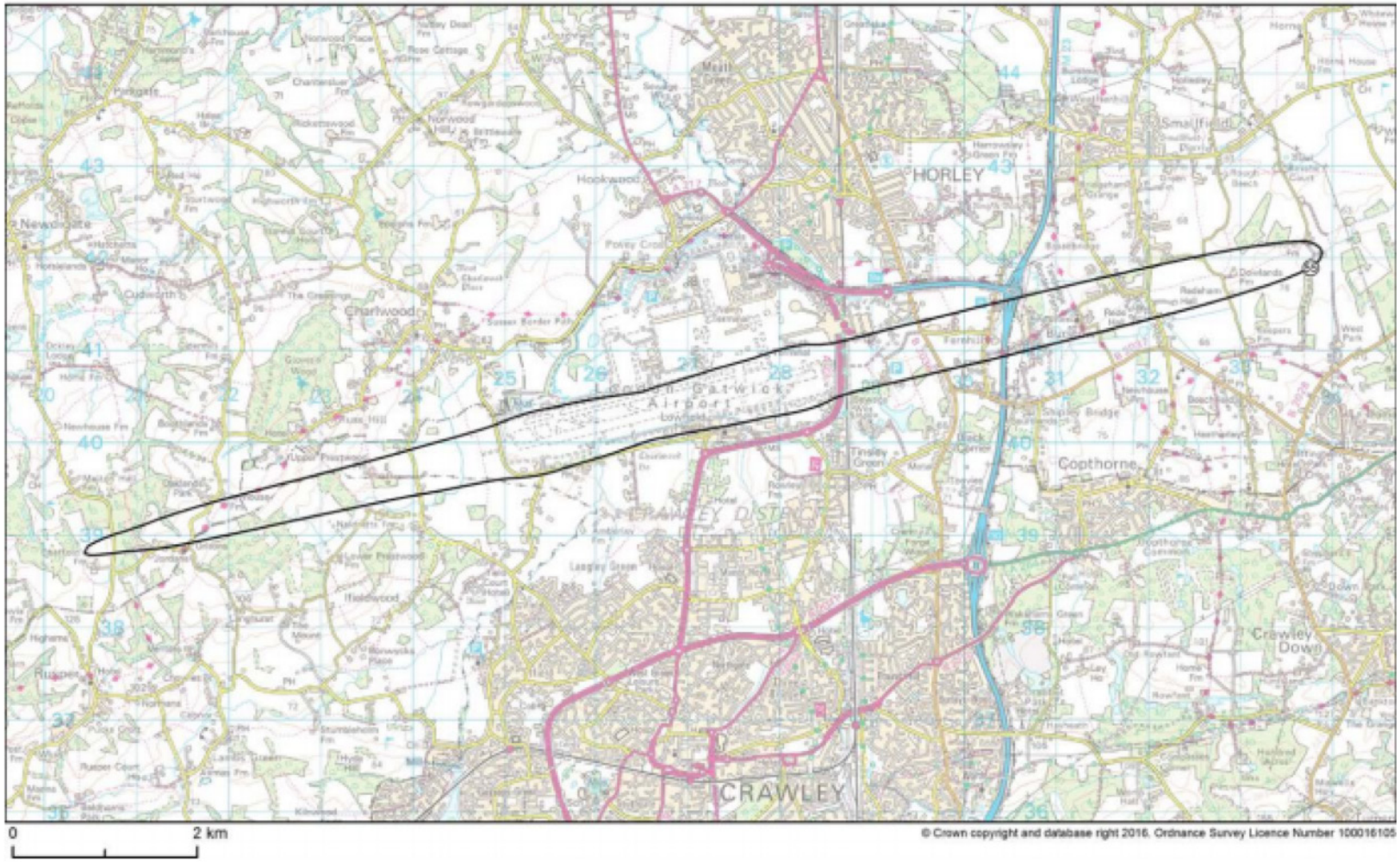


Figure 33: Estimated current financial cost to Gatwick Airport Ltd of noise management

TYPE	DESCRIPTION	APPROXIMATE ANNUAL COST
Noise insulation and mitigation schemes	Acoustic insulation, relocation scheme, insulation of noise sensitive community buildings and vortex strike scheme.	£950k (varies)
Staff costs	Salaries for staff engaged with noise and airspace related activities.	£850k
Airspace change costs	Costs associated with airspace change activities including LAMP, introducing R-NAV1 SIDs etc.	£710k (varies)
Noise Management Board	Management and maintenance of the board	£550k
	NMB airspace initiatives	£600k
	Independent technical support for the Community Noise Groups.	£40k
Noise and Track Keeping system costs	Software licences, development support and maintenance of noise monitoring equipment.	£300k
Section 106 Costs	Annual S.106 payments.	£206k
Research and Consultancy	Research activities and consultancy associated with Section 106 verification, Decade of change verification.	£150k
Publications and communications	Seminars, venue hire, noise related publications, documents and maintenance of the airspace and noise website.	£100k
Noise Contours	Fees for the development of the annual noise contours.	£25k
Community Noise Reports	Independent reporting and studies.	£15k
Freepost costs	Freepost licence and postage costs incurred.	£7k
Fines	Departure noise limits and track-keeping.	£1.5k (varies)*

SOURCE – GATWICK AIRPORT LTD

* Cost charged to the aircraft operator concerned and monies forwarded to the Gatwick Airport Community Trust.

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ANNEX NINE A

FEEDBACK RECEIVED REGARDING THE PROPOSED LIST OF ACTION PLAN ACTIONS

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Feedback on the list of draft Action Plan Actions was received from the following organisations:

- Crawley Borough Council;
- Horsham District Council;
- Reigate and Banstead Borough Council;
- Surrey County Council;
- West Sussex County Council;
- The Gatwick Airport Consultative Committee (GATCOM), including:
  - o Report from the Secretariat and Technical Advisor to the GATCOM Steering Group dated 4 January 2018;
  - o Final Response dated 2 February 2018.

In addition, a letter dated 15 December 2017 from the Noise Management Board Community Noise Groups and the Gatwick Area Conservation Campaign was received setting out their collective view on the draft Action Plan Actions and issues relating to the interpretation and implementation of Government Policy. A document containing further feedback was received on 16 February 2018.

The following pages include details of feedback received and also suggested Action Plan Actions to be included and the Gatwick Airport Ltd response is underneath each item in blue text.

KEY THEMES IN THE FEEDBACK RECEIVED

1. **The link between noise and the adverse impacts on health is becoming ever stronger.**

GATWICK AIRPORT RESPONSE

This is acknowledged, a recent study (Aircraft noise and cardiovascular disease near Heathrow Airport in London: small study area. Hansell et al (2013); British Medical Journal, 347, f5432) around London Heathrow Airport examined risks for hospital admission and mortality for stroke, coronary heart disease and cardiovascular disease for around 3.6 million people living near London Heathrow airport. Both daytime (LAeq,16h) and night-time (Lnight) aircraft noise exposure were related to increased risk for a cardiovascular hospital admission. Compared to those exposed to aircraft noise levels below 51 dB in the daytime, those exposed to aircraft noise levels over 63dB in the daytime had the following higher chance of a hospital admission:

- 24% for a stroke,
- 21% for coronary heart disease,
- 14% for cardiovascular disease.

Similar effects were also found between aircraft noise exposure and mortality for stroke, coronary heart disease and cardiovascular disease.

2. **An acknowledgement of the extensive range of noise management activity undertaken by Gatwick Airport Ltd to date and further activities proposed for the coming five years. However, it must be recognised that residents remain affected by increasing absolute levels of noise, arising from a net increase in aircraft movements which has offset many of the technological and operational improvements. In response**

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to this, the action plan should give residents confidence that Gatwick Airport Ltd is committed to sharing benefits of noise management progress, in the sense of an outcome of absolute noise reductions (or as a minimum, no further increases), even in a context of growth.

GATWICK AIRPORT RESPONSE

It is accepted that there is an extensive range of activities undertaken by the airport both historically and also in the future. The establishment of the Noise Management Board has heralded a step-change in how the airport engages with local communities and collaboratively identifies areas for improvements and establishes a workplace for their development and introduction.

The airport is growing and the 2017 Aviation Policy Consultation sets out at para 3.14 that:

"Industry should, as far as is practical, proactively seek to avoid, minimise and mitigate adverse noise impacts, building on existing best practice. This is consistent with the overarching policy principle that the benefits of noise reduction brought about by new technology should be shared between industry and those affected by aircraft noise. This means that communities should benefit from noise reductions, while industry should have space to grow sustainably and serve passenger demand".

By "industry" Government means manufacturers, airlines, air traffic control and airports. Implicit in the Government's calculation is that, between now and 2050, manufacturers will continue to invest in research and development to make aircraft quieter and airlines will continue to invest in the new aircraft types, so that overall, noise per movement will decrease.

Further, Government expects that new technology will bring other benefits including:

- airspace changes enabling reductions in the numbers of people overflown on departure and arrival ; and
- other airspace and aircraft performance improvements to enable faster climbs and quieter descents.

The investment by industry thus provides a "dividend" which results in the amount of noise made by each aircraft reducing gradually over time. This is the share that the Community gets in the investment made by industry, together with the wider benefits both locally and to the national economy brought by aviation.

Thus, in the overall policy terms the "sharing benefits of noise reduction between industry and communities in support of sustainable development" is in the context of an expectation that industry will continue to invest, communities should continue to benefit from noise reductions, and that industry "should have space to grow sustainably and serve passenger demand".

3. Government Policy is confused and contradictory. The actions set out in Gatwick's current NAP have not achieved the END's aim of avoiding, preventing or reducing the impacts of noise. The current NAP has also failed to achieve the government's noise policy objectives, most specifically to "reduce and mitigate noise as airport capacity grows". And the overall objective of reducing noise has not been achieved.

GATWICK AIRPORT RESPONSE

The Government's current aviation noise policy is encapsulated in the 2017 Airspace Policy Consultation Response as follows:

"The government's overall policy on aviation noise is to limit and, where possible, reduce the number of people in the

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*UK **significantly** affected by aircraft noise, as part of a policy of sharing benefits of noise reduction between industry and communities in support of sustainable development".*

The 2013 Airports Policy Framework (2013 APF) set the sustainable development of airports in the wider context of the National Planning Policy Framework (NPPF 2012), the NPSE (2010), and the UK's climate change commitments. It states that Government wants to make best use of existing airport capacity, this again would appear to the layman to be contradictory to the aviation noise policy as detailed above.

Gatwick Airport Ltd recognises that, at times, Government Policy can appear confused and contradictory. It is for these reasons, and in response to challenges made by the Community Noise Groups that sit on the Noise Management Board, that the airport commissioned a Review of Government Noise Policy and Strategy.

The basic constituent of the above "to limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise" appears in the 2003 Air Transport White Paper. The second element "as part of a policy of sharing benefits of noise reduction between industry and communities in support of sustainable development" first appears in the February 2017 Airspace Policy Consultation, however, it is present thematically in the 2013 APF, and indeed can be discerned in 2003 ATWP.
A matter of debate surrounds what constitutes 'significantly' as a number of people may consider themselves to be significantly affected whereas, according to policy, they are affected by low levels of **aircraft noise and so are annoyed, but not significantly affected**.

4. **The absence of a complete version of the revised action plan including population counts for the consultation meant there was no context against which to assess whether the proposed measures to reduce noise were appropriate to the scale of the problem, and given the potential obligation(s) that could be placed upon councils around the airport by the plan under UK legislation. All what was provided was a list of potential Action Plan Actions.**

GATWICK AIRPORT RESPONSE
Gatwick Airport Ltd initially circulated the list of proposed Action Plan Actions to the Gatwick Airport Consultative Committee, Crawley Borough Council and West Sussex County Council, as well the membership of the Noise and Track Monitoring Advisory Group and the Noise Management Board.

The full document, including feedback received, suggested Action Plan Actions for inclusion and the population counts was circulated to those organisations prior to the end of February 2018 to allow for any further comments to be forwarded to the GATCOM Steering Group meeting of 22 March 2018.

5. **The Noise Action Plan should commit to noise impact outcomes. It should specify clear, binding, noise impact reductions together with the time profile for achieving those reductions. The targets should be set based on the government's core policy principles of balance, benefit sharing and noise impact reduction. Gatwick's NAP should commit to noise impact reductions equivalent to or greater than the growth projected by the airport in the NAP period together with a further factor reflecting the growth enjoyed by the industry from 2013-2018 the benefits of which have not been shared with impacted communities. Alongside those noise outcomes Gatwick should set out the actions it intends to take**

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to achieve them, but the risk that those actions fail to achieve the outcomes should be borne by the airport and the wider industry not by communities.

The actions set out in Gatwick's current NAP have not achieved the END's aim of avoiding, preventing or reducing the impacts of noise. The current NAP has also failed to achieve the government's noise policy objectives. There is no reason to believe that a similarly structured set of noise actions for the 2019-24 period would be any more successful in achieving the END's aims and the government's policy objectives. Gatwick has announced plans to continue to grow in that period. In the absence of appropriate action by regulators to enforce the Directive and government policy, that is likely to mean that the noise environment around the airport will continue to worsen, as it has done over the current NAP period. The government should not approve any NAP that fails to reflect these or comparable principles.

GATWICK AIRPORT RESPONSE

Action Plans are a legal requirement under Directive 2002/49/EC relating to the Assessment and Management of Environmental Noise. This Directive is commonly referred to as the Environmental Noise Directive or END. The requirements of the END are transposed in the Environmental Noise (England) Regulations 2006 as amended ("the Regulations"). Both the Directive and the Regulations contain no requirement to commit to binding noise impact outcomes.

In accordance with the Regulations, Gatwick has proposed actions which aim to manage noise issues and effects, including noise reductions. An approach which is consistent with the Government's Aviation Policy aim to limit and where possible reduce the number of people in the UK significantly affected by aircraft noise.

The Secretary of State for DEFRA, in liaison with the Department for Transport, will form a view regarding whether or not the submitted revised plan meets the requirements of the Regulations and, therefore, whether or not the plan is appropriate for adoption.

If the Secretary of State for DEFRA considers that the requirements set out in the Regulations are met, they will notify the airport accordingly that the Action Plan has been adopted. The Action Plan should then be published by the Airport Operator as a public document in an electronic format within 28 days.

If the requirements set out in the Regulations are not met, the airport operator will be required to make the necessary changes to the plan. Following revision, the revised plan will need to be resubmitted to the Secretary of State for DEFRA by an agreed date for further consideration.

6. **The Noise Action Plan noise reduction targets should be independently monitored and enforced. If the targets were not achieved, or appeared unlikely to be achieved, DEFRA's Secretary of State should intervene and require the airport to take measures, including limiting its growth, so as to achieve them.**

GATWICK AIRPORT RESPONSE

In accordance with the DEFRA guidance, the proposed actions within Gatwick's Noise Action plan have been assessed to determine their expected outcome and how this will be tracked.

In addition, as the proposed actions within the Gatwick's noise

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action plan complement the Section 106 Legal Agreement with West Sussex County Council and Crawley Borough Council. Gatwick is subject to an independent review and audit of selected actions as part of the annual S106 monitoring process. The Final Annual Monitoring Report circulated to Crawley Borough Council and West Sussex County Council for circulation among the wider local authorities and the Gatwick Airport Consultative Committee. This report is published on the Airport website.

7. **Lack of clarity on who should produce the Noise Action Plan – "the EU legislation directs member states to produce noise action plans for major roads, railways, agglomerations and airports but does not stipulate which parties within the member state should produce these plans. In the UK, the Government has directed that Gatwick Airport Ltd shall produce that plan for Gatwick Airport. It is, therefore, the UK's noise action plan for Gatwick Airport; it is not Gatwick Airport Ltd's noise action plan".**

   The current NAP has not been an effective policy instrument primarily because it is based on inputs rather than outcomes and because it entirely ignores the significant growth that has occurred at Gatwick.

GATWICK AIRPORT RESPONSE

Action Plans are a legal requirement under Directive 2002/49/EC relating to the Assessment and Management of Environmental Noise. This Directive is commonly referred to as the Environmental Noise Directive or END. The requirements of the END are transposed in the Environmental Noise (England) Regulations 20064 as amended ("the Regulations").

The END requires Member States to produce strategic noise maps for the main sources of environmental noise, i.e. major roads, major railways, major airports and agglomerations every five years.

Action Plans must be drawn up by the airport operators and be based on the results of the noise mapping. The Regulations also require the Action Plans to be reviewed at least every five years and revised if necessary and whenever a major development occurs affecting the existing noise situation.

DEFRA is required under the END to submit summaries of each airport Action Plan to the European Commission no later than 18th January 2019. Each airport is also required to publish their Action Plan by this date. The regulations also require that each Action Plan is formally "adopted" by DEFRA's Secretary of State before the above steps can take place. DEFRA will contact each airport to agree a timetable for adoption and publication of their Action Plan.

8. **The Department for Transport is the noise regular for Gatwick Airport and as such the Government sets laws and rules relating to aircraft noise management however the airport operator also has a legal duty to operate the airport in such a manner as to make its facilities open to all types of aircraft operator which may result in noisier types of aircraft being operated.**

GATWICK AIRPORT RESPONSE

The Secretary of State for Transport has specific responsibility for noise control at Heathrow, Gatwick and Stansted airports. Certain noise mitigation measures are promulgated in the London Gatwick Aeronautical Information Publication (AIP) and the Flight Performance Team at Gatwick Airport reports compliance against these measures on a quarterly basis.

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In addition, Gatwick Airport also has a Section 106 Legal Agreement in place with Crawley Borough Council and West Sussex County Council that includes further obligations and Action Plan Actions relating to both air and ground noise management. The Noise Management Board has also overseen the implementation of the recommendations of the Independent Review of Arrivals and its own, mutually agreed work plan.

The London Gatwick Conditions of Use document details all of the requirements that aircraft operators are required to adhere to, and also provides an overview of the aeronautical charges levied to airlines. While the airport operator cannot arbitrarily forbid a slot-holding airline to operate solely dependent on noise levels (subject to the aircraft type not being banned from operating in the UK/EU), it does detail how financial penalties and charging differentials can influence what aircraft type an airline may opt to operate in and out of the aerodrome.

All of the above illustrates that the noise mitigation measures stipulated by the Secretary of State do not operate in isolation and form part of a suite of measures aimed at managing noise at Gatwick Airport.

9. There should be a reappraisal of the format of Gatwick's Noise Action Plan, the obligations it imposes on the airport and the wider industry and the consequences of failing to meet those obligations.

GATWICK AIRPORT RESPONSE
The comments in response to item 5 refer.

10. It was disappointing to see the consultation largely restricted to the airport consultative committee, rather than the airport undertaking a wider direct consultation with residents affected by noise from the airport.

GATWICK AIRPORT RESPONSE
Section 3.4 of the "Guidance for Airport Operators on how to revise Noise Action Plans under the Environmental Noise (England) Regulations 2006 (as amended)" states that "It is envisaged that once the plan has been revised it will be presented to the Airport's Consultative Committee for comment, and any other appropriate bodies depending on the extent and nature of the revisions. The Airport Operator should summarise the comments received in the revised plan together with their response to the issues raised."

Gatwick Airport Ltd has circulated the draft list of Action Plan Actions and subsequently the full Noise Action Plan document to those organisations listed at the head of this section therefore the airport has gone above and beyond what was required of it.

11. The Government issued guidance to Gatwick Airport that the END Noise Action Plan review was to be 'light touch' while also instructing Gatwick to 'maximize its use of the airport'.

GATWICK AIRPORT RESPONSE
When Gatwick Airport Ltd was notified of the requirement to revise its Noise Action Plan, DEFRA advised that, as the airport already had a Noise Action Plan in place, a relatively light touch "review and revise" updating process was proposed. That said, in the draft list of proposed Action Plan Actions circulated at the commencement of the consultative process:

- 26 Previous Action Plan Action had been removed;

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- 8 Action Plan Actions had been retained;
- 18 Action Plan Actions had been revised;
- 27 Action Plan Actions were new.

It is longstanding Government policy to use the capacity afforded by existing airport sites and stability in the airspace routing structure and this is also consistent with its policy "to limit noise". For example, the 2013 Aviation Policy Framework advocates that airports make the best use of existing runway capacity to improve performance, resilience and passenger experience, encouraging new routes and services.

12. The Department for Transport had the opportunity with the recent review of the Night Flight Restrictions to further reduce the number of movements and quota count, which it failed to do.

GATWICK AIRPORT RESPONSE

The Government published its decision on the next night flights regime for Gatwick in 2017 and this will be in place for the period October 2017 to October 2022. The movements limit remains unchanged however the night quota limit will be reduced as set out below.

During the summer season, the number of air traffic movements permitted during the night period is limited to 11,200 and 3,250 during summer and winter respectively. The night quota limits will be reduced to 5,150 in the summer (from 6,200) in 2018 and to 1,785 in the winter (from 2,000) in 2017/18. This will further incentivise the use of quieter aircraft by encouraging industry to plan its operations with sufficient headroom to ensure the limits can still be complied with in the event of unplanned disruption or changes to their schedules.

13. No initiatives by the Government are included in the list of draft Action Plan Actions.

GATWICK AIRPORT RESPONSE

While this draft END Noise Action Plan focusses on issues particular to Gatwick Airport and its environs, there are a number of initiatives underway at a Government level however it wasn't deemed appropriate to include them in this document.

A key development will be the establishment of an Independent Commission on Aviation Noise (ICCAN) by spring 2018. Within 2 years it will be decided whether ICCAN should be given statutory powers of enforcement.

ICCAN will advise on airspace change and share best practice. ICCAN will be a key consultee in both airspace change and planning processes and will have a role in verifying airports' monitoring and communication of noise impacts. ICCAN should have a role in the monitoring and quality assurance of airport noise measurements and reporting, as well as how such measures are enforced.

The Government hopes that ICCAN will rebuild trust between industry and communities and make sure noise impacts are properly and transparently considered.

ICCAN will not be responsible for investigating breaches in noise restrictions as "This requires a broad understanding of the context for individual breaches, such as safety and air navigation matters, to ensure that decisions take into account all factors".

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14. The latest Noise Action Plan does not contain clear targets to reduce the impact of noise around Gatwick, especially at night.

GATWICK AIRPORT RESPONSE

As Gatwick Airport already has an Action Plan in place from previous rounds of END noise mapping, the current plan should be reviewed and revised to include, as necessary:

- updated details about the airport and its operation;
- the results of the noise mapping completed in 2017;
- the progress made against the actions described in the current Action Plan;
- updated information about relevant legislation and standards;
- updated relevant national and local policies;
- information about on-going actions; and
- information about any proposed new actions.

When revising their plans, airport operators should ensure that all the requirements set out in the regulations (listed above and described further in Annex C of the Guidance to Airport Operators) are met. Once the plan has been updated and finalised, the Regulations require that it be sent to the Secretary of State for DEFRA for formal "adoption".

GENERAL COMMENTS ON THE PROPOSED ACTION PLAN ACTIONS

The Action Plan should commit to noise impact outcomes. A step towards this would be the development and implementation of noise metrics, in consultation with the community, to track progress of the airport's noise reduction performance.

GATWICK AIRPORT RESPONSE

Addressed in response No. 5 and 6 which noted that this is a matter of Government Policy.

As a separate work stream, under the governance of the Noise Management Board, Gatwick is investigating both UK Aviation Policy and noise metrics to determine how progress, in terms of noise management and/or reduction could be reported.

It is important that Gatwick Airport Ltd identifies in the final list of actions some actions that should be treated as a priority where they could bring potential improvements to benefit communities in the short term or will improve monitoring and understanding early in the plan period. The Gatwick Airport Consultative committee has identified the following actions for consideration as priorities – Actions 9, 25, 31a 39 and 39a.

GATWICK AIRPORT RESPONSE

Gatwick is open to discussion with GATCOM which actions are considered priorities for implementation. This will form part of a subsequent discussion once the action plan has been adopted by DEFRA.

The proposed actions provide clear commitments from Gatwick Airport Ltd over the longer term to manage the noise impact around Gatwick. However, it is important that the actions

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are outcome based and measurable. As currently drafted the wording of some actions does not clearly provide an indicator to satisfactorily measure success of delivering improvements to the noise climate. For example, Action 31 is the implementation of new initiatives but how will the success of the implementation of new initiatives be measured? Gatwick Airport Ltd is requested to review the wording of the actions to ensure they are outcome based and/or measurable where possible. It is also suggested that for those actions from the current END Noise Action Plan which have been removed, the rationale for their removal is provided in each and every case.

GATWICK AIRPORT RESPONSE

It is appreciated that the performance indicators for the actions could be improved and steps have been taken to update these in the revised Action Plan. However, in some cases it is not possible to provide, with a degree of certainty, the likely benefit of some actions as:

- the action may relate to a study for which the likely benefits are not known; or,
- the action may relate to a number of smaller studies which are planned to deliver benefits in a time period within the Action Plan duration, for example the Noise Management Board and its 2017/2018 and subsequent workplans. In these cases, the relevant oversight group for that action, such as the NMB, NaTMAG or GNMG will determine the individual success factors and likely benefit of each action. Where appropriate, this information will be made publicly available; or,
- the action may be implemented by Gatwick, but require action from an external party, which is outside of the control of Gatwick to deliver a benefit, for example airline fleet replacement programs; or
- not be applicable to that relevant action, for example the achievement of FPT key performance indicators.

With regard to historic actions which have now been removed from the plan, more information has been added to explain why it was removed from the plan. In most cases this is due to a step change in aviation noise management since the last Noise Action Plan. The work of the Airports Commission, DfT, CAA and Gatwick itself through the Independent Arrivals Review and the creation of the Noise Management Board has led to a drastically different baseline on which the Noise Action Plan is be developed. The change in landscape has resulted in the majority of the actions previously listed either being overtaken by recently completed, in progress or planned work.

With measures 1 to 8, 10-12, 13-19, and 20 to 26 in the proposed action plan there is no indication given as to what improvement these measures will deliver over the next 5 years. For example with measure 8 no figures are given for the proportion of scheduled day movements that are currently taking place at night so that the impact of the proposed action can be assessed over the next five years. Also, no indication is given as to how much of an impact these late running aircraft are currently having on night noise levels / residents affected.

GATWICK AIRPORT RESPONSE

It is appreciated that some actions are not outcome based and measurable and steps have been taken to review and update the performance indicators. As listed above, in some cases it is not possible to provide, with a degree of certainty, an accurate estimate of the improvement at this stage.

With regard to the actions in question, the Flight Performance Team quarterly and annual reports track progress against a number of key performance indicators and could be used as a

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basis for tracking impact in comparison to historic periods.

SPECIFIC COMMENTS ON THE PROPOSED ACTION PLAN ACTIONS

Action 1 – Publishing the track fleet mix would allow year on year comparison. Could use an index which uses the Quota Count system to calculate average for summer/winter.

GATWICK AIRPORT RESPONSE
Fleet mix is currently reported to the Noise and Track Monitoring Group (NaTMAG). It is appreciated that the publication of this figure will allow for a year on year comparison and options for the publication of this figure will be explored, either through Action 1 (Charging differential to incentives the use of aircraft with the best in class noise performance) or Action 5 (Programme to rank airlines in relation to their overall performance for a range of noise and emissions impacts).

Action 3 – The objective of this action is not clear to us. Please could it be clarified?

GATWICK AIRPORT RESPONSE
This will incentivise through our aeronautical charging structure the increased use of the quietest and cleanest aircraft at Gatwick Airport.

Action 4 – This is an action in the current NAP, with a league table due to be published in 2014. The action is assessed as on-track (green) in the GAL's 2016 performance report published in January 2017. The action should be expedited. A worked-up proposal should be brought to the NMB by summer 2018 and an initial league table published in autumn 2018. The proposals should include financial incentives for performance improvement to the fullest possible extent.

GATWICK AIRPORT RESPONSE
The noise league table was listed on the previous noise action plan and was incorporated as part of the NMB 2017/2018 work plan to provide additional focus. Although the activity was listed on the NMB's 2017/2018 work plan, it was not designated as a high-priority and instead the NMB decided that additional focus should be placed on the delivery of Fair and Equitable Dispersal (FED), Continuous Descent Operations (CDO), Reduced Night Noise (RNN) and Noise Abatement Departure Procedures (NADP).

Despite not being a high-priority of the NMB, Gatwick and its independent consultants have commenced work on the scoping, design and implementation of a noise league table. This program is expected to be complete in 2019 and the proposals would be circulated to relevant stakeholders for comment.

Action 5 – As currently drafted this simply sets out GAL's legal obligation to consult on charges. We would like to see more detailed actions that reflect the proposals we (the CNGs) made to GAL in our response to its 2018/19 charges consultation (dated 29 September 2017).

GATWICK AIRPORT RESPONSE
In 2017, Gatwick has explained to the NMB the regulations and laws under which the airport's charging policy exist. Despite the NMB not being formal consultees in the charge consultation process, Gatwick agreed to circulate the relevant consultation papers for comment. The NMB provided formal response and these were considered by Gatwick and covered in its decision paper. As noted in the action, Gatwick will continue to seek the views of the NMB using the same process as above in future

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airport charges consultations.

Action 6 –This does no more than set out GAL's legal obligations in relation to night flights. In addition to our comments on charges (5 above) we propose two additional actions:

(1) that GAL should voluntarily transfer responsibility for all derogation decisions to DfT and
(2) that GAL should not seek to grow night flights (particularly in the winter period where there is surplus permitted capacity) unless it can be clearly and independently demonstrated that there is net economic benefit in doing so taking account of all externalities.

GATWICK AIRPORT RESPONSE

The DfT provides oversight on the management of the night quota period, including reviewing decisions for dispensations made by the Airport. As noted in the 2017 DfT consultation on night flight restrictions, the Government had not received any evidence that dispensations are being used inappropriately. The DfT noted that they will continue to monitor the use of dispensations and carry out further work to consider whether the current process for issuing dispensations is appropriate. Gatwick will support any ongoing work as required.

With regard to night flights, the 2017 consultation reviewed the night movement and quota limits. The DfT concluded that it was not appropriate to make any changes to Gatwick's movement limits as reducing the number of night flights would add to the capacity constraints that are already facing the south east. In accordance with Government Policy, from the winter of 2017/18 a reduced the quota limit and a new quota class for certain aircraft types will be introduced by the DfT. Both initiatives will ensure 'we reap the benefits of a strong aviation sector over the coming years while continuing to limit or reduce the number of people significantly affected by aircraft noise at night, through ensuring that aircraft cannot get any louder and that a proliferation of movements by exempt aircraft is prevented.'

Action 9 – A mandatory ban should be imposed by the Department for Transport and that such an action by them should be included in the plan. Without prejudice to that view, until such time as that happens, the voluntary ban should occur well before 2024.

There is no reason why a ban on QC4 aircraft operating could not be introduced from summer 2019 rather than 2024.

The ban must apply to the night period (23:00 to 07:00) as defined under the EU directive as this plan is published as part of the END, not the 'core night' period (23:30 to 06:30)

During the summer period of 2017 there were in excess of 40 QC4 flights (all from the same airline) that were repeatedly late (scheduled day) departures in the night period which went on for 6 months, led to numerous complaints from residents, and also resulted in two breaches of the night noise departure limits (this compares to one such event in the previous five years). Given there were 10 such departures in the first month of the summer but the practice continued for another 5 months indicates that the current controls in place are insufficient to remain in place for another 7 years.

A ban on QC4 aircraft at night would follow past practice at the airport of improving the night noise regime by first stopping the scheduling of a given QC rated aircraft followed by a ban on the use of such aircraft at night.

This should be brought forward to 2019. Alternatively introduce a charging differential (like FOPP) where there is a significantly

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increased charge from 2019 on QC4s at night.

Night noise is the most harmful of aviation noise.

Follow Heathrow's lead on introduction on a ban of night flights during the quietest period of the night.

This should be brought forward to 2019 at the latest.

GATWICK AIRPORT RESPONSE
The Secretary of State for Transport has specific responsibility for noise control at Heathrow, Gatwick and Stansted airports and the application of such a ban is a matter of Government Policy. As an airport operator, Gatwick cannot arbitrarily restrict or forbid a slot-holding airline to operate solely dependent on noise levels either directly, or through the application of a QC ban (subject to the aircraft type not being banned from operating in the UK/EU).

There are potential opportunities to introduce voluntary measures and these will be explored as part of this activity. Concerns regarding the timeframe in which the voluntary ban could come into effect are appreciated and the target has been brought forward to 2022 from 2024. However any voluntary initiative will be subject to agreement with the airlines.

Action 15 – The NMB's work programme envisages this work being completed by end 2018. The metric should therefore be reported from January 2019 at the latest. The proposals should include financial incentives for performance improvement to the fullest possible extent.

GATWICK AIRPORT RESPONSE
The action has been updated with a planned completion date of 2019. Proposals for financial incentives would be explored by Gatwick on conclusion of the study.

Action 21 – This action suggests that a single noise abatement procedure be specified for all routes out of Gatwick. As for any given route, a different procedure may be optimal, therefore action 21 is not sufficiently challenging. (Explanation: There are currently two types of departure procedure but at Gatwick Airport there is currently no preferred one. Unfortunately, which one is optimal for a given departure route depends upon many factors including where populations of residents exist beneath them. It may be the case that the procedure which is optimal for one departure route may not be optimal for another. We are suggesting that it is possible to specify different departure procedures for different routes in order maximise the overall noise reduction.)

The airport currently operates two noise abatement departure procedures from the airport, allowing the airline operator to choose which to use. Rather than settling on one of these procedures for all departure routes from the airport as proposed, each route should be assessed individually and the airport adopt the optimal departure procedure for a given route.

GATWICK AIRPORT RESPONSE
Noise Abatement Departure Procedures (NADP) are a general noise management procedure which are used between 800ft and 3,000ft. The procedure changes the location of noise benefit to either be close to the runway (NADP 1) or at an increased distance from the airport (NADP 2). The specific location of this benefit can vary depending on the aircraft in question and the airline's own specific procedures.

Gatwick currently has an ongoing program of works to investigate the potential benefits and dis-benefits of both procedures, this includes a consideration to noise, emissions and fly-ability. The

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study has not concluded yet and is linked to an additional study commissioned by the DfT ANMAC group which is investigating NADP at Gatwick, Heathrow and Stansted.

Gatwick will await the results of these studies before implementing a preferred procedure.

However, in accordance with guidance published by the International Civil Aviation Organisation (ICAO), the airport cannot to mandate the use of a single NADP and instead only a recommendation can be made. In addition, ICAO Document 8168 restricts the total number of departure procedures to two per aircraft for a given airline, this requirement is mandated within EU Law EU OPS 1.235. These requirements both rule out the mandated use of a single procedure and the use of specific local procedures or variations. As a result, the use of anything other than a recommended single NADP is highly likely to increase the risk of non-compliance and remove the likely benefits that could be realised.

Action 22 – Equivalent reviews should be carried out on all other departure routes.

GATWICK AIRPORT RESPONSE
As reported in the minutes of NMB/8, initial efforts focussed on these two routes for legacy reasons, it was not intended to suggest that work on other routes is excluded and it was agreed that the Departures work objectives would be updated to include other departure routes. A newly revised NMB 2017/2018 work plan was circulated to NMB/9 to note this change and this Action has been updated accordingly.

Action 24 – With modern aircraft there is no excuse exceeding the departure limits. A review of the fines should be carried out and they should be set at a level that would far exceed any benefit that maybe gained from exceeding the noise limits.
The Department for Transport departure noise limits are now over 15 years old, with the limits set based primarily on aircraft that no longer exist in the fleet. Given that aircraft noise is still a health issue around the airport especially at night, the airport should introduce a revised set of departure noise limits specific to Gatwick (as allowed by the Department for Transport) to minimise any unnecessary noise impact on residents around the airport.

GAL should publish details of all breaches including the individual and aggregate amount of fines levied.

GATWICK AIRPORT RESPONSE
Noise limits are set by the Secretary of State for Transport which has specific responsibility for noise control at Heathrow, Gatwick and Stansted airports. The specific noise limits are noted within the Gatwick Airport - London (Noise Abatement Requirements) Notice 2004 and are noted in the AIP. As an airport operator, Gatwick cannot arbitrarily restrict or forbid a slot-holding airline to operate solely dependent on noise levels (subject to the aircraft type not being banned from operating in the UK/EU).

However, it is appreciated that these noise limits are now rarely broken and as part of Action 25, Gatwick will engage with the DfT via the ANMAC committee to commence a review of departure noise limits.

Details of fines levied are contained within the Flight Performance Team annual and quarterly reports.

Action 25 – GAL could introduce its own lower limits if the Department for Transport will not support a change. Bring forward to 2020.

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GATWICK AIRPORT RESPONSE
The Secretary of State for Transport has specific responsibility for noise control at Heathrow, Gatwick and Stansted airports. The specific noise limits are noted within the Gatwick Airport - London (Noise Abatement Requirements) Notice 2004 and are noted in the AIP.

It is appreciated that these noise limits are now rarely broken and as part this Action, Gatwick will engage with the DfT via the ANMAC committee to commence a review of departure noise limits.

Action 27 – Whilst this undertaking is appreciated, it is felt that it should not form a part of a noise action plan. GAL should publish details of the aggregate amount provided under this and other compensation.

GATWICK AIRPORT RESPONSE
Whilst it is appreciated that this action is not directly related to noise, it is an important action to manage the potential impacts of aviation on the local community. Its inclusion as part of the Action Plan ensures awareness and performance tracking of the scheme.

Action 29 – The 2014 scheme should be expanded to include those within the 60 dB LAeq16hr contour.

2014 scheme expanded to include the 60dB LAeq16hr.

GAL should carry out a full review of its compensation schemes based on a polluter pays principle. Any person exposed to increased noise from GAL's operations should be able to claim compensation equivalent to that envisaged under the Land Compensation Act.

GATWICK AIRPORT RESPONSE
The specific recommendations will be included in the review proposed by Action 28 "we will continue a scheme that helps with the cost of acoustically insulting homes against the effects of aircraft noise. We undertake to review the scheme every 5 years to ensure it remains appropriate and relevant."

Action 30 – There are no proposed changes to NPRs with LAMP2, however if there is no other option available and a new NPR is introduced and new people are overflown then a lower figure should be considered.

GATWICK AIRPORT RESPONSE
Both the Property Market Support Bond and Home Owners Support Scheme are voluntary proposals developed by Gatwick and relate to measures which would be enacted should Gatwick be permitted and received planning permission to build a second runway.

As noted in the documentation for both schemes, the areas currently stated are based upon the relevant noise contours. If the second runway was permitted to be constructed, the boundary for the schemes would be extended to include any new properties which may fall within the revised contour. The airport will also any airport which were inside, but then fall outside of the boundary.

Action 31 – Include reference to publishing the annual report of the NMB which will list success of work program.

GAL should commit to noise impact reductions equivalent to or greater than the growth projected by the airport in the NAP period together with a further factor reflecting the growth enjoyed by the industry from 2013-2018 the benefits of which have not been shared with impacted communities.

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GATWICK AIRPORT RESPONSE

The NMB publish an annual report on progress against its agreed work plan, this has been referenced in the performance indicator and reporting section.

Action Plans are a legal requirement under Directive 2002/49/EC relating to the Assessment and Management of Environmental Noise, commonly referred to as the Environmental Noise Directive or END. The requirements of the END are transposed in the Environmental Noise (England) Regulations 2006 as amended ("the Regulations"). Both the Directive and the Regulations contain no requirement to commit to binding noise impact outcomes. In accordance with the Regulations, Gatwick has proposed actions which aim to manage noise issues and effects, including noise reductions. An approach which is consistent with the Government's Aviation Policy aim to limit and where possible reduce the number of people in the UK significantly affected by aircraft noise.

In order to better measure noise performance, Gatwick has commenced work to identify noise metrics and reporting as part of Activity 2 of the NMB 2017/2018 work plan. As this study will require input from a wide range of stakeholders, the work stream has already been expanded to consider parties external to the NMB such as the Environmental Health Officers, GATCOM, NaTMAG, Gatwick Noise Monitoring Group as well as national bodies such as Sustainable Aviation and DfT ANMAC. Due to the wider applicability of this work, it has been included as a standalone action within the MONITORING AND REPORTING OUR PROGRESS section as Action 39a as follows "We will conduct a review of Government policy to identify new noise metrics and reporting to compliment the current noise contours and measure our noise performance."

Action 39 – The night contours should be for the whole night period (23:00-07:00) rather than the Quota Period (23:30-06:00). This is a requirement of the END which specifies 23:00 to 07:00 as night (not the lesser period of 23:30 to 06:00). 'Summer L_{eq} contours' is a repeat of the 'summer 16hr L_{eq} contours' mentioned in the first bullet point. The frequency/years for publication should be specified.

The Night contours should be for the whole night period (23:00-07:00) rather than the Quota Period (23:30-06:00).
'Summer L_{eq} contours' are a repeat of the summer 16hr L_{eq} contours above.

The action discusses the production of 'night quota period' contours. As this is an EU / UK government action plan the contours must be for Lnight (23:00 to 07:00). If the airport wishes to produce contours for the quota period in addition to the night period this would be welcome.

GATWICK AIRPORT RESPONSE

The contours listed in the draft action plan have been updated and now note:

- Summer 16 hour day Leq (actual)
- Summer 16 hour day (standard) L_{eq}
- Summer Night L_{eq} (actual)
- The above compared to the previous year.
- Summer Night 10 year average modal split L_{eq}.

These contours are produced by CAA ERCD upon direct request and tasking from Gatwick. This work was previously commissioned by the DfT. The 2016 contours were the first to be commissioned by Gatwick Airport Ltd.

Action 40 – GAL to commit to publishing noise contours no later than three months after the end of the period in question.

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On every occasion that a noise contours reveals an increase in noise impacts GAL should, within a further three months, publish a remediation plan setting out the actions it intends to take to reduce noise impacts to a level consistent with our comment on action 31 above. The remediation plan should be submitted to and agreed with DfT as noise regulator for Gatwick and the NMB.

GATWICK AIRPORT RESPONSE
As Gatwick is now responsible for commissioning the noise contours from CAA ERCD, the airport is exploring contractual options to deliver the noise contours in a timely manner.

With regard to the noise contour increases, this is a matter of Government Policy as neither Directive 2002/49/EC relating to the Assessment and Management of Environmental Noise, nor the Environmental Noise (England) Regulations 2006 which transpose these requirements, require airports to undertake a review of their action plan following the publication of noise contours.

Via Action 39a, Gatwick will investigate noise metrics and reporting to better measure noise performance. This study will help shape and guide the implementation of the actions contained within this action plan to manage noise issues and effects, including noise reductions. An approach which is consistent with the Government's Aviation Policy aim to limit and where possible reduce the number of people in the UK significantly affected by aircraft noise.

Action 42 – Methods of complaint should be stated to include complaints through a webpage, free-phone telephone number (which may be to an answer-phone) or by letter to a free post address. (Note: Email is not suggested as that method is capable of abuse by the automation of the sending of emails.)

Following many complaints it has been agreed to re-instate a phone service for noise complaints. Reference to which should be included in this condition.

GATWICK AIRPORT RESPONSE
Currently, in accordance with the updated complaints policy revised after the Independent Arrivals Review, all complaints will need to be processed via Casper with a free-post facility available for those who don't have access to a computer or the internet. The various methods have now been listed on the action plan. In addition, following feedback gathered, the action has been expanded to include a target to re-introduce the telephone complaints system by the end of 2018.

Action 52 – This action has been included in order to "create a structure that has capacity to accommodate forecast traffic levels beyond 2040". Achieving desired traffic levels is not in itself an action related to noise reduction (it is more likely to be the opposite). It is suggested that this action should explicitly include undertakings to use the LAMP process to achieve reductions in noise.

Given the magnitude of what is being proposed here, in essence a complete redesign of the London airspace, this is an ideal opportunity to reduce the noise impact of the airport. At present the performance indicator is of no value unless it gives an indication of the noise benefits with and without LAMP in 2024.

GATWICK AIRPORT RESPONSE
The Action has been re-worded to include a noise benefit as follows "52. We will participate in all activities relating to 'LAMP2' – the redesign of the London Terminal Manoeuvring Area (LTMA) and en-route airspace to eliminate chokepoints, alleviate areas of intensive aircraft concentrations, reduce the number of people affected by noise and to create a structure that has capacity to

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accommodate forecast traffic levels beyond 2040."

Action 53 – This is not an appropriate in a noise action plan; it is a noise creation action not a noise reduction action. Instead GAL should support the proposal in the CNG's paper on LAMP 2 that NATS and GAL, together with other London area airports as necessary, should develop new overarching principles for LAMP 2 which:

- reflect the government's aircraft noise policies, including that the benefits of growth should be shared between the industry and impacted communities and that there should be balance between the interests of the industry and those of communities impacted by it.
- rule out any increase in the number of people significantly impacted by aircraft noise, subject to consistency with principles of fair and equitable dispersal agreed or to be agreed
- give equal weight to increasing capacity and reducing environmental impacts, particularly noise.

GATWICK AIRPORT RESPONSE

The Action has been re-worded to include a noise as follows "52. We will participate in all activities relating to 'LAMP2' – the redesign of the London Terminal Manoeuvring Area (LTMA) and en-route airspace to eliminate chokepoints, alleviate areas of intensive aircraft concentrations, reduce the number of people affected by noise and to create a structure that has capacity to accommodate forecast traffic levels beyond 2040."

This wording is consistent with the Future Airspace Strategy (FAS) 2030 vision to establish "safe, efficient airspace, that has the capacity to meet reasonable demand, balances the needs of all users and mitigates the impact of aviation on the environment." In addition, managing environmental impacts, including noise, which is one of the three strategic drivers for modernising UK airspace alongside safety and capacity. Gatwick will continue to work with the CAA, DfT, NATS and other London airports to ensure that LAMP 2 can deliver a benefit for all in accordance with the Future Airspace Strategy.

SUGGESTIONS FOR INCLUSION OF FURTHER UNDERTAKINGS

Reduce the departure noise limits

This is a matter of regulation and should be for the Department for Transport to implement. See proposed Action 25. Gatwick Airport Ltd could introduce its own lower limits if the Department for Transport will not support a change. In either case it should be brought forward to 2020.

As there is no excuse for modern aircraft and rather old departure noise limits to exceed those limits, the fines should be increased. This should be for the Department for Transport to implement. Gatwick Airport Ltd could increase fines themselves if the Department for Transport doesn't.

GATWICK AIRPORT RESPONSE

As reported in the feedback to Action 25, the Secretary of State for Transport has specific responsibility for noise control at Heathrow, Gatwick and Stansted airports. The specific noise limits are noted within the Gatwick Airport - London (Noise Abatement Requirements) Notice 2004 and are noted in the AIP. As an airport operator, Gatwick cannot arbitrarily restrict or forbid a slot-holding airline to operate solely dependent on noise levels (subject to the aircraft type not being banned from operating in the UK/EU).

It is appreciated that these noise limits are now rarely broken and as part of Action 25, Gatwick will engage with the DfT via the ANMAC committee to commence a review of departure noise limits.

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Introduction of arrivals noise limits.
(This should be an issue for the Department for Transport to consider.)

GATWICK AIRPORT RESPONSE
During the 1990s the Government considered the feasibility of setting noise limits for arriving aircraft through its Aircraft Noise Monitoring Advisory Committee (ANMAC). ANMAC advises the Department for Transport on technical and policy aspects of aircraft noise mitigation and track-keeping policies at Heathrow, Gatwick and Stansted airports.

The work was published by the Department of the Environment, Transport and the Regions (DETR) in 1999, which concluded that it was impracticable to set approach noise limits similar to those for departing aircraft. The Government therefore decided against imposing operational noise limits for arrivals and in February 2000 announced that it would ask the aviation industry to develop a code of practice to promote the use of Continuous Descent Operations (CDO), which the report had identified as the primary means of reducing noise experienced on the ground.

Recently the CAA reviewed the Arrivals Noise Controls with the resulting analysis published within CAP 1554. The study noted that "due to the number of noise monitors required, effective noise monitoring of CDO performance prior to the capture of the glide path would not be practical. However, once aircraft have joined the final approach path, practical approach noise monitoring could be accomplished with a small and practical number of noise monitors, at distances between approximately 6 to 10 NM from landing threshold. Such monitoring would only measure the benefits of low power, low drag (LP/LD) procedures and not CDO.

When monitoring approach noise within 6 to 10 NM from landing threshold, there is limited scope for pilot discretion as the aircraft configuration will to a large extent be dictated by ATC speed control, making it difficult to subsequently attribute any noisier arrival to pilot, aircraft system or ATC action. A limit-based noise monitoring system, similar to that for departures, would therefore not be feasible."

Work to identify noise metrics and reporting to support the measurement of and track progress of, the NMB work plan and Noise Action Plan initiatives.
The Gatwick Airport Consultative committee acknowledges the concerns of local communities about the need for Gatwick Airport Ltd and the industry to address the impact of incremental traffic growth on the noise climate. To help give confidence to communities that GAL is actively and seriously addressing this concern and to pick up a new work stream of the NMB, the Committee suggests an additional action – new Action 31a. The inclusion of this action will bring into the END NAP process GAL's work to identify noise metrics and reporting which will enable the airport's growth and noise reduction performance to be more robustly measured and tracked.

GATWICK AIRPORT RESPONSE
Work to identify noise metrics and reporting was commenced by Gatwick as part of Activity 2 of the NMB 2017/2018 work plan, currently captured within Action 31 of this Action Plan.

As this study will require input from a wide range of stakeholders, the work stream has already been expanded to consider parties external to the NMB such as the Environmental Health Officers, GATCOM, NaTMAG, Gatwick Noise Monitoring Group as well as national bodies such as Sustainable Aviation and DfT ANMAC.

Due to the wider applicability of this work, it has been included as

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a standalone action within the MONITORING AND REPORTING OUR PROGRESS section as Action 39a as follows "We will conduct a review of Government policy to identify new noise metrics and reporting to compliment the current noise contours and measure our noise performance."

Fining for lack of continuous descent approach on landing.
(The continuous descent approach is already a requirement contained within the Aeronautical Information Publication as regulated by the Department for Transport.)

GATWICK AIRPORT RESPONSE
CAP 1554, Review of Arrivals Noise Controls noted that "it is sometimes not possible to achieve a CDO due to a range of factors, including ATC instructions and information, airspace constraints, overriding safety requirements and weather. An analysis of CDO achievement rates over a period of several years may show seasonal peaks and troughs in performance.

In addition, when flying a CDO an aircraft may still require a short segment of level flight in order to reduce speed and/or to reconfigure. Thus without knowledge of the associated ATC voice instructions to flight crew (the monitoring of which would be impracticable), any instances of non-CDO could not automatically be attributed to the flight crew, making it difficult to apply financial or other penalties for not achieving a CDO."

Fining for breaches of any rule within the Aeronautical Information Publication.
(This should be an issue for the Department for Transport to consider.)

GATWICK AIRPORT RESPONSE
As noted above, due to a range of factors such as ATC instructions and information, airspace constraints, overriding safety requirements and weather it is it difficult to apply financial or other penalties for not achieving the rules within the AIP. Gatwick airport's FPT monitors adherence to the AIP rules and provides information to airlines when these are breached to support continual operational improvement.

Impose a significant reduction in night noise quotas.
(This should be an issue for the Department for Transport to consider.)

GATWICK AIRPORT RESPONSE
The Government published its decision on the next night flights regime for Gatwick in 2017 and this will be in place for the period October 2017 to October 2022. The movements limit remains unchanged however the night quota limit will be reduced as set out below.

During the summer season, the number of air traffic movements permitted during the night period is limited to 11,200 and 3,250 during summer and winter respectively. The night quota limits will be reduced to 5,150 in the summer (from 6,200) in 2018 and to 1,785 in the winter (from 2,000) in 2017/18. This will further incentivise the use of quieter aircraft by encouraging industry to plan its operations with sufficient headroom to ensure the limits can still be complied with in the event of unplanned disruption or changes to their schedules.

Ban the scheduling of QC/2 aircraft in the night period.
(This is a matter for the Department for Transport to consider.)

GATWICK AIRPORT RESPONSE
The Government published its decision on the next night flights regime for Gatwick in 2017 and this will be in place for the period

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October 2017 to October 2022. Although a QC/2 ban was not subject to this consultation, proposals for a QC/4 ban were made to the DfT.

Introduce a voluntary ban on all QC4 aircraft during the Night Quota Period by 2019.

GATWICK AIRPORT RESPONSE
This request is captured by Action 9 of the proposed action plan, the date of this action was set at 2024 due to the necessary requirement for airline consultation. Concerns regarding the timescale of this action are appreciated and the end date has been adjusted to 2022.

Introduce a ban on scheduling QC4 aircraft during the night period (23:00-07:00) by 2024.

GATWICK AIRPORT RESPONSE
The Secretary of State for Transport has specific responsibility for noise control at Heathrow, Gatwick and Stansted airports and the London Heathrow, London Gatwick and London Stansted Airports Noise Restrictions Notice (No.2) 2017 note:

- QC4 aircraft may not be scheduled to take off or land during the night quota period.
- QC8 and 16 aircraft may not take off or land during the night period.

The Government published its decision on the next night flights regime for Gatwick in 2017 and this will be in place for the period October 2017 to October 2022. Proposals for a QC/4 ban were proposed to the DfT as part of this consultation.

GAL should commission and publish, at least annually, a detailed analysis of the health impacts of the airport's operations and the societal costs involved.
Over time these should identify trends and recommend actions to reduce health impacts.

GATWICK AIRPORT RESPONSE
These comments would be considered as part of the ongoing study to identify noise metrics and reporting as part of Activity 2 of the NMB 2017/2018 work plan to better measure noise performance. This task has been included as Action 39a as follows "We will conduct a review of Government policy to identify new noise metrics and reporting to compliment the current noise contours and measure our noise performance."

From the summer of 2020 no QC 2 flights can be scheduled during the period 23:30 to 06:30, and from 2023 no QC2 flights to be scheduled during the night period (23:00 to 07:00).
The purpose of the measure is to limit the use of the noisiest aircraft at night to minimise the number of people affected by sleep disturbance. This follows past practice at the airport of improving the night noise regime by first stopping the scheduling of a specific QC rated aircraft at night followed in the longer term by a ban on the use of such aircraft at night – as already proposed by the airport for QC4 aircraft.

GATWICK AIRPORT RESPONSE
The Secretary of State for Transport has specific responsibility for noise control at Heathrow, Gatwick and Stansted airports. The Government published its decision on the next night flights regime for Gatwick in 2017 and this will be in place for the period October 2017 to October 2022. Proposals for a QC/4 ban were proposed to the DfT as part of this consultation.

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As there are only a few flights during the middle of the night, it is therefore now possible to introduce a no-flight period during the night (01:30-05:00) by 2024.

GATWICK AIRPORT RESPONSE
This request is captured by Action 9 of the proposed action plan.

Produce N60 contours for the night period (and 60 dB L_{ASmax} average contours for the most frequent aircraft types (5% or more of total movements) using Gatwick at night (23:00-07:00).
(Note: The 60 dB contour equates to an internal noise level of 45 dB L_{Amax} with the windows open, which is recognised as the level that will give rise to sleep disturbance. This action is to help inform the understanding of sleep disturbance on the residents surrounding Gatwick).

We will produce N60 contours for the night period (and 60dB L_{ASmax} average contours for the most frequent aircraft types (5% or more of total movements) using Gatwick at night (23:00-07:00).

Production of annual (Calendar year) N60 contours for the airport (standard modal split) for the night period (23:00 to 07:00).

Production of summer N60 contours for the airport (standard modal split) for the night period (23:00 to 07:00).
With these contour maps the airport should also tabulate each year the number of residential premises in each contour band, and after the initial year e.g. 2018 use the same residential data set (2018) for subsequent years, in addition to the residential data set for that calendar year e.g. 2020, so that the improvements in residents' noise exposure can be tracked. The purpose of calculating the figures on both the original and current residential data set applicable at that time is to allow for new developments that might take place in an area to be accounted for..

The reason for this measure being proposed is that one off noise events above an L_{Amax} of 60 dB outside (45dB L_{Amax} inside) will have a negative effect on sleep and health7 and thus the above contours will be a key indicator of the health impact on residents around the airport. From 2024 the airport may wish to consider N50 contours as well given emerging evidence of health effects at levels below 45 dB L_{Amax}.

The production of N60 night time contours is also in line with government guidance.

GATWICK AIRPORT RESPONSE
The above four proposals relate to noise contours published as Action 39. As part of Activity 2 of the NMB 2017/2018 work plan, work to identify noise metrics and reporting was commenced by Gatwick currently captured within Action 31.

Due to the wider applicability of this work, it has been included as a standalone action within the MONITORING AND REPORTING OUR PROGRESS section as Action 39a as follows "We will conduct a review of Government policy to identify new noise metrics and reporting to compliment the current noise contours and measure our noise performance." The proposals listed above will be included as part of this newly introduced Action.

A compensation payment to each residential household within the 57 dB L_{Aeq} 16h contour beginning in 2019 of £1000 per annum index linked to the retail prices index.
The airport clearly recognises the negative impact of aircraft noise on residents living within the 57 dB contour and above, given its proposals to compensate residents with £1000 per annum outlined in the letter from the company chairman to the prime minister in

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June 2016.

In economic terms noise at Gatwick is an environmental externality and the above measure is intended to address this issue in the short term, while the longer term objective of the action plan under UK and EU law is achieved.

GATWICK AIRPORT RESPONSE
This refers to a commitment made by Gatwick Airport Ltd in 2014 where an initiative was introduced so that all households most affected by noise from a second runway at Gatwick would receive annual compensation equivalent to Band A Council Tax (currently £1000) if and when the second runway becomes operational.

As Gatwick Airport wasn't chosen as the site for an additional runway in the south-east, it is not appropriate to adopt this proposed Action Plan Action as there are there schemes currently in place, for example the Noise Insulation Scheme that offers up to £3,000 towards double glazing and loft insulation.

A new monitoring and enforcement regime should instead be proposed.
This should include provision that where a target is not achieved, or appears unlikely to be achieved, GAL should first prepare a remediation plan, if this does not promptly result in the achievement of the target GAL should report the failure to the DfT and/or DEFRA Secretary of State requesting direction on the actions it should take.

GATWICK AIRPORT RESPONSE
In accordance with the DEFRA guidance, the proposed actions within Gatwick's Noise Action plan have been assessed to determine their expected outcome and how this will be tracked. The Secretary of State for DEFRA, in liaison with the Department for Transport, will form a view regarding whether or not the submitted revised plan meets the requirements of the Regulations and, therefore, whether or not the plan is appropriate for adoption.

In terms of ongoing monitoring, the proposed actions within the Gatwick's noise action plan will be monitored in accordance with their proposed performance indicator and reporting process. In addition, the proposed actions in this noise action plan complement the Section 106 Legal Agreement with West Sussex County Council and Crawley Borough Council. As part the annual S106 monitoring process, Gatwick is subject to an independent review and audit of selected actions. The Final Annual Monitoring Report circulated to Crawley Borough Council and West Sussex County Council for circulation among the wider local authorities and the Gatwick Airport Consultative Committee. This report is published on the Airport website.

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ANNEX NINE B

FEEDBACK RECEIVED REGARDING THE INITIAL VERSION OF THE DRAFT NOISE ACTION PLAN

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As detailed at the commencement of the consultative process, feedback would be sought on the draft Noise Action Plan in its entirety. The date of 26 April 2018 was selected for the closure of this further state of consultation, this being the date of the full meeting of GATCOM.

In the previous round of consultation on the draft list of Action Plan Actions, comments were received from Crawley Borough Council, Horsham District Council, Reigate and Banstead Borough Council, Surrey County Council, West Sussex County Council, GATCOM and a joint letter was received from GACC and the Community Noise Groups of the Noise Management Board. Themes of all feedback received has been set out earlier in this section.

In accordance with the revised guidance from DEFRA to airport operators of February 2018, Gatwick Airport Ltd has considered the feedback provided and adapted its proposed actions accordingly. Key changes included:

- Updated structure of the draft actions table to include more information on the proposed action, costs/benefits, key stakeholders how it is to be tracked and reported and the proposed aim.
- Action 9, covering the voluntary operational ban on Q/C 4 aircraft in the night was brought forward to 2022. This date is now constrained by the required airline consultation process.
- Action 22 which covered a review of departure route limitations on Route 3 and 4 has been updated to cover all routes.
- Action 25 which covered departure noise limits, Gatwick continues to engage with the DfT on an ongoing study into departure noise limits. This study is expected to be completed in Summer 18. If required the DfT confirmed that they would consider a proposal at Gatwick to review these limits further.
- Action 39a has been introduced to capture a range of topics focusing on how noise metrics can be used to measure noise performance. It is a key action required to track the success of the draft NAP actions.
- Action 42, we are investigating options to introduce a complaints phone line by the end of 2018.

The full draft NAP including these changes was released to those organisations who provided comment on the draft list of Action Plan Actions in the first round of consultation and was also published on the Gatwick Airport noise website. Feedback was requested to be directed to the GATCOM members.

Feedback was duly received from the following organisations:

- GATCOM,
- The Community Noise Groups (CNGs) that sit on the Noise Management Board and the Gatwick Area Conservation Campaign.

The feedback received from these organisations is set out in full over the next pages.

FEEDBACK RECEIVED REGARDING THE INITIAL VERSION OF THE DRAFT NOISE ACTION PLAN

DURING THE SECOND STAGE OF ENGAGEMENT, INCLUDING THE GATWICK AIRPORT LTD RESPONSE

RESPONSE FROM THE GATWICK AIRPORT CONSULTATIVE COMMITTEE (GATCOM)

GATCOM
Gatwick Airport Consultative Committee

27 April 2018

Dear Lee,

GATWICK END NOISE ACTION PLAN 2019 - 2024

GATCOM welcomes the opportunity to help shape the reviewed draft END NAP and is confident that at the end of the consultation process involving GATCOM, the NMB community noise groups and Gatwick Local Authorities that GAL will have one of the most comprehensive and effective END NAPs in the country.

The END NAP is viewed as the overarching, statutory key driver for the airport to manage and mitigate the impact of aircraft noise around Gatwick bringing together the work of the various noise management groups and noise mitigation initiatives. It is important therefore that the NAP is seen as a "living document" and offers scope for regular review to reflect changing local circumstances. Having an effective and transparent monitoring and audit regime which helps ensure GAL remains on track to fulfil the various actions and commitments also needs to include a process to put in place remedial action when necessary, will give confidence to local communities impacted by aircraft overflight and noise that GAL is doing all that it can to mitigate the impacts and where possible seek an improvement in the noise climate.

Overall, GATCOM believes the draft reviewed END NAP gives a comprehensive account of the way in which GAL manages the noise climate, the legislative and regulatory framework within which GAL is required to operate, the proposed actions to be undertaken over the next five years and the schedule of consultation responses received. Many of the actions proposed in the draft NAP are supported and the revised format which introduces new additional columns against each action to address the requirements of DEFRA's guidance is welcomed. The inclusion of information on the estimated area/number of people to benefit from the action, the expected benefit and cost of the action and the other organisations to be involved in fulfilling the action will assist in the monitoring process.

GATCOM particularly supports GAL's work, being pursued through the NMB, to identify noise metrics and reporting to track traffic growth and the noise impact on local communities. It is noted that GATCOM previously suggested new actions 31a and 39a to capture the development of noise metrics and N60 contours for the night period, to be progressed as a priority in the early part of the plan period, have now been addressed through the bringing together of these actions into a standalone action – Action 39a - within the "monitoring and reporting our progress" section of the NAP.

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RESPONSE FROM THE GATWICK AIRPORT CONSULTATIVE COMMITTEE (GATCOM)
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However, GATCOM remains concerned about the lack of clear indicators or targets in the draft document. Some of the 'expected outcomes' from the additional KPIs set out in the draft document are already being achieved and as a result will just maintain the positive steps already being taken. The removal of all Chapter 3 aircraft is welcome as is the move to 80% Chapter14 aircraft. However the final outcome concerning the 48dB 6.5hr night contour being within 47km2 is confusing as in annex 6 (p.106) of the Action Plan there is reference to the Local Authority Planning Conditions, where it states:

"Limit the 6.5 hour, 48 dB(A) Leq contour (for the winter and summer seasons combined) to 47km² by 2011/2012. At Gatwick in 2011/2012 the 6.5 hour 48dBA Leq contour (for the winter and summer seasons combined) was 34.1 km2. In 2002-2003 it was 41.3 km2."

In addition the table in Figure 24 (p.106) shows that in Summer 2015 and Winter 2016 the combined 48dB Leq, 6.5hr contour area was 35.2 km2. As night noise is one of the major sources of annoyance for local communities GATCOM believes that GAL should be aiming to ensure this contour area remains the same at the very minimum as traffic grows and preferably be reduced over the next 5 years.

There is an overall lack of general overarching targets which is surprising given that some of the KPIs could be measured as there is existing data. However GAL needs to give a clearer commitment to actually measure any improvements and compare them to previous reports. For example, Action 10: Ground Noise - the indicator is unclear and "aim" is to maintain effective ground noise operational controls. The lack of clear indicators or targets could create difficulties for the auditors of the Noise Action Plan as there are no targets to be able to audit against. This will ultimately result in auditors confirming an action has been done but being unclear on any potential benefit. As it is important that the NAP outcomes are tangible and are able to be effectively assessed, GATCOM recommends that GAL reviews its "Aims" to make them "Targets" and introduces a few overarching targets which will help drive the behaviour to achieve those targets.

As regards the identification of actions to be progressed as a priority in the early part of the plan period, is it noted that GAL is open to discussion with GATCOM which actions are considered priorities for implementation and that this will form part of a subsequent discussion once the END NAP has been agreed by DEFRA. GATCOM wishes to pursue this point and whilst not wishing to circumvent the clear NMB role in helping to agree noise mitigation priorities as part of its work plan which is also captured by the NAP, it is felt that identifying some priorities in the NAP will help to build confidence and trust amongst communities that initiatives of importance are being treated as a priority by GAL. As a reminder GATCOM has suggested Actions 9, 25, 39 and 39a. Should this point not be accepted in the final version of the END NAP then GATCOM welcomes the opportunity for further discussions at the earliest possible time following DEFRA's approval of the plan.

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RESPONSE FROM THE GATWICK AIRPORT CONSULTATIVE COMMITTEE (GATCOM)
CONTINUED

GATCOM
Gatwick Airport Consultative Committee

As regards Action 9: Implementation of a voluntary ban on operations of QC4 aircraft within the core night period, and Action 25: Review of Departure Noise Limits, GAL's response to GATCOM's previous comments is noted. However, the Committee believes the GAL should do more to pursue these actions and believes that GAL should seek confirmation from the Secretary of State for Transport whether they can set their own limits over and above those by the Secretary of State. In respect of night flights generally, GATCOM would remind GAL that the Government's decision on the current night flights regime offered scope for airports to explore bespoke, airport-specific arrangements during the five year night flight regime should they wish to do so. GATCOM hopes therefore that this opportunity be further explored through the work of the NMB.

Finally, GATCOM has considered GAL's response to the Committee's comments on the specific actions. Set out in the table attached to this letter is GATCOM's response to how GAL has taken on board its comments. In some cases GATCOM has asked that GAL gives further consideration to the proposed action as part of this response to the consultation on the draft plan.

I trust GATCOM's comments set out in this letter and in the attached table can be taken into account in the final draft version of the plan.

Yours sincerely,

Paula Street
Assistant Secretary

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NMB COMMUNITY NOISE GROUPS' COMMENTS ON GAL'S PROPOSED 2019-2024 NOISE ACTION PLAN ACTIONS

The NMB Community Noise Groups and GACC submitted comments on GAL's draft Noise Action Plan (NAP) actions on 16 February 2018. Those comments, together with our previous NMB paper on Noise Action Plans, are attached as appendices to this document. Our NMB paper sets out our overall view on NAPs. This document sets out our joint comments on GAL's draft full Noise Action Plan V2.01.

Overarching comments

1. We support many of the actions proposed in the draft NAP. However, we continue to believe that the current NAP as a whole has not been effective, largely because it is based on inputs rather than measurable outcomes and because it takes no account of the significant growth that has occurred at Gatwick. CAA data shows that the noise environment around Gatwick has deteriorated every year since the current NAP came into effect.

2. The overall structure of GAL's 2019-2024 draft NAP, and the actions in it, are very similar to those in the current plan. Because Gatwick plans further growth in the 2019-2024 period it is likely that, if adopted and implemented, the draft plan would result in similar outcomes to the current plan. Specifically the noise environment around the airport would be likely to continue to deteriorate. We do not believe this is sustainable or consistent with the END' aims or the government's aviation noise policy objectives. We therefore continue to believe that there should therefore be a reappraisal of the format of Gatwick's NAP, the obligations it imposes on the airport and the wider industry and the consequences of failing to meet those obligations, on the basis set out in our previous comments.

3. None of the actions in the draft NAP meet the requirement in Defra's guidance to set out "the reduction of the number of people affected ... as a result of the measures in the Action Plan". In addition, in our view, few if any of the actions meet Defra's supplementary requirement (set out on page 95 of the draft NAP) that they should be "challenging" and only a handful are "quantified" in any form at all.

4. Numerous references in the introductory sections of the NAP (sections 2-7) are incorrect or out of date. In particular the SONA study findings and government's 2017 airspace policy decisions are not uniformly reflected. The document is wrong to claim that "in the last 15 years the number of people affected by noise within Gatwick's 57 decibel contour has fallen considerably …". The benefits and likely impact on noise of the NMB is overstated in these sections; this text should be toned down.

The proposed actions

5. Our analysis suggests that only nine of the 53 actions have direct potential to reduce noise. These are actions 1, 2, 3, 5, 9, 15, 17, 22, and 31. Five of those actions are repeated from or comparable to actions in the current NAP (1, 2, 3, 5 and 31), so their incremental impact is likely to be low. Two simply commit to implementing NMB solutions (17 and 31) but with no specificity on what those will be or the outcomes they will secure. One (22) seems likely to be technically very challenging.

6. Most of the other actions commit GAL to consultation, reporting, monitoring, mitigation measures or complying with the law, or will redistribute (rather than reduce) noise. We support most of these actions, but they will not in themselves reduce the airport's noise impacts.

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GAL's response to previous CNG and GACC comments

7. Very few of our previous comments have led to changes in the actions proposed by GAL. We draw particular attention to the following comments which we do not believe have been given the thorough consideration required by Defra:

ACTION / COMMENT NUMBER	PREVIOUS CNG COMMENT	CURRENT CNG VIEW
Comment 5, 9	The Noise Action Plan should commit to quantified noise impact outcomes	As discussed in 3 above the plan is not quantified in the manner required by Defra. GAL has suggested it is for Defra to consider whether it is adequate in this regard. In our view the current draft of the plan should not be adopted.
Action 5	The NAP should address the comments made by CNGs on the 2018/19 charges consultation	GAL has not responded to this.
Action 39a	-	This action should mirror the new priority workstream now agreed by the NMB, i.e. that the NMB will seek to develop and agree between industry and community representatives a set of metrics, processes and outcomes by which (1) the growth of the airport since 2013 and (2) its future growth are related to reductions in its noise impacts in a proportionate, fair and balanced manner. The current drafting of action 39a is unclear and too restrictive.
Action 40	GAL should prepare a remediation plan when noise contours show there has been an increase in noise.	GAL has dismissed this on the basis that it is a matter of government policy and not required by the END. In our view this misses the point: if noise is increasing the airport should be examining every option to reduce it; the process we have proposed would formalise that in a clear way and make the airport more accountable for its impacts. We would like GAL to reconsider this idea.
-	GAL should commission and publish, at least annually, a detailed analysis of the health impacts of the airports operations and the social costs involved.	GAL's response suggests that this will be addressed as part of its proposal to review noise metrics and reporting (number 39a). In our view these are entirely separate actions. We believe GAL should take greater responsibility for the health impacts of its operations and that the action we have proposed is a constructive way to commence that process. We would like GAL to reconsider this idea.

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PREVIOUS NMB COMMUNITY NOISE GROUPS' COMMENTS ON GAL'S PROPOSED 2019-2024 NOISE ACTION PLAN ACTIONS

Overarching comments

The NMB Community Noise Groups with GACC submitted a paper to NMB 9 on Noise Action Plans in general and GAL's current NAP and proposed 2019-2024 NAP actions in particular. That paper is attached as an appendix to these comments. It continues to represent our overall view on NAPs. Key points from the paper are:

1. The actions set out in Gatwick's current NAP have not achieved the END's aim of avoiding, preventing or reducing the impacts of noise. The current NAP has also failed to achieve the government's noise policy objectives, most specifically to "reduce and mitigate noise as airport capacity grows". And the overall objective of reducing noise set out in Theresa Villiers' 2010 letter to GACC has not been achieved.

2. The current NAP has therefore not been an effective policy instrument. We believe this is primarily because the NAP is based on inputs rather than outcomes and because it entirely ignores the significant growth that has occurred at Gatwick.

3. There is no reason to believe that a similarly structured set of noise actions for the 2019-24 period would be any more successful in achieving the END's aims and the government's policy objectives. Gatwick has announced plans to continue to grow in that period. In the absence of appropriate action by regulators to enforce the Directive and government policy, that is likely to mean that the noise environment around the airport will continue to worsen, as it has done over the current NAP period.

4. There should therefore be a reappraisal of the format of Gatwick's NAP, the obligations it imposes on the airport and the wider industry and the consequences of failing to meet those obligations. We do not believe that GAL's current NAP or the actions proposed in its draft 2019-2024 NAP are fit for purpose.

5. A new approach should be applied in developing and approving the 2019-2024 NAP, based on the following core principles:

   I. **The NAP should commit to noise impact outcomes.** It should specify clear, binding, noise impact reductions[2] together with the time profile for achieving those reductions. The targets should be set based on the government's core policy principles of balance, benefit sharing and noise impact reduction. In our view, therefore, Gatwick's NAP should commit to noise impact reductions equivalent to or greater than the growth projected by the airport in the NAP period together with a further factor reflecting the growth enjoyed by the industry from 2013-2018 the benefits of which have not been shared with impacted communities. Alongside those noise outcomes Gatwick should set out the actions it intends to take to achieve them, but the risk that those actions fail to achieve the outcomes should be borne by the airport and the wider industry not by communities.

   II. **The NAP noise reduction targets should be independently monitored and enforced.** If the targets were not achieved, or appeared unlikely to be achieved, DEFRA's Secretary of State should intervene and require the airport to take measures, including limiting its growth, so as to achieve them.

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6. The government should not approve any NAP that fails to reflect these or comparable principles.

Points 5 (I) and (ii) above should be regarded as specific comments on GAL's draft 2019-2024 NAP Actions.

We note that DEFRA has subsequently written to all relevant airport operators including GAL making clear, amongst other things, that their plans should include "estimates in terms of the reduction of the number of people affected (annoyed, sleep disturbed, or other)… as a result of [the measures in] their Action Plan" including evidence that the measures are challenging, objective, quantified (where reasonably practicable), subject to specific timescales, and have taken full account of the views of local communities. We believe this is consistent with our point 5 (I) above. DEFRA have also emphasised that the issues raised by consultees are demonstrably given thorough consideration by airport operators and that they will be looking for evidence of how airports have ensured this is the case in their submitted Plans.

[2] Noise impact reductions should be measured on a basis to be agreed with community groups and representatives. They should include components for both average noise levels and the frequency of noise events at a wide range of locations both close to the airport and further away under flight paths. Metrics should reflect principles of fair and equitable dispersal to ensure noise impact reductions are not achieved by concentrating noise in areas of low population density.

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PAPER BY THE GATWICK NOISE MANAGEMENT BOARD COMMUNITY NOISE GROUPS WITH THE GATWICK AREA CONSERVATION CAMPAIGN REGARDING ENVIRONMENTAL NOISE REGULATIONS 2006: NOISE ACTION PLANS

Purpose of Environmental Noise Directive and Noise Action Plans

The aim of the Environmental Noise Directive (END) is to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise.

Noise Action Plans (NAPs) are intended to prevent and reduce environmental noise where necessary and particularly where exposure levels can induce harmful effects on human health and to preserve environmental noise quality where it is good.

Action Plans are required to identify whether there are any particular or additional measures that might be taken to meet these policies, including noise reduction if necessary.

Current and historic UK policy context

The UK policy context for Gatwick's 2019-2024 Noise Action Plan (NAP) is the government's current policy on aviation noise. This is:

> *"to limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise as part of a policy of sharing benefits of noise reduction with industry in support of sustainable development".*[3]

This policy is open to multiple interpretations. The core policy principles seem to be:

1. *Limiting and where possible reducing the number of people significantly impacted by aircraft noise.* Although unclear this appears to rule out increases in the number of people significantly impacted.

2. *Sharing of benefits.* This concept is expressed in a range of ways in different government documents. The current airspace policy document (quoted above) talks about sharing benefits of noise reduction. The Aviation Strategy Call for Evidence talks about sharing the benefits of growth and a greater sense of fairness. In any event the principle appears to be that if the industry benefits so should impacted communities. We take community "benefit" in this context to mean absolute reductions in noise impacts, on a basis to be agreed with impacted communities.

3. *Balance.* The executive summary of the government's most recent aircraft noise policy document talks about striking a balance between the economic and social benefits of the industry and its local impacts. Balance is also a core principle in the government's Air Navigation Guidance 2017 issued to the CAA. The plain English meaning of balance is "a situation in which different elements are equal or in the correct proportions". In the context of aircraft noise we take this to mean that an airport should only be permitted to grow if it reduces its noise impacts. The 2013 Aviation Policy Framework confirms that interpretation (see below).

4. *Sustainable development.* This is not defined, but the Aviation Strategy Call for Evidence talks about supporting growth where environmental impacts can be managed and exploiting all opportunities to reduce the industry's environmental impact. It

[3] Consultation Response on UK Airspace Policy: A framework for balanced decisions on the design and use of airspace. October 2017

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also raises the idea of targets for noise reduction.

The policy context for the current (2013-2018) NAP is clearer as regards the balance between growth and noise. The overall policy objective when the NAP was approved was to *"limit and where possible reduce the number of people in the UK significantly affected by aircraft noise"*. The policy went on to say *"future growth in aviation should ensure that benefits are shared between the aviation industry and local communities ... This means that the industry should reduce and mitigate noise as airport capacity grows ".*[4]

More broadly it has been UK government policy for many years that the effect of NAPs should be to *reduce* noise impacts. In a letter to GACC dated 27 May 2010 the Aviation Minister Theresa Villiers said *"The noise action plans will make a key contribution to helping to reduce the local noise impacts for residents. … Can I assure you that these plans are currently being submitted to rigorous scrutiny to ensure that they do meet the underlying aim of the EU Directive namely avoiding, preventing or reducing the harmful effects due to exposure to environmental noise?"*

The success or otherwise of the current NAP should be judged principally by the extent to which it has achieved the END's aims and facilitated achievement of the government's historic aircraft noise policies as set out above. If those aims and policies have not been achieved it follows, in our view, that there should be changes in any or all of: the basis on which NAPs are prepared; the actions that individual airports commit to taking; and the way those actions are enforced.

We note that DEFRA's July 2017 guidance on airport NAPs proposes no substantive changes to the previous round of noise mapping and action planning carried out in 2012 and proposes a relatively light touch "review and revise" updating process. This does not, however, stop individual airports from undertaking a more detailed review and update should they wish.

Assessment of Gatwick's 2013-2018 NAP

Since the 2013-2018 NAP was published CAA and Gatwick data shows that:

- the number of air traffic movements at Gatwick has grown every year, by over 12% in total;
- the number of passengers using Gatwick has grown every year, by 22% in total;
- the number of people within the 57 dB(A) day contour[5] has increased every year, by over 27% in total;
- the area covered by the 57 dB(A) day contour has increased every year, by over 8% in total; and
- night flight impacts have also increased as set out in the government's 2017 night flight consultation.

It is clear that the END's aim of avoiding, preventing or reducing the impacts of noise has not been achieved in the current NAP period.

Assessing the above data against the current core UK policy principles set out above we reach the following conclusions:

1. *Limiting and where possible reducing the number of people significantly impacted by aircraft noise.* This has not been achieved. The number of people significantly affected, measured using the government's preferred metric, has increased substantially. Alternative metrics that more accurately reflect the effects of aircraft noise would be likely

[5] Whilst we do not believe the 57 dBA contour is an appropriate measure of the impact of aviation noise on communities, it is the only long-term data set that we are aware of. More realistic data that also took account of the number of flights, a key factor for communities, would certainly show greater increases in noise impacts over the same period.

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to show greater increases in impacts. The number of noise-related complaints for example has risen very substantially since 2013.

2. *Sharing of benefits.* This has not been achieved. Gatwick and its industry partners have enjoyed very substantial benefits from the growth of the past four years. But those benefits are not being shared. Noise impacts have increased year-on-year and continue to increase as flights numbers and the average size of aircraft using Gatwick grow.

3. *Balance.* This has not been achieved. There is no credible basis on which it could be argued that the data above represents a balanced outcome as between the interests of the industry and those of impacted communities.

4. *Sustainable development.* This is an insufficiently clear policy to allow an objective assessment to be made, but it has almost certainly not been achieved.

In addition the 2013 APF policy objective to "reduce and mitigate noise as airport capacity grows" has not been achieved in any year since 2013. And the overall objective of reducing noise set out in Theresa Villiers' 2010 letter has not been achieved.

In summary the actions set out in Gatwick's current NAP have not achieved the END's aims or the government's noise policy objectives. The current NAP has therefore not been an effective policy instrument. We believe this is primarily because the NAP is based on inputs rather than outcomes and because it entirely ignores the significant growth that has occurred at Gatwick.

Proposals

There is no reason to believe that a similarly structured set of noise actions for the 2019-24 period would be any more successful in achieving the END's aims and the government's policy objectives. Gatwick has announced plans to continue to grow in that period. In the absence of appropriate action by regulators to enforce the Directive and government policy, that is likely to mean that the noise environment around the airport will continue to worsen, as it has done over the past NAP period.

Our view therefore is that there should be a reappraisal of the format of Gatwick's NAP, the obligations it imposes on the airport and the wider industry and the consequences of failing to meet those obligations. We do not believe that GAL's current NAP or the actions proposed in its draft 2019-2024 NAP are fit for purpose.

We propose a new approach should be applied in developing and approving the 2019-2024 NAP. This should be based on the following core principles:

I. **The NAP should commit to noise impact outcomes.** It should specify clear, binding, noise impact reductions together with the time profile for achieving those reductions[6]. The targets should be set based on the government's core policy principles of balance, benefit sharing and noise impact reduction. In our view, therefore, Gatwick's NAP should commit to noise impact reductions equivalent to or greater than the growth projected by the airport in the NAP period together with a further factor reflecting the growth enjoyed by the industry from 2013-2018 the benefits of which have not been shared with impacted communities. Alongside those noise outcomes Gatwick should

[6] Noise impact reductions should be measured on a basis to be agreed with community groups and representatives. They should include components for both average noise levels and the frequency of noise events at a wide range of locations both close to the airport and further away under flight paths. Metrics should reflect principles of fair and equitable dispersal to ensure noise impact reductions are not achieved by concentrating noise in areas of low population density

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set out the actions it intends to take to achieve them, but the risk that those actions fail to achieve the outcomes should be borne by the airport and the wider industry not by communities.

II. **The NAP noise reduction targets should be independently monitored and enforced.** If the targets were not achieved, or appeared unlikely to be achieved, DEFRA's Secretary of State should intervene and require the airport to take measures, including limiting its growth, so as to achieve them.

We will have detailed comments on the draft list of actions provided by GAL in due course. But we believe that an appropriate set of NAP foundations and principles, which hold the airport properly to account for its noise impacts in accordance with government policy, must be established first.

We do not believe that the government should approve any NAP that fails to reflect these or comparable principles.

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GATCOM'S RESPONSE IN RESPECT OF SPECIFIC ACTIONS

Gatwick Airport Consultative Committee

	ACTION	GATCOM COMMENT	GAL RESPONSE	GATCOM RESPONSE TO GAL'S RESPONSE
1	We will maintain a charging differential in our published airport charges which incentivises the use of aircraft with the best in class noise performance.	Publishing the track fleet mix would allow year on year comparison. Could use on index which uses the QC system to calculate average for summer/winter.	Included under Performance Indicator and Reporting: **Indicator: Fleet mix including % of Chapters 4 and 14 Aircraft. Reported: Quarterly to NaTMAG.** Included under 'AIM': **By 2024, 90% of movements are by Chapter 14 aircraft.**	Accept
3	We will review the landing fee differential at least every five years.	Or in response to a change of circumstances (i.e. FOPP)	No amendment made to action.	Recommends that the wording of the action be amended to include reference to our previous comments. It is important to ensure that the NAP remains a "living" document and is adaptable to changing circumstances

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GATCOM'S RESPONSE IN RESPECT OF SPECIFIC ACTIONS
CONTINUED

Gatwick Airport Consultative Committee

	ACTION	GATCOM COMMENT	GAL RESPONSE	GATCOM RESPONSE TO GAL'S RESPONSE
8	We will, as far as is practicable, take all necessary steps to manage the late running of aircraft to prevent scheduled day movements taking place during the sensitive night period.	Yes but also suggest include reference to reporting to FLOPSC	Indicator amended to read: **Indicator: The number of off-schedule flights which are delayed into the night period. Reported: Airside operations and airlines.**	Accept
9	We will implement a voluntary ban on operations of Quota Count 4 aircraft within the core night period by the end of 2024.	This should be brought forward to 2019. Alternatively introduce a charging differential (like FOPP) where there is a significantly increased charge from 2019 on QC4s at night.	Action changed: **We will implement a voluntary ban on operations of Quota Count 4 aircraft within the core night period by the end of 2022.**	Accept. GATCOM recommends that this Action be identified as a priority early in the Plan period - see also comments in covering letter
24	We will continue to fine aircraft in breach of the Department for Transport departure noise limits with all such monies passed to the Gatwick Airport Community Trust	With modern aircraft there is no excuse exceeding the departure limits. A review of the fines should be carried out and they should be set at a level that would far exceed any benefit that maybe gained from exceeding the noise limits.	No amendment made to Action.	See comments under Action 25

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GATCOM'S RESPONSE IN RESPECT OF SPECIFIC ACTIONS
CONTINUED

Gatwick Airport Consultative Committee

	ACTION	GATCOM COMMENT	GAL RESPONSE	GATCOM RESPONSE TO GAL'S RESPONSE
25	We will engage with the Department for Transport and the Aircraft Noise Management Advisory Committee to review departure noise limits at Gatwick Airport.	GAL could introduce its own lower limits if the DfT will not support a change. Also suggest that the target date is brought forward to 2020.	No amendment made to Action.	Recommend that GAL seeks confirmation from the Secretary of State for Transport whether they can set their own limits over and above those by the Secretary of State. See also the comments in the covering letter. GATCOM also recommends that this action is treated as a priority by GAL.
29	We will continue to offer acoustic insulation to noise sensitive buildings within the 63LAeq,16hr Summer noise contour.	2014 scheme expanded to include the 60dB LAeq16hr.	Action amended to read: **We will continue to offer acoustic insulation to noise sensitive buildings within the 60LAeq noise contour.**	Accept

FEEDBACK RECEIVED REGARDING THE INITIAL VERSION OF THE DRAFT NOISE ACTION PLAN

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GATCOM'S RESPONSE IN RESPECT OF SPECIFIC ACTIONS
CONTINUED

GATCOM
Gatwick Airport Consultative Committee

	ACTION	GATCOM COMMENT	GAL RESPONSE	GATCOM RESPONSE TO GAL'S RESPONSE
30	To address the impacts of future growth we will continue to offer to purchase those properties suffering from both a high level of noise (63dB LAeq,16hr or more) and a large increase in noise (3dB LAeq or more), in accordance with the Terms of Reference of the Property Market Support Bond and Home Owners Support Scheme.	There are no proposed changes to NPRs with LAMP2, however if there is no other option available and a new NPR is introduced and new people are overflown then a lower figure should be considered.	No amendment made to Action.	Noted. Given the concerns subsequently expressed by a community group about the potential blight arising from changes to airspace, GATCOM no longer wishes to pursue its previous comments.
31	In conjunction with the Noise Management Board we will explore innovative methods to reduce both inbound and outbound aircraft noise levels.	Yes but also include reference to publishing the annual report of the NMB which will list the successes of work programme.	Performance Indicator Amended. **Indicator: Implementation progress reports.** **Reported: to each NMB meeting with public reports published annually.**	Accept. GATCOM also recommends that as part of this action options to provide respite for those communities under multiple use flight paths, particularly for areas where aircraft are generally lower than 4000ft.

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FEEDBACK RECEIVED REGARDING THE INITIAL VERSION OF THE DRAFT NOISE ACTION PLAN

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GATCOM'S RESPONSE IN RESPECT OF SPECIFIC ACTIONS
CONTINUED

Gatwick Airport Consultative Committee

ACTION	GATCOM COMMENT	GAL RESPONSE	GATCOM RESPONSE TO GAL'S RESPONSE
31a	Action recommended by GATCOM: Work to identify noise metrics and reporting to support the measurement of, and track the progress of, the NMB work plan and Noise Action Plan initiatives.	New action not included:	See comments in covering letter.

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GATCOM'S RESPONSE IN RESPECT OF SPECIFIC ACTIONS
CONTINUED

GATCOM
Gatwick Airport Consultative Committee

	ACTION	GATCOM COMMENT	GAL RESPONSE	GATCOM RESPONSE TO GAL'S RESPONSE
39	We will update to our website the following noise contours: • Summer 16 hour day forecast LAeq contours for air noise • Night forecast contours for ground noise • Forecast Lden contours for air noise • Night quota period 48dB LAeq contour (07:00-23:00) • Summer Leq contours	The Night contours should be for the whole night period (23:00-07:00) rather than the Quota Period (23:30-06:00). 'Summer Leq contours' are a repeat of the Summer 16hr Leq contours above	Action amended to read: **We will update to our website the following noise contours:** **• Summer 16 hour day Leq (actual)** **• Summer 16 hour day (standard) Leq** **• Summer Night Leq (actual)** **• The above compared to the previous year.** **• Summer Night 10 year average modal split Leq**	The production of N60 night contours around Gatwick Airport has been identified as an important tool by the Local Authority Environmental Health Practitioners to help identify those most affected by night noise and also to assist the Local Authorities to control and ensure adequate mitigation for housing developments within their Authorities. At the recent NMB workshop on noise contours and metrics it was identified by attendees that there was a need for supplementary noise metrics, N60 contours being one of those metrics identified. Recommend that GAL address this point in the final NAP and that it be treated as a priority.

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GATCOM'S RESPONSE IN RESPECT OF SPECIFIC ACTIONS
CONTINUED

Gatwick Airport Consultative Committee

	ACTION	GATCOM COMMENT	GAL RESPONSE	GATCOM RESPONSE TO GAL'S RESPONSE
39a		Action recommended by GATCOM: We will produce updated N60 contours for the night period (and 60dB LASmax average contours for the most frequent aircraft types (5% or more of total movements) using Gatwick at night (23:00-07:00).	New Action partially included **We will conduct a review of Government policy to identify new noise metrics and reporting to compliment the current noise contours and measure our noise performance.**	Accept but see comments in covering letter about the need for general overarching targets and the need for this to be a priority item.
42	We will continue to offer various methods for complaints about aircraft noise events.	Following many complaints it has been agreed to re-instate a phone service for noise complaints. Reference to which should be included in this condition.	Recommendation included in 'AIM': **Implementation of a complaints phone line by the end of 2018.**	Accept

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GATWICK AIRPORT LTD RESPONSE TO THE FEEDBACK RECEIVED AND ISSUES RAISED DURING THE SECOND ROUND OF CONSULTATION

Gatwick Airport Ltd welcomes the feedback provided and appreciates the comments made by GATCOM which *"is confident at the end of the consultation process involving GACOM, the NMB community noise groups and Gatwick Local Authorities that GAL will have one of the most comprehensive and effective NAP in the country".*

The END NAP will be the overarching statutory driver for noise management and mitigation around the airport and GAL confirms its ambitions for the END NAP to be a 'living document' involving tracking, regular review and update. The first stage in this process is achieving additional clarity on the aims and commitments to further our work to manage aviation noise, a central theme of the feedback. To meet this GAL has added several actions to the END NAP and in particular, expanded the scope of Action 39a. The revised scope aims to identify new noise metrics and reporting to complement the current noise contours and measure our future noise performance. These metrics could then be used to more precisely describe the aims and outcomes of the actions within this END NAP.

The identification of new noise metrics and reporting will be based upon a review of government policy and its implementation. Through this process we aim to reach a measure of consensus with community groups on future airport utilisation relative to noise impacts. Another output from the feedback.

We appreciate that a key piece of feedback regarded the use of the word 'aims' or 'targets' with regard to our actions. We note that the END Regulations and DEFRA guidance confirms that no binding targets are required and no penalties are to be imposed furthermore the Regulations and the DEFRA Guidance use the term 'aim' and hence our decision to remain with the term 'aim'.

Due to the importance of Action 39a GAL has designated this as a priority action and GAL confirms that we will discuss the priority of the remaining actions once the END NAP has been accepted by DEFRA.

To support the measurement of our ongoing and planned noise management programs listed within the END NAP; GAL has committed to expanding its community noise monitoring program by procuring and deploying additional noise monitoring terminals. This will provide a vital asset to both understanding the current noise climate whilst measuring the benefits delivered by the END NAP actions and those undertaken by the Noise Management Board via Action 47.

To continue to drive continuous improvement, as part of Action 25, GAL was to explore options to reduce its departure noise limits with the DfT. Following the feedback provided, GAL can confirm that the DfT has confirmed that GAL can explore options to reduce these limits beyond the current set DfT levels and corresponding Action has been updated. To confirm our commitment to improving our noise management we have also introduced Action 24a which aims to increase the fines that are levied against airlines that breach departure noise limits, be these the current or revised limits when they are introduced.

In summary, the following actions have been updated within the draft END NAP in response to the feedback provided:

- **Action 2a** introduced to capture additional aircraft or manufacture specific noise defects which can be rectified

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by a modification are identified (similar to the FOPP) we will seek to identify, consult and implement corresponding charging penalties. This aims to provide the living document approach which is adaptable based upon changing demands in the future.

- **Action 25** covered a review of the departure noise limits and has been updated to reference both engagement with the DfT and unilateral action following confirmation from the DfT that this approach may be possible given a suitable evidence base.

- The review of noise limits in action 25 is complimented by Action 24a which targeted increasing the fines that are levied against airlines that breach the departure noise limits.

- **Action 28a** was introduced to confirm that GAL will undertake a review of its acoustic noise insulation programs by the end of 2019. With subsequent reviews considered every 5 years as noted in Action 28.

- **Action 37a** aims to expand the community noise monitoring scheme by deploying additional noise terminals. This is part of GAL's commitment to understand the noise impacts around the airport whilst identifying and measuring the potential benefits delivered by the actions in this END NAP.

- As previously discussed, **Action 39a** has been expanded to aim to reach a measure of consensus with community groups on future airport utilisation relative to noise impacts. Based upon a review of Government policy including how Government policy should be interpreted and how that policy has been applied in practice, we will aim to develop new noise metrics and reporting to complement the current noise contours and measure our future noise performance. This work will be used to more precisely describe outcomes to support this END Noise Action Plan. Although not specifically mentioned, this Action will consider the use of N-above metrics and their potential inclusion in the annual noise contour reports.

- In addition to the expanded noise monitoring scheme, **Action 49** has been updated to include the production of local and holistic noise reports.

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DURING THE THIRD STAGE OF ENGAGEMENT, INCLUDING THE GATWICK AIRPORT LTD RESPONSE

CONTENT OF THE PAPER ISSUED BY GATWICK AIRPORT LTD TO THE GATCOM STEERING GROUP MEETING HELD ON 21 JUNE 2018

Introduction to the Final Draft END NAP

Background

It was agreed at the meeting of GATCOM on 26 April 2018 that the final draft Noise Action Plan, having been updated in response to the feedback received, be presented to the 21 June 2018 meeting of the GATCOM Steering Group for consideration prior to it being presented for a final time to the full meeting of GATCOM, scheduled for 19 July 2018. The effect of this additional stage of consultation is that there has been three stages of consultation; commencing with the circulation of a proposed list of Action Plan Actions, the circulation of an initial draft Noise Action Plan and culminating in the final draft of the Noise Action Plan being presented.

Feedback received and the changes made

In the previous round of consultation the full draft Action Plan was released to those organisations who provided comment with feedback received from:

- GATCOM,
- The Community Noise Groups (CNGs) that sit on the Noise Management Board and the Gatwick Area Conservation Campaign.

The feedback provided by these parties is included in full, within Annex 9B of the final draft Noise Action Plan.

Gatwick Airport Ltd welcomes and appreciates the feedback provided and as taken this on-board in the development of its final draft. A key theme of the feedback was a desire to identify new noise metrics and more precisely describe the aims, targets and outcomes of the actions. In response, GAL has added several actions as outlined below and in particular has:

- Expanded the scope of Action 39a, to aim to identify new noise metrics and reporting to complement the current noise contours and measure our future noise performance. These metrics could then be used to more precisely describe the aims, targets and outcomes of the actions within the END NAP. The identification of new noise metrics and reporting will be based upon a review of government policy and its implementation. Through this process we aim to reach a measure of consensus with community groups on future airport utilisation relative to noise impacts. Another key output from the feedback.

- Re-affirmed its ambition for the Noise Action Plan to be a 'living document' involving tracking, regular informal review and update. The first stage of this approach will be incorporation of the findings of Action 39a. Due to the importance of this work, GAL has designated this as a priority action. GAL confirms that we will discuss the priority of the remaining actions once the Action Plan has been accepted by DEFRA.

To support the measurement of our ongoing and planned noise management programs listed within the END NAP; GAL has committed to expanding its community noise monitoring program by procuring and deploying additional noise monitoring terminals. This will provide a vital asset to both understanding the current noise climate whilst measuring the benefits delivered by the Noise Action Plan can be measured and assessed.

To continue to drive continuous improvement, as part of Action 25, GAL was to explore options to reduce its departure noise limits with the DfT. Following the feedback, GAL notes that the DfT has

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confirmed that GAL can explore options to reduce these limits beyond the currently set levels and the corresponding action has been updated.

To confirm our commitment to improving our noise management we have also introduced Action 24a which aims to increase the fines that are levied against airlines that breach departure noise limits, be these the current or revised limits when they are introduced.

In response to feedback and to build upon the success delivered by the A320 fuel over pressure port (FOPP) retrofit. GAL has added Action 2a to identify, consult and implement corresponding charging penalties for any additional aircraft or manufacture specific noise defects which can be rectified by a modification. Finally, GAL has introduced Action 28a to confirm that the airport will undertake a review of its acoustic noise insulation programs by the end of 2019. With subsequent reviews considered every 5 years as noted in Action 28.

Through the feedback provided and the corresponding adaptation to the Noise Action Plan, GAL believes the final draft of the Noise Action Plan provides a comprehensive and effective overarching statutory driver for noise management and mitigation around the airport.

Next steps

The final draft END NAP will be presented to the 21 June 2018 meeting of the GATCOM Steering Group for consideration prior to it being presented for a final time to the full meeting of GATCOM, scheduled for 19 July 2018.

Should the final draft be accepted by GATCOM, regulations require that it be sent to the Secretary of State for DEFRA for formal "adoption". The Secretary of State for DEFRA, in liaison with the Department for Transport, will form a view regarding whether or not the submitted revised plan meets the requirements of the Regulations and, therefore, whether or not the plan is appropriate for adoption.

- If the Secretary of State for DEFRA considers that the requirements set out in the Regulations are met, they will notify the airport accordingly that the Action Plan has been adopted. The Action Plan should then be published by the Airport Operator as a public document in an electronic format within 28 days.

- If the requirements set out in the Regulations are not met, the airport operator will be required to make the necessary changes to the plan. Following revision, the revised plan will need to be resubmitted to the Secretary of State for DEFRA by an agreed date for further consideration.

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REPORT FROM THE SECRETARIAT AND TECHNICAL ADVISIOR OF THE GATWICK AIRPORT CONSULTATIVE COMMITTEE TO THE MEETING OF THE COMMITTEE HELD ON 19 JULY 2018

GATCOM
Gatwick Airport Consultative Committee

SUMMARY
Following GATCOM's consideration at the last meeting of Gatwick Airport Limited's (GAL) draft reviewed Environmental Noise Directive (END) Noise Action Plan (NAP), GAL has considered all the responses received to its consultation and has now produced a final version of the END NAP. The way in which GAL has taken into account GATCOM's comments was considered by the GATCOM Steering Group at its meeting on 21 June. This report sets out the views and recommendations of the Steering Group (see section 3), the on-going concerns of the NMB community noise groups (see section 4) and sets out a final GATCOM response in Appendix 2 for approval.

1. OVERVIEW

1.1 At the last meeting, the Committee's response to GAL's draft reviewed END NAP was agreed. In summary the key points of GATCOM's response was as follows:

- Overall, the draft reviewed END NAP gives a comprehensive account of the way in which GAL manages the noise climate, the legislative and regulatory framework within which GAL is required to operate, the proposed actions to be undertaken over the next five years and the schedule of consultation responses received at the time of publishing the draft document.

- Many of the actions proposed in the draft NAP are supported and the revised format which introduces new additional columns giving information on the estimated area/number of people to benefit from the action, the expected benefit and cost of the action and the other organisations to be involved in fulfilling the action is welcomed as it will assist in the monitoring process.

- Whilst a number of GATCOM's comments on GAL's proposed list of actions had been taken into account, GAL had not committed to specifying targets to be achieved and that some actions lacked clear indicators. GAL has been asked to review its "Aims" to make them "Targets".

- Whilst not wishing to circumvent the clear NMB role in helping to agree noise mitigation priorities as part of its work plan which is also captured by the NAP, GAL has been asked to identify some priority actions that would bring benefits to the noise climate early in the plan period. This will help to build confidence and trust amongst communities that initiatives of importance are being treated as a priority by GAL. As a reminder GATCOM has suggested Actions 9, 25, 39 and 39a.

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- GAL should do more to pursue Action 9: Implementation of a voluntary ban on operations of QC4 aircraft within the core night period, and Action 25: Review of Departure Noise Limits.

1.2 GATCOM also asked to see the Final Draft END NAP document before it being submitted to Defra for approval.

1.3 GAL has now produced the Final Draft END NAP which was considered by the GATCOM Steering Group at its meeting on 21 June together with GAL's covering report, which is attached at Appendix 1 for consideration. GATCOM is asked to consider and agree its final response to GAL.

2. FINAL DRAFT END NAP

2.1 A copy of the Final Draft END NAP together with the Annexes and GAL's covering report was circulated to all members and supporting officers on 29 June for consideration in advance of the GATCOM meeting.

2.2 The final version of the END NAP has now been split into 2 parts – part 1 is the main document and action plan – part 2 contains all the annexes. It is a comprehensive plan which sets out the overarching approach to noise management at Gatwick and the KPIs to be met on a variety of performance standards.

2.3 GAL's paper attached at Appendix 1 addresses the way in which it has taken account of the feedback received to the consultation on the reviewed draft END NAP. In particular, GAL has advised that:

- Defra's guidance does not require targets to be set as part of the action plan process.
- It has reaffirmed its ambition for the END NAP to be a "living document" involving tracking, regular informal review and update.
- It has expanded the scope of Action 39a relating to the identification of new noise metrics and reporting (a key priority of the Noise Management Board (NMB)).
- A greater commitment has been given under Action 25 to explore options to reduce noise limits beyond those currently set by the DfT.

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- A commitment has been given in Action 24a to increase the fines for breaches in departure noise limits.
- A new commitment to implement corresponding charging penalties for any additional aircraft or manufacture noise defects which can be rectified by modification is given in Action 2a.
- A commitment in Action 28a has been given to undertake a review of the noise insulation program by the end of 2019.

3. GATCOM STEERING GROUP'S COMMENTS

3.1 The further refinements to a number of the actions have been welcomed by the GATCOM Steering Group. They address more specifically aircraft noise and disturbance through a variety of management and mitigation techniques, all of which enhance the comprehensiveness of the END NAP. However a key matter on which the Steering Group and GAL have not been able to reach agreement is on having specific targets to support the delivery of the actions in the END NAP. GAL still refers to "aims".

3.2 GAL has stated in its paper at Appendix 1 that the Defra guidance confirms that no binding targets are required and no penalties are to be imposed. GAL has also stated:

> "Expanded the scope of Action 39a, to aim to identify new noise metrics and reporting to complement the current noise contours and measure our future noise performance. These metrics could then be used to more precisely describe the aims, targets and outcomes of the actions within the END NAP. The identification of new noise metrics and reporting will be based upon a review of government policy and its implementation. Through this process we aim to reach a measure of consensus with community groups on future airport utilisation relative to noise impacts. Another key output from the feedback."

3.3 In addition to this GAL has re-affirmed its ambition for the Noise Action Plan to be a 'living document' involving tracking, regular informal review and update. The first stage of this approach will be incorporation of the findings of Action 39a and GAL has designated this as a priority action.

3.4 As regards GATCOM wish to see priority given to certain actions, GAL has confirmed that this will be the subject of discussion once the END

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NAP has been accepted by DEFRA.

3.5 Whilst the Steering Group welcomed GAL's approached in respect of the priority to be given to Action 39a and the scope to use the outcome of that work to describe the aims, targets and outcomes of the actions in the END NAP, it was disappointed that GAL had not taken the opportunity to set an overarching target in the END NAP against which the overall noise performance could be meaningfully monitored and tracked. It is acknowledged that neither the Environmental Noise (England) Regulations 2006 or Defra's Guidance refer to the setting of targets and that both documents only refer to the term "aim" (they are silent on the use of the term "target"), the Steering Group felt that in order to give greater confidence to local communities impacted by aircraft overflight and noise that GAL is serious about containing the noise environment as traffic at the airport grows, the setting of an overarching target in the statutory END NAP was something that GAL should embrace. The Steering Group therefore recommends that this matter be raised in GATCOM's response to GAL.

3.6 The suggested draft GATCOM response is set out in Appendix 2 for consideration and approval.

3.7 The Steering Group was also of the view that the Government needed to have a greater oversight of the airport's noise performance generally to ensure that airports were managing the noise climate in accordance with the Government's policy objectives. It is therefore suggested that GATCOM raises this point with the Government and to seek clarification on how it intends to monitor the implementation and effectiveness of the Gatwick NAP to ensure it delivers the aims of Government policy.

4. NMB COMMUNITY NOISE GROUPS VIEW

4.1 As GATCOM is aware, the views of the NMB Community Noise Groups and Gatwick Area Conservation Campaign have been reported to GATCOM both at the time of considering the proposed draft list of actions (January 2018) and the reviewed Draft END NAP (April 2018). The NMB Community Noise Groups are still of the view that GAL's Final Draft END NAP is not compliant with Defra's guidance. They also believe that GAL's undertaking to develop new noise metrics and reporting (in Action 39a) is inadequate and cannot be relied on given GAL had previously committed to developing such metrics by 2011.

4.2 This view was again expressed at the recent meeting of the NMB held on 27 June which they wished to bring to the attention of GATCOM. The Committee is therefore asked to take their views into consideration in agreeing its final response to GAL.

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RECOMMENDED

(1) that the suggested draft response to GAL's Final Draft END NAP as set out in Appendix 2 be approved; and

(2) that GATCOM writes to Defra and the DfT to highlight the need for a greater oversight of the airport's noise performance generally to ensure that the airport was managing the noise climate in accordance with the Government's policy objectives.

PAULA STREET
Secretariat

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GATCOM RESPONSE TO FINAL DRAFT END NOISE ACTION PLAN

GATCOM
Gatwick Airport Consultative Committee

24 July 2018

Dear Lee,

FINAL DRAFT: GATWICK END NOISE ACTION PLAN 2019 - 2024
Firstly, thank you for giving GATCOM a further opportunity to review the Final Draft of the END Noise Action Plan (NAP). The Committee is pleased to note that many changes have been made to the Final Draft NAP including further refinement to a number of the actions reflecting the feedback GAL has received from its consultation with GATCOM and other key interested parties.

As part of its consideration of the Final Draft END NAP, GATCOM has again been informed of the on-going concerns of some community noise groups represented on Gatwick's Noise Management Board and that their view is that the reviewed plan does not adhere to Defra's guidance and is not fit for purpose. GATCOM does not share this view and overall the Committee believes the Final Draft END NAP provides a comprehensive plan setting out the overarching approach to noise management at Gatwick and the KPIs to be met on a variety of performance standards.

GATCOM is also pleased that GAL has added new actions in response to feedback received and has particularly welcomed the expanded scope of Action 39a relating to the identification of new noise metrics and reporting. GAL's work on developing new noise metrics is viewed as a high priority by GATCOM given the importance of establishing measures to track more meaningfully airport growth against the impact this has on the noise climate around Gatwick.

GATCOM supports the "living document" approach which echoes the Government's previous advice to airport consultative committees on the purpose of the END NAP and is pleased that it is GAL's intention to use the outcomes from its metrics work to assist in describing more precisely the aims, targets and outcomes of the actions within the END NAP.

However, an area on which GATCOM has not been able to reach agreement with GAL is on the need for the statutory END NAP to set an overarching target against which the airport's overall performance in maintaining, and where possible, achieving a reduction in the noise climate can be monitored and measured. GATCOM believes that in order to give greater confidence to local communities impacted by aircraft overflight and noise that GAL is serious about containing the noise environment as traffic at the airport grows, the setting of an overarching target in the statutory END NAP is something that GAL should embrace.

GATCOM acknowledges that the use of the term "aim" is used widely throughout the NAP and whilst it is noted that this term is consistent

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with both the Environmental Noise (England) Regulations 2006 and Defra's Guidance (which only stipulate the need for new noise abatement objectives with the aim of providing further management of the noise impact), does not easily lend itself to be monitored and measured in the same way as a target.

As "critical friend" to the airport, GATCOM therefore recommends that GAL reviews whether an overarching target can be included in the END NAP which would also align with the aim set out in Action 39(a) in the development of new noise metrics and which can then be informally reviewed through the "living document" approach. Should GAL agree to such an approach GATCOM would expect to be consulted on any such informal review alongside community noise groups.

Finally, GATCOM also has concerns about how the Government intends to monitor the success of the END NAP to ensure that the airport is delivering the Government's noise management policies and objectives. This is a matter that the Committee will pursue with the DfT and Defra direct.

I trust our comments can be taken into account in the Final END NAP submission to Defra.

Yours sincerely,

Paula Street
Assistant Secretary

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GATWICK AIRPORT LTD RESPONSE

Although GATCOM's comments on "aims" and "targets" are appreciated, GAL would like to re-iterate its desire to identify new noise metrics and more precisely describe the aims, targets and outcomes of the actions contained in the END NAP. We plan to do this using our "living document" approach which involves tracking, regular informal review and update. The first stage of this process is the integration of the currently ongoing growth and noise work captured by Action 39a which has been designated as a priority. This work will also aim to reach a measure of consensus with community groups on future airport utilisation relative to noise impacts, providing a first step towards the setting of overarching targets as requested by GATCOM. These adaptations will be tracked through the regular reporting of the END NAP on an annual basis.

In addition, we have noted our willingness to discuss priority actions with GATCOM once the END NAP has been agreed with DEFRA, at this time we can seek to prioritise actions 9, 25, 39 and, where possible, accelerate the implementation of these. Action 39a is already designated as a priority.

As an airport we operate within Government policy. Issues that arise from differing viewpoints on the interpretation of this policy create issues for all and as a result we welcome GATCOM's proposals to write the DEFRA and the DfT regarding the ongoing monitoring of the END NAP. GAL would like to extend an offer to work with and support GATCOM, the DfT and DEFRA in this piece of work.

Figure 34: Estimated Total Number of People and Dwellings above Various Noise Levels, L_{den}

NOISE LEVEL (DB)	NUMBER OF DWELLINGS 2016	NUMBER OF PEOPLE 2016	NUMBER OF DWELLINGS 2011	NUMBER OF PEOPLE 2011	NUMBER OF DWELLINGS 2006	NUMBER OF PEOPLE 2006
≥ 55	5,450	13,500	4,500	11,300	4,700	11,900
≥ 60	950	2,300	850	2,000	1,300	3,200
≥ 65	250	600	200	500	250	600
≥ 70	<50	<100	<50	<100	50	100
≥ 75	0	0	0	0	0	0

Figure 35: Estimated Total Number of People and Dwellings above Various Noise Levels, L_{day}

NOISE LEVEL (DB)	NUMBER OF DWELLINGS 2016	NUMBER OF PEOPLE 2016	NUMBER OF DWELLINGS 2011	NUMBER OF PEOPLE 2011	NUMBER OF DWELLINGS 2006	NUMBER OF PEOPLE 2006
≥ 54	4,000	9,800	3,550	8,700	4,100	10,300
≥ 57	1,350	3,200	1,200	2,800	1,850	4,400
≥ 60	550	1,400	500	1,200	500	1,300
≥ 63	250	600	200	500	250	600
≥ 66	50	200	100	200	150	300
≥ 69	<50	<100	<50	<100	<50	<100
≥ 72	-	-	-	-	0	0
≥ 75	-	-	-	-	0	0

ANNEX TEN

THE RESULTS OF PREVIOUS NOISE MAPPING

Figure 36: Estimated Total Number of People and Dwellings above Various Noise Levels, $L_{evening}$

NOISE LEVEL (DB)	NUMBER OF DWELLINGS 2016	NUMBER OF PEOPLE 2016	NUMBER OF DWELLINGS 2011	NUMBER OF PEOPLE 2011	NUMBER OF DWELLINGS 2006	NUMBER OF PEOPLE 2006
≥ 54	3,300	8,000	2,600	6,400	2,550	6,200
≥ 57	900	2,100	750	1,800	750	1,900
≥ 60	450	1,000	300	700	350	800
≥ 63	150	400	150	400	150	400
≥ 66	<50	100	<50	100	<50	100
≥ 69	0	0	0	0	<50	<100
≥ 72	-	-	-	-	0	0
≥ 75	-	-	-	-	0	0

Figure 37: Estimated Total Number of People and Dwellings above Noise Levels, $L_{Aeq, 16hday}$

NOISE LEVEL (DB)	NUMBER OF DWELLINGS 2016	NUMBER OF PEOPLE 2016	NUMBER OF DWELLINGS 2011	NUMBER OF PEOPLE 2011	NUMBER OF DWELLINGS 2006	NUMBER OF PEOPLE 2006
≥ 54	3,850	9,400	3,300	8,100	3,550	8,900
≥ 57	1,200	2,900	1,050	2,500	1,550	3,700
≥ 60	550	1,300	450	1,100	450	1,200
≥ 63	200	600	200	500	200	600
≥ 66	50	200	50	200	100	300
≥ 69	<50	<100	<50	<100	<50	<100
≥ 72	-	-	-	-	0	0
≥ 75	-	-	-	-	0	0

Figure 38: Estimated Total Number of People and Dwellings above Various Noise Levels, L_{night}

NOISE LEVEL (DB)	NUMBER OF DWELLINGS 2016	NUMBER OF PEOPLE 2016	NUMBER OF DWELLINGS 2011	NUMBER OF PEOPLE 2011	NUMBER OF DWELLINGS 2006	NUMBER OF PEOPLE 2006
≥ 48	3,650	9,000	2,950	7,200	3,000	7,500
≥ 51	1,150	2,800	1,250	2,900	1,500	3,700
≥ 54	500	1,100	450	1,00	450	1,100
≥ 57	200	500	200	500	200	500
≥ 60	50	200	100	200	100	300
≥ 63	<50	<100	<50	<100	<50	<100
≥ 66	0	0	0	0	0	0
≥ 66	-	-	-	-	0	0

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ANNEX ELEVEN

SUMMARY PERFORMANCE REPORT OF THE PREVIOUS NOISE ACTION PLAN

Progress against the 62 Action Plan Action in the previous version of the Environmental Noise Directive Noise Action Plan is reported on a quarterly basis to the meetings of the Noise and Track Monitoring Advisory Group. An annual report is also prepared, published online and presented to the Gatwick Airport Consultative Committee. The layout of the quarterly and annual reports list the Action Plan Action, in the order it is listed in the original Environmental Noise Directive Noise Action Plan, followed by a **Red** / **Amber** / **Green** status, an update on the previous reporting period and a plan for the upcoming period.

AS OF JANUARY 2018:
Four Action Plan Actions were identified as RED - Not on track. The rationale behind the rating is in italics beneath each Action Plan Action

30. We will continue to offer a range of contact options for complaints and enquires regarding aircraft noise including by post, email, lo-call voicemail facility and online on the noise website.

GATWICK AIRPORT COMMENT
As recommended by the Independent Review of Arrivals, all complaints are registered online through 'Casper' or by freepost.

37. By the end of 2011 we will review, develop and consult on alternative metrics for describing the impact of aircraft operations during the course of this action plan. We will work and liaise with other UK airports and the Department for Transport on the revised metrics whilst seeking review by Aircraft Noise Monitoring Advisory Committee (UK) ANMAC.

GATWICK AIRPORT COMMENT
As the issue of noise metrics is now being discussed at Government level, at a subgroup of Aircraft Noise Management Advisory Committee (ANMAC), we will continue to play an active role in the Aircraft Noise Management Advisory Committee sub-group (once resumed) as this, and other matters are progressed.

39. We will conduct customer service surveys for the FPT every three years commencing in 2010.

GATWICK AIRPORT COMMENT
This Action Plan Action has been placed on hold indefinitely due to the changes made to complaints handling arising from the Independent Review of Arrivals and the introduction of the Noise Management Board.

53. We will benchmark internationally and publish our ranking in aircraft noise communications with other comparable airports in 2010 and 2013.

GATWICK AIRPORT COMMENT
This Action Plan Action has been placed on hold indefinitely due to the changes made to how Gatwick communicates noise and airspace issues arising from the Independent Review of Arrivals and subsequent activities of the Noise Management Board.

Three Action Plan Actions have been identified as AMBER – Neither on track nor not on track.

19. d) Gatwick Airport Ltd will write to the Department for Transport requesting research be undertaken to fully understand the effects of aircraft noise on human health.

GATWICK AIRPORT COMMENT
The airport is awaiting the outcomes of the World Health Organisation Report on the effects of noise on human health prior

SUMMARY PERFORMANCE REPORT OF THE PREVIOUS NOISE ACTION PLAN

to taking any further action regarding this issue.

44. We will publish on our website the night quota period 48dB (A) Leq contour.

GATWICK AIRPORT COMMENT
The annual 2016 noise contours were commissioned by the airport and calculated by the Civil Aviation Authority Environmental Research and Consultancy Department. The airport is in receipt of these and they will be published on the website in February 2018.

45. We will publish annually on our website the summer Leq contours as produced by the Department for Transport.

GATWICK AIRPORT COMMENT
The annual 2016 noise contours were commissioned by the airport and calculated by the Civil Aviation Authority Environmental Research and Consultancy Department. The airport is in receipt of these and they will be published on the website in February 2018.

The remaining fifty-three Action Plan Actions were all found to be GREEN – on track.

FURTHER INFORMATION
To access further information regarding Gatwick Airport's noise reporting, please visit
https://www.gatwickairport.com/business-community/aircraft-noise-airspace/noise-reports/fpt-reports/
on these webpages you can view:

- Minutes from the Noise and Track Monitoring Advisory Group
- END Noise Action Plan Annual Report
- Verification of 'Casper' – the Gatwick Airport Noise and Track Keeping system
- Community Noise Studies – as part of Gatwick's Community Noise Monitoring Programme
- Flight Performance Team Annual and Quarterly Reports

The interactive 'Casper' Noise Lab can be found at:
http://noiselab.casper.aero/lgw/

On our **Sustainability** Pages at
https://www.gatwickairport.com/business-community/community-sustainability/sustainability/
you can view:

- Section 106 Annual Monitoring Reports
- Section 106 / Decade of Change Management Action Plans
- Decade of Change Reports

On our **Noise Management Board** webpages at
https://www.gatwickairport.com/business-community/aircraft-noise-airspace/noise-management-board/
there is a substantial amount of information relating the Independent Review of Arrivals, the Noise Management Board and minutes of meetings, meeting papers and details of studies and analysis undertaken.

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COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

In revising this Noise Action Plan, Gatwick Airport Ltd has decided to undertake a full refresh of the Action Plan Actions therein to ensure they remain relevant as the airport grows.

This table fulfils Gatwick's obligation to publish details of removed, retained, amended and new Action Plan Actions. The left hand column contains all of the previous Noise Action Plan Actions and the right the retained, amended or new Action Plan Actions.

- 26 previous Action Plan Action have been removed.
- The 8 retained Action Plan Actions are in **black**.
- The 18 amended Action Plan Actions are in **blue**.
- The 32 new Action Plan Actions are in **green**

COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

Figure 39: Comparison of old and new Action Plan Actions

OLD ACTION PLAN ACTION	NEW ACTION PLAN ACTION
1. We will develop and consult with airlines on policy prioritising airlines operating Chapter 4 aircraft, or equivalent when introducing new business to Gatwick with the aim of increasing the percentage of Chapter 4 or equivalent aircraft operating at Gatwick to 83% by 2015.	1. We will maintain a charging differential in our published airport charges which incentivises the use of aircraft with the best in class noise performance.
2. We will consult with our airline partners on the voluntary phase out of Chapter 3 high aircraft in favour of Chapter 4 or equivalent at Gatwick.	4. Gatwick Airport Ltd will consult with its airline partners annually regarding the Airport Charges Structure. The Noise Management Board will also be asked for its feedback.
3. We will review the landing fee differential at least every five years commencing in 2010. From 2015 onwards this will be with due regard to CAP 119.	3. We will review the landing fee differential at least every five years.
4. In conjunction with our airline partners we will seek to introduce a 'fly quiet and clean' programme. This will rank our airline partners in relation to their overall performance for noise and emissions impacts using metrics such as compliance with abatement techniques, fleet age, engine fit and passenger loads per km. critical to this programme will be the continued delivery of high CDA performance through partnership work with airlines.	5. In conjunction with our airline partners we will seek to re-introduce, by the end of this Noise action Plan period a programme that will rank our airline partners in relation to their overall performance for a range of noise and emissions impacts potentially including, but not limited to metrics such as compliance with abatement techniques, fleet age, engine fit and passenger loads per km.
4. a) Gatwick Airport Ltd will write to its largest fleet operators of A320 family aircraft seeking their intentions to retrofit A320 family aircraft with vortex generators to eliminate noise created by air passing over the Fuel Tank Pressure Equalisation Vents.	2. We will continue to apply and report upon charging penalties to those aircraft operators of Airbus A320 family aircraft that have not had the Fuel Over Pressure Protector (FOPP) modification retrofitted.
5. We will continue to promote adherence to the Arrivals Code of Practice and in particular the achievement of Continuous Descent Operations through forums such as the Flight Operations Performance and Safety Committee, the Gatwick Airport Pilots Forum, Sustainable Aviation and other communication events.	13. We will continue to promote adherence to the Arrivals Code of Practice through groups such as Flight Operations Performance and Safety Committee (FLOPSC), Sustainable Aviation and other engagement events.

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COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

OLD ACTION PLAN ACTION	NEW ACTION PLAN ACTION
6. We will continue to promote, monitor, seek to improve and report on adherence to the departure noise abatement procedures detailed in the Gatwick Aeronautical Information Publication. The detail of this is described within the main body of this (END Noise Action Plan) document.	19. We will continue to promote, monitor, seek to improve and report on adherence to the departure noise abatement procedures detailed in the London Gatwick Aeronautical Information Publication.
7. We will continue to promote, monitor, seek to improve and report on adherence to the arrival noise abatement procedures detailed in the Gatwick Aeronautical Information Publication. See section six (of the END Noise Action Plan).	14. We will continue to promote, monitor, seek to improve and report on adherence to the arrival noise abatement procedures detailed in the London Gatwick Aeronautical Information Publication.
8. We will continue to administer the Department for Transport night restrictions regime and ensure that the number of operations at night is within the limits prescribed. We will also be actively involved in the Government night noise consultation in 2010.	6. We will continue to administer the Department for Transport night flight regime and ensure that we operate at night within the prescribed ATM and QC limits.
9. We will continue to monitor adherence to and review the effectiveness of our ground noise operational controls.	10. We will continue to monitor adherence to and review the effectiveness of our ground noise operational controls.
10. In conjunction with our partners in Sustainable Aviation we will continue to lobby for and seek to support continual improvements in technology and operations towards the ACARE goal of 50% reduction in perceived external noise by 2020 based on new aircraft of 2020 relative to equivalent new aircraft in 2000.	**ACTION REMOVED AS GATWICK AIRPORT LTD REMAINS A COUNCIL MEMBER OF SUSTAINABLE AVIATION AND WILL CONTINUE TO WORK WITH THE ALLIANCE THROUGH THE VARIOUS WORKING GROUPS TO ACHIEVE THIS COLLECTIVE OBJECTIVE.**
11. We will continue to fine aircraft in breach of the Department for Transport departure noise limits, and we will seek to increase the fining levels with the aim of penalising repeat offenders or departure noise infringements in 2010 and review levels every five years.	24. We will continue to fine aircraft in breach of the Department for Transport departure noise limits with all such monies passed to the Gatwick Airport Community Trust.

COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

OLD ACTION PLAN ACTION	NEW ACTION PLAN ACTION
12. We will work with our partners in Sustainable Aviation to develop and promote low noise flight procedures through evaluation of future operational methods and implementation of best practice, e g, evaluating the feasibility of introducing a steeper approach as part of an international initiative. Gatwick Airport will implement any recommendations resulting from feasibility studies in conjunction with the Civil Aviation Authority and the Department for Transport as and when they are released.	**ACTION REMOVED AS GATWICK AIRPORT LTD REMAINS A COUNCIL MEMBER OF SUSTAINABLE AVIATION AND WILL CONTINUE TO WORK WITH THE ALLIANCE THROUGH THE VARIOUS WORKING GROUPS TO ACHIEVE THIS COLLECTIVE OBJECTIVE.** **THE FUTURE WORKPLAN OF THE NOISE MANAGEMENT BOARD, AGREED ANNUALLY, MAY CONSIDER FEASIBILITY STUDIES WITH THE INTENTION OF INTRODUCING LOW NOISE FLIGHT METHODS. ANY SUCH ACTIVITIES WOULD BE SHARED WITH SUSTAINABLE AVIATION, AS APPROPRIATE.**
13. In conjunction with our airline partners and NATS (air navigation services provider) we will undertake a review in 2010 of our stand planning procedures to identify any opportunities to prioritise stand allocation so as to minimise ground noise impacts.	**ACTION REMOVED – THIS WORK IS UNDERTAKEN BY GATWICK AIRPORT LTD AS PART OF ITS 'BUSINESS AS USUAL' ACTIVITIES TO ENSURE MAXIMUM UTILISATION OF AVAILABLE RESOURCES WHILE ENSURING THAT GROUND NOISE IMPACTS ARE NOT ADVERSELY AFFECTED.**
14. We will make a financial contribution towards the acoustic insulation all eligible properties within the boundary of our new residential noise insulation scheme. This is scheduled for launch in January 2014 and benefits from a larger scheme boundary than in previous schemes.	28. We will continue a scheme that helps with the cost of acoustically insulting homes against the effects of aircraft noise. We undertake to review the scheme every 5 years to ensure it remains appropriate and relevant.
15. We will request that the Department for Transport review and explore in conjunction with Gatwick Airport the possibility of updating the current departure noise limits.	25. Through engagement with the Department for Transport, Aircraft Noise Management Advisory Committee and/or through unilateral action review our departure noise limits.
16. We will continue to offer households subject to high levels of noise (69dB(A) Leq or more) assistance with the costs of relocating.	30. To address the impacts of future growth we will continue to offer to purchase those properties suffering from both a high level of noise (63dB(A) Leq or more) and a large increase in noise (3dB(A) Leq or more), In accordance with the Terms of Reference of the Property Market Support Bond and Home Owners Support Scheme.

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ANNEX TWELVE

COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

OLD ACTION PLAN ACTION	NEW ACTION PLAN ACTION
17. We will request that the Department for Transport review and explore in conjunction with Gatwick Airport the possibility of updating the current night departure noise limits.	**ACTION REMOVED – THIS HAS BEEN SUPERSEDED BY THE AMENDED ACTION 25** *"We will engage with the Department for Transport and the Aircraft Noise Management Advisory Committee to review departure noise limits at Gatwick Airport."*
18. We will continue to offer acoustic insulation to other noise sensitive buildings such as schools and hospitals, exposed to medium to high levels of noise (63dB(A) Leq or more).	29. We will continue to offer acoustic insulation to noise sensitive buildings within the 60LAeq noise contour.
19. We will request that the Department for Transport review current airspace utilisation around Gatwick.	52. We will participate in all activities relating to 'LAMP 2' – the redesign of the London Terminal Manoeuvring Area (LTMA) and en-route airspace to eliminate chokepoints, alleviate areas of intensive aircraft concentrations, and to create a structure that has capacity to accommodate forecast traffic levels beyond 2040.
19. a) We will explore the feasibility of providing 'rotating respite' to those communities affected by noise from arriving aircraft.	**ACTION REMOVED – REFER TO ACTION 31.** *"In conjunction with the Noise Management Board we will explore innovative methods to reduce both inbound and outbound aircraft noise levels."*
19. b) In conjunction with the London Airspace Management Programme we will explore innovative new methods to control both inbound and outbound aircraft to strive for operational best practice with a view to minimising their impact on the communities below.	31. In conjunction with the Noise Management Board we will explore innovative methods to reduce both inbound and outbound aircraft noise levels.
19. c) We will consult appropriately in respect of actions 19a and19b.	53. Ensure that local communities are informed about LAMP 2 plans and the progress and airport plans for the integration of Gatwick specific departure and arrival procedures.

COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

OLD ACTION PLAN ACTION	NEW ACTION PLAN ACTION
19. d) Gatwick Airport Ltd will write to the Department for Transport requesting research be undertaken to fully understand the effects of aircraft noise on human health.	**ACTION REMOVED AS GATWICK AIRPORT LTD IS AWARE, THROUGH SUSTAINABLE AVIATION THAT THE WORLD HEATH ORGANSIATION IS UNDERTAKING A STUDY THAT WILL DETAIL, AMONG OTHER MATTERS, THE EFFECTS OF AIRCRAFT NOISE ON HUMAN HEALTH.**
20. To address the impacts of future growth we will continue to offer acoustic insulation to any residential property which suffers from a medium to high level of noise (66dB(A) Leq or more) and a large increase in noise (3dB(A) Leq or more).	**ACTION REMOVED – REFER TO ACTIONS 28 AND 30.** Action 28: *"We will continue a scheme that helps with the cost of acoustically insulting homes against the effects of aircraft noise. We undertake to review the scheme every 5 years to ensure it remains appropriate and relevant."* Action 30: *"To address the impacts of future growth we will continue to offer to purchase those properties suffering from both a high level of noise (63dB(A) Leq or more) and a large increase in noise (3dB(A) Leq or more), In accordance with the Terms of Reference of the Property Market Support Bond and Home Owners Support Scheme."*
21. To address the impacts of future growth we will continue to offer to purchase those properties suffering from both a high level of noise (63dB(A) Leq or more) and a large increase in noise (3dB(A) Leq or more), In accordance with the Terms of Reference of the property market support bond and home owners support scheme.	**ACTION REMOVED – REFER TO ACTION 30.** *"To address the impacts of future growth we will continue to offer to purchase those properties suffering from both a high level of noise (63dB(A) Leq or more) and a large increase in noise (3dB(A) Leq or more), In accordance with the Terms of Reference of the Property Market Support Bond and Home Owners Support Scheme."*
22. We will undertake and publish a feasibility study to assess the potential economic and environmental costs and benefits of operating a runway preference by the end of 2010.	**ACTION REMOVED – REFER TO ACTION 31.** *"In conjunction with the Noise Management Board we will explore innovative methods to reduce both inbound and outbound aircraft noise levels."*

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COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

OLD ACTION PLAN ACTION	NEW ACTION PLAN ACTION
23. We will continue to engage with our aviation partners through the Flight Operations Performance and Safety Committee to seek to improve adherence to the Aeronautical Information Publication.	18. We will continue to promote adherence to the Departures Code of Practice through groups such as FLOPSC, Sustainable Aviation and other communication events.
24. We will develop a strategy to minimise Auxiliary Power Unit use in order to reduce ground noise and local air quality emissions, and replace with and roll out through 2010. Impacts will be reviewed on an annual basis.	12. We will continue to minimise aircraft auxiliary power unit use in order to reduce ground noise and local air quality emissions via Gatwick Airport Directives and monitoring of compliance.
25. We will publish each quarter on our website the level of adherence with the noise abatement procedures in the Gatwick Aeronautical Information Publication.	38. We will report progress against the published Noise Abatement Procedures contained within the London Gatwick Aeronautical information Publication and this Noise Action Plan on a quarterly basis to the Noise and Track Monitoring Advisory Group, the Gatwick Airport Consultative Committee and on our webpages.
26. We will continue to keep abreast of government research and guidance in relation to issues of tranquillity and overflight of Areas of Outstanding Natural Beauty (AONB).	**ACTION REMOVED – AONB GUIDANCE CONTINUALLY MONITORED AS PART OF THE AIRPORT'S 'BUSINESS AS USUAL' ACTIVITIES. THE LATEST GUIDANCE IS LISTED WITHIN THE 2017 AIR NAVIGATION GUIDANCE.**
27. We will continue to engage with local community representatives on air noise through appropriate consultation groups, such as the Gatwick Airport Consultative Committee, Noise and Track Monitoring Advisory Group and the Flight Operations Performance and Safety Committee.	46. We will continue to engage with local communities through the established noise governance groups.
28. We will report on the progress of the (Environmental Noise Directive) action plan to the Noise and Track Monitoring Advisory Group as a standing agenda item.	**ACTION REMOVED – REFER TO ACTION 38.** *"We will report progress against the published Noise Abatement Procedures contained within the London Gatwick Aeronautical information Publication and this Noise Action Plan on a quarterly basis to the Noise and Track Monitoring Advisory Group, the Gatwick Airport Consultative Committee and on our webpages."*

COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

OLD ACTION PLAN ACTION	NEW ACTION PLAN ACTION
29. We will continue to engage with the Gatwick Airport Consultative Committee on noise management providing quarterly reports of performance and the work of the Flight Performance Team, Noise and Track Monitoring Advisory Group and the Flight Operations Performance and Safety Committee.	**ACTION REMOVED – REFER TO ACTION 38.** *"We will report progress against the published Noise Abatement Procedures contained within the London Gatwick Aeronautical information Publication and this Noise Action Plan on a quarterly basis to the Noise and Track Monitoring Advisory Group, the Gatwick Airport Consultative Committee and on our webpages."*
30. We will continue to offer a range of contact options for complaints and enquires regarding aircraft noise including by post, email, lo-call voicemail facility and online on the noise website.	42. We will continue to offer various methods for complaints about aircraft noise events.
31. We will continue to provide public access to flight track information (delayed by 20 minutes) via the online flight tracking facility.	33. We will continue to provide public access to flight track information and noise related data via the Gatwick Airport noise website and the online flight tracking facility, available both on desktop and mobile devices.
32. We will continue to provide a Flight Performance Team service and implement service improvements where identified. The Flight Performance Team will continue to provide accurate and timely data to aid strategy development and noise complaint handling.	34. We will continue to provide a Flight Performance Team (FPT) service and implement service improvements where identified. The FPT will continue to provide accurate and timely data to aid strategy development and noise complaint handling.
33. We will continue to log all complaints relating to aircraft operations and publish the statistics on our website quarterly.	41. We will continue to log all complaints relating to aircraft operations in line with the extant Noise Complaints Handling Policy and publish the statistics on our website quarterly.
34. We will seek to respond to at least 95% of all complaints and enquiries within eight working days of receipt and publish our performance in Flight Performance Team quarterly reports.	40. We will seek to respond to at least 95% of all complaints and enquiries within eight working days of receipt, in line with the extant Complaints Handling Policy, and publish our performance in FPT quarterly reports.

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ANNEX TWELVE

COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

OLD ACTION PLAN ACTION	NEW ACTION PLAN ACTION
35. Through our work with the Noise and Track Monitoring Advisory Group and the Gatwick Noise Monitoring Group we will seek to further develop our community noise monitoring programme to help gain greater understanding of the impacts in communities affected by Gatwick operations.	37. We will continue to provide a Community Noise Monitoring Scheme, operated under the supervision of the Noise and Track Monitoring Advisory Group and the Gatwick Noise Monitoring Group.
36. We will continue to direct all money raised by noise infringements to the Gatwick Airport Community Trust.	**ACTION REMOVED – REFER TO ACTIONS 24 AND 26.** *"We will continue to fine aircraft in breach of the Department for Transport departure noise limits with all such monies passed to the Gatwick Airport Community Trust."* *"We will work with our airlines and noise governance groups to explore the feasibility of introducing supplementary charges for aircraft departures which persistently fail to operate in accordance with Noise Preferential Routes prescribed for the airport as measured by the noise and track monitoring system operated by Gatwick Airport Ltd, with all such monies passed to the Gatwick Airport Community Trust."*
36. a) In conjunction with the Gatwick Noise Monitoring Group and the Noise and Track Monitoring Advisory Group we will continue to commission noise studies to gain an insight into the noise climate in a particular area and we will publish these on our website.	49. In conjunction with the Gatwick Noise Monitoring Group we will commission noise studies to gain an insight into the noise climate in a particular area and we will publish these on our website.

COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

OLD ACTION PLAN ACTION	NEW ACTION PLAN ACTION
37. By the end of 2011 we will review, develop and consult on alternative metrics for describing the impact of aircraft operations during the course of this action plan. We will work and liaise with other United Kingdom airports and the Department for Transport on the revised metrics whilst seeking review by Aircraft Noise Management Advisory Committee.	39a. We will aim to reach a measure of consensus with community groups on future airport utilisation relative to noise impacts. In order to achieve this we will conduct a review of Government policy including how Government policy should be interpreted and how that policy has been applied in practice. Following the establishment of a workable policy baseline we will aim to develop new noise metrics and reporting to complement the current noise contours and measure our future noise performance. This work will be used to more precisely describe outcomes to support this END Noise Action Plan.
38. We will continue to engage with local community representatives on ground noise issues through the ground noise agenda item of the Noise and Track Monitoring Advisory Group.	**ACTION REMOVED AS THE GROUND NOISE REPORT ISSUED BY AIRSIDE COMPLIANCE IS A STANDING AGENDA ITEM OF NATMAG.**
39. We will conduct customer service surveys for the FPT every three years commencing in 2010.	**ACTION REMOVED – INDEPENDENT REVIEW OF ARRIVALS EXAMINED GATWICK'S NOISE COMMUNICATION STRATEGIES WITH LOCAL COMMUNITIES AND RECOMMENDED AREAS FOR IMPROVEMENT, ALL OF WHICH WERE ACCEPTED.**
40. We will host a local focus forum/seminar every two years, inviting local interest groups and other key stakeholders.	50. We will continue to host an annual airspace seminar, to include an annual update from the Noise Management Board, inviting local interest groups and stakeholders.
41. We will commission and publish night forecast contours for ground noise for 2015 in 2010.	39. We will update to our website the following noise contours: - Summer 16 hour day Leq (actual) - Summer 16 hour day (standard) Leq - Summer Night Leq (actual) - The above compared to the previous year. - Summer Night 10 year average modal split Leq

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COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

OLD ACTION PLAN ACTION	NEW ACTION PLAN ACTION
42. We will commission and publish summer 16 hour day forecast Leq contours for air noise for 2015 in 2010.	**ACTIONS REMOVED – REFER TO ACTION 39.** *"We will update to our website the following noise contours:* • *Summer 16 hour day forecast Leq contours for air noise* • *Summer 16 hour day forecast Leq contours for air noise* • *Night forecast contours for ground noise* • *Forecast Lden contours for air noise* • *Night quota period 48dB (A) Leq contour"*
43. We will commission and publish forecast Lden contours for air noise for 2015 in 2010.	
44. We will publish on our website the night quota period 48dB (A) Leq contour.	
45. We will publish annually on our website the summer Leq contours as produced by the DfT.	
46. We will continue to engage with local planning authorities in order to ensure they are well informed about noise issues at Gatwick Airport.	51. We will continue to engage with local planning authorities in order to ensure they are well informed about noise issues at Gatwick, and to provide information on the airport and its operation.
47. We will continue to monitor adherence and review the effectiveness of our ground noise operational controls and publish data in the Noise and Track Monitoring Advisory Group meeting minutes.	11. We will report on a quarterly and annual basis the following: • Fixed Electrical Ground Power availability. • The amount of Ground Power Unit dispensations granted. • The number of audit checks of aircraft auxiliary power unit running. • The number of non-compliances of aircraft APU runs identified. • The number of aircraft engine runs undertaken.
48. We commit to maintaining a suitable Noise and Track Keeping system to manage noise, track-keeping and to provide an online self-service flight tracking / complaint facility. We will also enhance this service when upgrades become available.	32. We will ensure that our Noise and Track Keeping systems are suitable, relevant and reliable, providing updates as appropriate.
49. We will continually review and amend as appropriate the Gatwick Airport Directives relating to noise management.	**ACTION REMOVED – REFER TO ACTION 12.** *"We will continue to minimise aircraft auxiliary power unit use in order to reduce ground noise and local air quality emissions via Gatwick Airport Directives and monitoring of compliance."*

COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

OLD ACTION PLAN ACTION	NEW ACTION PLAN ACTION
50. We will continue to operate and enhance our Noise Management systems.	**ACTION REMOVED – REFER TO ACTION 32.** *"We will ensure that our Noise and Track Keeping systems are suitable, relevant and reliable, providing updates as appropriate."*
51. We will monitor the performance indicators listed within the action plan and where we determine that a discouraging trend is emerging, we will seek to set an annual target to help address it.	**ACTION REMOVED – REFER TO ACTION 38.** *"We will report progress against the published Noise Abatement Procedures contained within the London Gatwick Aeronautical information Publication and this Noise Action Plan on a quarterly basis to the Noise and Track Monitoring Advisory Group, the Gatwick Airport Consultative Committee and on our webpages."*
52. We will benchmark internationally and publish our ranking on operational noise management with other comparable airports in 2010 and 2014.	**ACTION REMOVED – THE 2015 INDEPENDENT REVIEW OF ARRIVALS EXAMINED GATWICK'S OPERATIONAL NOISE MANAGEMENT STRATEGIES AND RECOMMENDED AREAS FOR IMPROVEMENT, ALL OF WHICH WERE ACCEPTED.**
53. We will benchmark internationally and publish our ranking in aircraft noise communications with other comparable airports in 2010 and 2014.	**ACTION REMOVED – THE 2015 INDEPENDENT REVIEW OF ARRIVALS EXAMINED GATWICK'S NOISE COMMUNICATION STRATEGIES AND RECOMMENDED AREAS FOR IMPROVEMENT, ALL OF WHICH WERE ACCEPTED.**
54. We will participate fully, through groups such as the Aircraft Noise Management Advisory Committee in discussing arrival and departure policies.	44. Gatwick will continue to engage actively with Government, the Regulator, Sustainable Aviation and such ad-hoc reviews that may be established and will respond appropriately to relevant consultations, engagement exercises and recommendations arising from those activities.
55. We will continue to monitor Government research into the effects of noise on human health where applicable and appropriate we will adopt the findings of any research and adopt the guidelines outlined by latest Word Health Organisation reviews.	**ACTION REMOVED - Word Health Organisation (WHO) GUIDANCE CONTINUALLY MONITORED.**

12 ANNEX TWELVE
COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

OLD ACTION PLAN ACTION	NEW ACTION PLAN ACTION
	21. In conjunction with our partners and the Noise Management Board we will adopt a preferred Noise Abatement Departure Procedure.
	22. We undertake to explore opportunities to remove the altitude restrictions on Routes 3 and 4 intended to reduce the noise impact of departing aircraft.
	23. We undertake to explore the feasibility of introducing an alternative Standard Instrument Departure routes within our Noise Preferential Routes in order to provide dispersions and / or respite.
	15. In conjunction with the Noise Management Board, Gatwick Airport will identify a reduced low noise arrival procedure which will capture Low Power Low Drag measures and result in a metric which will supplement Continuous Descent Operations as an additional measurable target.
	16. In line with Noise Management Board initiatives and the commitments in the Sustainable Aviation Noise Road Map, we will work with our airlines and air navigation services providers to improve CDO at Gatwick.
	17. We will implement agreed recommendations of the Noise Management Board Work Plan solutions that are intended to reduce the noise impact of arriving aircraft.
	7. We will report on a quarterly basis to the Noise and Track Monitoring Advisory Group the number of flights delayed from planned daytime arrival into night movements (after 23:30 local).
	8. We will, as far as is practicable, take all necessary steps to manage the late running of aircraft to prevent scheduled day movements taking place during the sensitive night period.

COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

OLD ACTION PLAN ACTION	NEW ACTION PLAN ACTION
	20. We have an annual limit of no more than 5% off-track departures. In future, we will compare on an annual basis the percentage of off-track departures against the average performance over the previous five years.
	26. We will work with our airlines and noise governance groups to explore the feasibility of introducing supplementary charges for aircraft departures which persistently fail to operate in accordance with Noise Preferential Routes prescribed for the airport as measured by the noise and track monitoring system operated by Gatwick Airport Ltd, with all such monies passed to the Gatwick Airport Community Trust.
	35. We will improve the availability of, and access to, airspace and noise related data.
	47. We will continue to support the existence of, and engage with a Noise Management Board, the work plan and meeting papers, which will be adequately published to our other noise governance groups and online.
	48. We will continue to engage with and provide noise data as required to local Environmental Health Officers through the Gatwick Noise Monitoring Group.
	45. Gatwick Airport will implement relevant recommendations resulting from feasibility studies in conjunction with the CAA and the DfT as and when they are released.
	43. In order to achieve community confidence in the Complaints Handling Policy and provide transparency of information, we will, where appropriate update our procedures relating to the receipt, processing and reporting of aircraft noise complaints.

12

ANNEX TWELVE

COMPARISON OF OLD AND NEW ACTION PLAN ACTIONS

OLD ACTION PLAN ACTION	NEW ACTION PLAN ACTION
	36. We will explore the feasibility of introducing an information service for local communities. This could include updates on airport operations, e.g. scheduled northern runway operations, change in runway direction, meteorological information, scheduled number of aircraft movements during the day and night periods, reported thunderstorm activity etc.
	27. We will continue to provide a vortex-damage repair scheme to repair roofs that have been damaged by aircraft vortices.
	9. We will implement a voluntary ban on operations of Quota Count 4 aircraft within the core night period by the end of 2022.
	2a. If additional aircraft or manufacturer specific noise defects which can be rectified by a modification are identified (similar to the FOPP) we will seek to identify, consult and implement corresponding charging penalties.
	24a. We will review and increase the fines currently levelled against airlines which breech departure noise limits with all such monies passed to the Gatwick Airport Community Trust.
	28a We will undertake a review of our acoustic noise insulation programs by the end of 2019. With subsequent reviews considered every 5 years as noted in Action 28.
	37a. We will seek to expand the Community Noise Monitoring Scheme with additional noise monitoring terminals and update the reporting process to include holistic noise reports for the area around Gatwick Airport.

DETAILS OF THE REVISION PROCESS OF THE DRAFT NOISE ACTION PLAN

AS COMMUNICATED TO THE VARIOUS NOISE GOVERNANCE GROUPS

REVISION OF THE ENVIRONMENTAL NOISE DIRECTIVE NOISE ACTION PLAN 2019 – 2024

Update dated 7 November 2017 to the Gatwick Airport Consultative Committee, Noise and Track Monitoring Advisory Group, the Noise Management Board, Crawley Borough Council and West Sussex County Council.

BACKGROUND

Under the Environmental Noise (England) Regulations 2006, Gatwick Airport Ltd is required to produce a Noise Action Plan, designed to manage noise issues and effects arising from aircraft departing from and arriving at the airport. This is the third version of the Environmental Noise Directive Noise Action Plan and it continues to align with the S106 Legal Agreement with West Sussex County Council and Crawley Borough Council, the work plan of the Noise Management Board and our Decade of Change Sustainability Strategy.

Gatwick Airport's first Environmental Noise Directive Noise Action Plan was published in June 2010 and covered the period 2010 - 2015. This action plan was subsequently updated to cover the period 2013 - 2018. This is the third revision to the action plan and has been devised in line with the latest guidance provided to airport operators by the Department for Environment, Food and Rural Affairs (DEFRA).

ROUND THREE CYCLE

On 26 July 2017, Gatwick Airport Ltd received notification from DEFRA that the airport should revise its Noise Action Plan.

In accordance with the published guidance, the purpose of this revised Noise Action Plan is to manage and where possible reduce the impact of noise from aircraft at Gatwick Airport over the five year period from 2019 – 2024, building on the actions of the 2010 – 2015 and 2013 - 2018 action plans.

REVISING A NOISE ACTION PLAN

The current plan should be reviewed and revised to include, as necessary:

- updated details about the airport and its operation;
- the results of the noise mapping completed in 2017;
- the progress made against the actions described in the current Action Plan;
- updated information about relevant legislation and standards;
- updated relevant national and local policies;
- information about on-going actions; and
- information about any proposed new actions.

As Gatwick Airport already has a Noise Action Plan in place, DEFRA has proposed that a relatively light touch "review and revise" updating process is undertaken. This does not preclude the airport from undertaking a more detailed review and update should the need arise.

CONSULTATION

Section 3.4 of the Guidance for Airport Operators on how to revise Noise Action Plans under the Environmental Noise (England) Regulations 2006 (as amended) states, inter alia:

"It is envisaged that once the plan has been revised it will be presented to the Airport's Consultative Committee for comment, and any other appropriate bodies depending on the extent and nature of the revisions. The Airport Operator should summarise the comments received in the revised plan together with their response to the issues raised."

COMMENCEMENT OF THE CONSULTATIVE PROCESS

This paper is to be presented to the meeting of the Gatwick Airport Consultative Committee, scheduled to take place on Thursday

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ANNEX THIRTEEN

DETAILS OF THE REVISION PROCESS OF THE DRAFT NOISE ACTION PLAN

AS COMMUNICATED TO THE VARIOUS NOISE GOVERNANCE GROUPS

9 November 2017. It will then be presented to the subsequent meetings of the Noise and Track Monitoring Advisory Group for discussion and the Noise Management Board for information.

For the avoidance of doubt, 9 November 2017 is deemed to be official commencement of the consultative process. Comments on the draft list of actions to be included in the revised draft noise action plan are required to be submitted to GAL by Friday 2 February 2018.

During this period, feedback will also be sought from Crawley Borough Council and West Sussex County Council, both being the Lead Authorities for the purposes of the Section 106 Memorandum of Understanding with the other Local Authorities whose areas are significantly affected by the activities of the Airport.

The feedback received will be considered by Gatwick Airport Ltd and included in Annex 9 of the main Environmental Noise Directive Noise Action Plan document. A draft of Annex 9, together with the final list of proposed actions, will be presented to the GATCOM Steering Group, scheduled for 22 March 2018, for initial consideration and then reported to the main GATCOM meeting, scheduled for 26 April 2018 for consideration and approval.

RECEIPT OF FEEDBACK

It is anticipated that feedback will be received via:

- The Gatwick Airport Consultative Committee,
- The Noise and Track Monitoring Advisory Group,
- Crawley Borough Council,
- West Sussex County Council.

As mentioned above, this paper will be presented to the Noise Management Board. If the Noise Management Board has any comments on the draft list of actions these will be referred to Gatwick Airport Ltd and also reported to the Gatwick Airport Consultative Committee through the usual report back process of the deliberations of the Noise Management Board.

Should members of the public wish to provide feedback on the Environmental Noise Directive Action Plan Actions then it is proposed they provide these to their Gatwick Airport Consultative Committee Representative in the first instance. Feedback received directly by the airport will be considered and included in Annex 9 of the main Environmental Noise Directive Noise Action Plan document.

GATWICK AIRPORT LTD RESPONSE TO FEEDBACK RECEIVED

As detailed in the guidance to airport operators, Gatwick Airport Ltd will provide appropriate responses to the key themes of feedback received and include these in annex 9 of the main Environmental Noise Directive Noise Action Plan document.

FURTHER ROUND OF CONSULTATION

It was agreed at the meeting of GATCOM on 26 April 2018 that the draft Noise Action Plan, having been updated in response to the feedback received, be presented to the 21 June 2018 meeting of the GATCOM Steering Group for consideration prior to it being presented for a final time to the full meeting of GATCOM, scheduled for 19 July 2018. The effect of this additional stage of consultation is that there has been three stages of consultation; commencing with the circulation of a proposed list of Action Plan Actions, the circulation of an initial draft Noise Action Plan and culminating in the final draft of the Noise Action Plan being presented.

ADDENDUM TO THE 2019-2024 END NOISE ACTION PLAN

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POST SUBMISSION DEVELOPMENTS

In the time since this Noise Action Plan was submitted to DEFRA, there have been two key developments that are relevant to the growth and operation of the airport and the Noise Action Plan and therefore warrant inclusion in this annex document.

GATWICK AIRPORT DRAFT MASTERPLAN

As part of the airport planning process - and reflecting industry best practice - Gatwick Airport Ltd creates and regularly publishes a 'masterplan' to show how the airport intends to develop and grow in the longer term. The masterplan also helps to inform the wider regional and local planning process.

The 2018 draft masterplan sets out proposals for the airport's ongoing development and sustainable growth. It explains the latest thinking on how the airport can meet the increasing demand for air travel and provide Britain with enhanced global connectivity. This draft masterplan is also a direct response to the Government's call in June 2018 for UK airports to look at 'making best use of their existing runways[7]' and this masterplan therefore explores how Gatwick Airport could grow across three scenarios:

1. MAIN RUNWAY: USING NEW TECHNOLOGIES TO INCREASE CAPACITY
   In the near term, the airport has explored how deploying new technology could increase the capacity of the main runway, offering incremental growth through more efficient operations.

2. STANDBY RUNWAY: INNOVATIVE PLAN TO BRING EXISTING STANDBY RUNWAY INTO USE
   Under its current planning agreement, the airport's existing standby runway is only used when the main runway is closed for maintenance or emergencies. However, the 40-year planning agreement that prevents the simultaneous use of the two runways will come to an end in 2019. The draft master plan sets out for the first time how we could potentially bring the existing standby runway into routine use for departing flights, alongside the main runway, by the mid-2020s.

3. ADDITIONAL RUNWAY: SAFEGUARDING FOR THE FUTURE
   While the airport is not actively pursuing the option of a building a brand new runway to the south of the airport - as was suggested through the Airports Commission process – the airport believes it is in the national interest to continue to safeguard this land for the future as part of its masterplan.

   A period of public consultation and associated public sessions has taken place and in 2019, the airport will publish a final masterplan document which will consider the feedback received during the consultation period.

For the avoidance of doubt, should options two or three be implemented at Gatwick Airport, these would be deemed to be a 'major development' as set out in section 1.11 of the 'Guidance to Airport Operators on how to revise Noise Action Plans under the Environmental Noise (England) Regulations 2006 (as amended)' that states:

"Action Plans must be drawn up by the airport operators and be based on the results of the noise mapping. The Regulations also require the Action Plans to be reviewed at least every five years and revised if necessary and whenever a major development occurs affecting the existing noise situation."

[7] https://www.gov.uk/government/publications/aviation-strategy-making-best-use-of-existing-runways

14 ANNEX FOURTEEN
ADDENDUM TO THE 2019-2024 END NOISE ACTION PLAN

For the purposes of clarity, the term 'major development' is not defined in the Regulations or the Environmental Noise Directive but it would include, for example, the use of a new runway.

NEW AVIATION STRATEGY

On 17 December 2018, the Department for Transport (DfT) announced that it is seeking feedback on its green paper which outlines proposals for a new Aviation Strategy. The strategy will set out the challenges and opportunities for aviation to 2050 and beyond and will emphasise the significance of aviation to the UK economy and regional growth.

The first step in the process of developing the strategy was the publication of an initial call for evidence in July 2017 on the strategy's aims and objectives. The government then published a 'next steps' document in April 2018 which set out some of the specific issues to be considered as part of the policy development process.

The consultation document, issued on 17 December 2018, forms part of the government's final consultation on the policy proposals for the Aviation Strategy. It is structured around the original objectives of the strategy, updated to reflect the feedback that the government has received to date on their relevance and priority.

The strategy will focus on:

- developing a partnership for sustainable growth which meets rising passenger demand, balanced with action to reduce environmental and community impacts
- improving the passenger experience, including through technology and innovation, a new passenger charter and action to reduce delays at the border
- building on the UK's success to establish new connections across the world and create greater choice for consumers.

The consultation document[8] states that demand for aviation has grown significantly since 2010 and while the government welcomes growth in the sector, it advises that this growth must be sustainable. Achieving this requires a partnership between the government, the regulator, the industry and other interested parties to work within a comprehensive policy framework to better manage the environmental impacts of the sector.

The consultation therefore:

- outlines the government's preferred approach for developing a framework for sustainable growth and the respective roles for the government and the industry
- makes the case for making the most efficient use of infrastructure, including by considering the system for slot allocation at airports and continuing to support the industry in improving resilience
- describes the approach being taken to modernise airspace to deliver capacity and environmental benefits
- sets out a robust policy framework and package of measures to reduce the harmful effects of aviation on the environment, such as carbon emissions, air quality and noise
- sets out the government's expectations that communities living close to airports should benefit directly from growth.

The consultation period is scheduled to run until 11 April 2019. A final white paper version of the aviation strategy will be published by the middle of 2019.

[8] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765253/aviation-2050-web.pdf

ADOPTION OF THE 2019 – 2024 END NOISE ACTION PLAN

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Department for Environment Food & Rural Affairs

Seacole Building
2 Marsham Street
London SW1P 4DF

T 03459 335577
defra.helpline@defra.gsi.gov.uk
www.gov.uk/defra

Dr Thérèse Coffey MP
Parliamentary Under Secretary of State
for the Environment

Lee Howes
Airspace and Environmental Performance Manager
Gatwick Airport
Horley
Gatwick
RH6 0NP

11 February 2019

Dear Mr Howes,

EU ENVIRONMENTAL NOISE DIRECTIVE (2002/49/EC): ADOPTION OF ROUND 3 AIRPORT NOISE ACTION PLAN

I am writing to inform you that I have formally adopted the Noise Action Plan for Gatwick Airport, as required by the Environmental Noise Directive and the Environmental Noise (England) Regulations 2006 (as amended).

In line with the updated guidance for airport operators on revision of airport Noise Action Plans, I am formally requesting that the final plan be published in an electronic format within 28 days.

The action planning process has provided a valuable opportunity for airports to bring together all their noise management activities into one living document. As living documents, the plans must be reviewed and, if necessary, revised with the participation of the public, whenever a major development occurs affecting the existing noise situation, and at least every five years.

Yours sincerely,

[redacted]

DR THERESE COFFEY MP

16 | ANNEX SIXTEEN
KEY STATISTICS 2018

Gatwick served more destinations than any other UK airport in 2018 (source OAG)

- **Total passengers:**
  46.1 million
- **Aircraft movements:**
  284,000
- **Total cargo:**
  113,000 metric tonnes
- **Total number of aircraft seats:**
  53.1 million
- **Average number of passengers per flight:**
  165
- **Average load factor:**
  86.7%
- **Biggest airline:**
  easyJet carrying 18.7m passengers
- **Long haul passengers:**
  8.6m (+18%)
- **Top destination served:**
  Barcelona (1.6m passengers)

OUR AIRLINES

Uniquely, we're home to a large mix of airline operators, with over 50 currently operating regularly from Gatwick. This means that we can offer our passengers a greater choice, through a combination of full service, low-cost and charter services, with many destinations having multiple daily services.

In 2018, Gatwick welcomed five new airlines. We will continue with our strategy of encouraging new airline partnerships, so that we can offer our passengers the best selection of travel options.

OUR DESTINATIONS

In an open market where airlines can choose where to fly from, Gatwick has been competing successfully with other London airports to win new routes to the UK's key trading partners, as well as leisure destinaitons. In 2018, we added 17 new destinations to our ever-growing network. These included nine long-haul destinations, such as:

- Buenos Aires — Argentina
- Chicago, Austin and Tampa — USA
- Halifax — Canada
- Doha — Qatar
- Shanghai — China

There were also new short-haul routes added, with even more choice to countries such as Germany, Poland, Jordan, Greece and Montenegro.

KEY STATISTICS 2018

PASSENGER PROFILE

- Sex: Male 47%; Female 53%
- Socio-economic group: AB: 38%; C1: 43%; C2: 13%; DE: 4%*
- Nationality: UK 63%; Overseas 37%
- UK business 10 %
- UK leisure 60 %
- Overseas business 7 %;
- Overseas leisure 23 %

* Due to rounding up/down does not add up to 100%

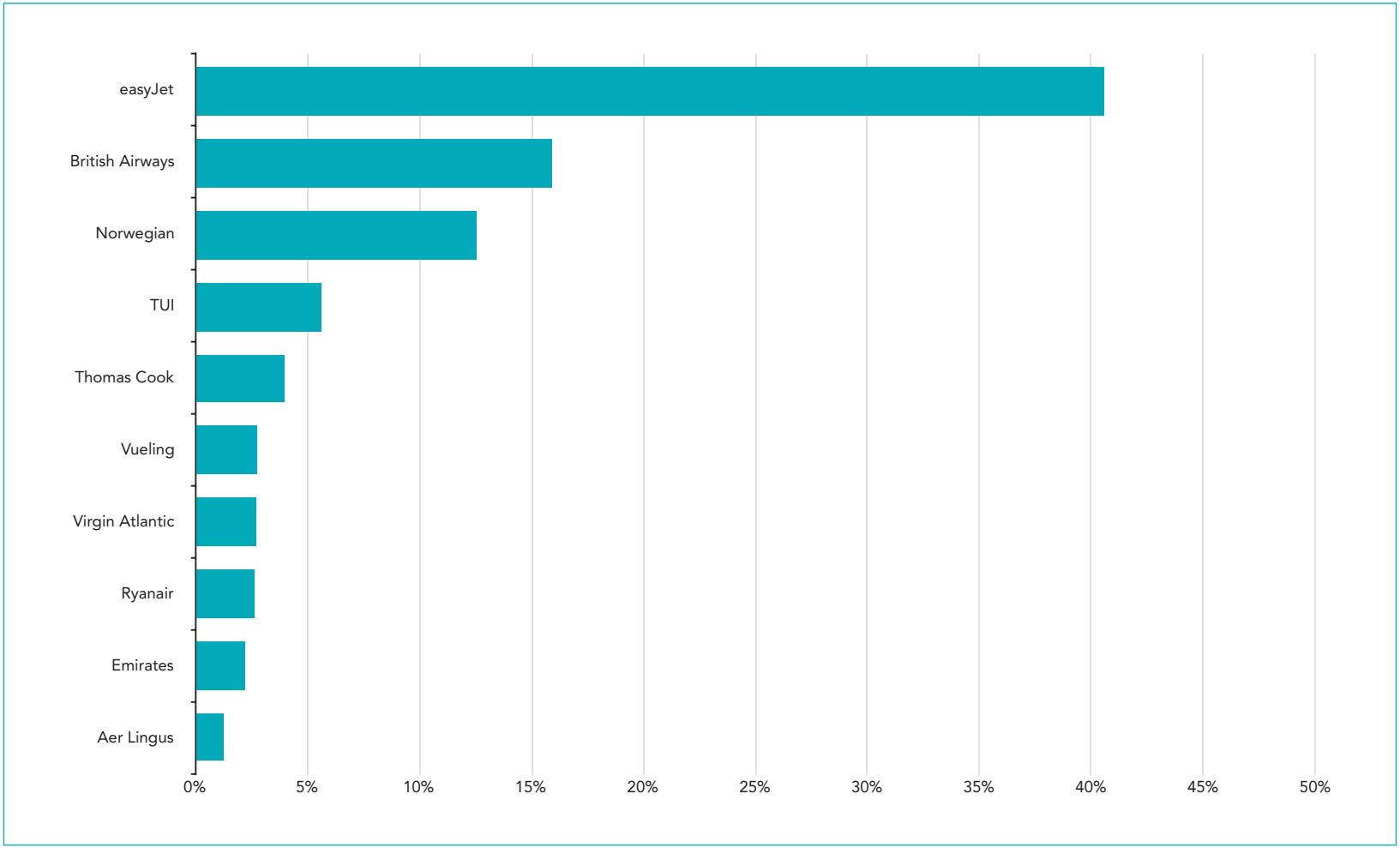
AWARDS

We're proud of Gatwick Airport and our achievements and we're delighted that some of our work is being recognised by external organisations. Below are just a few of our hard won awards from 2018 and 2019.

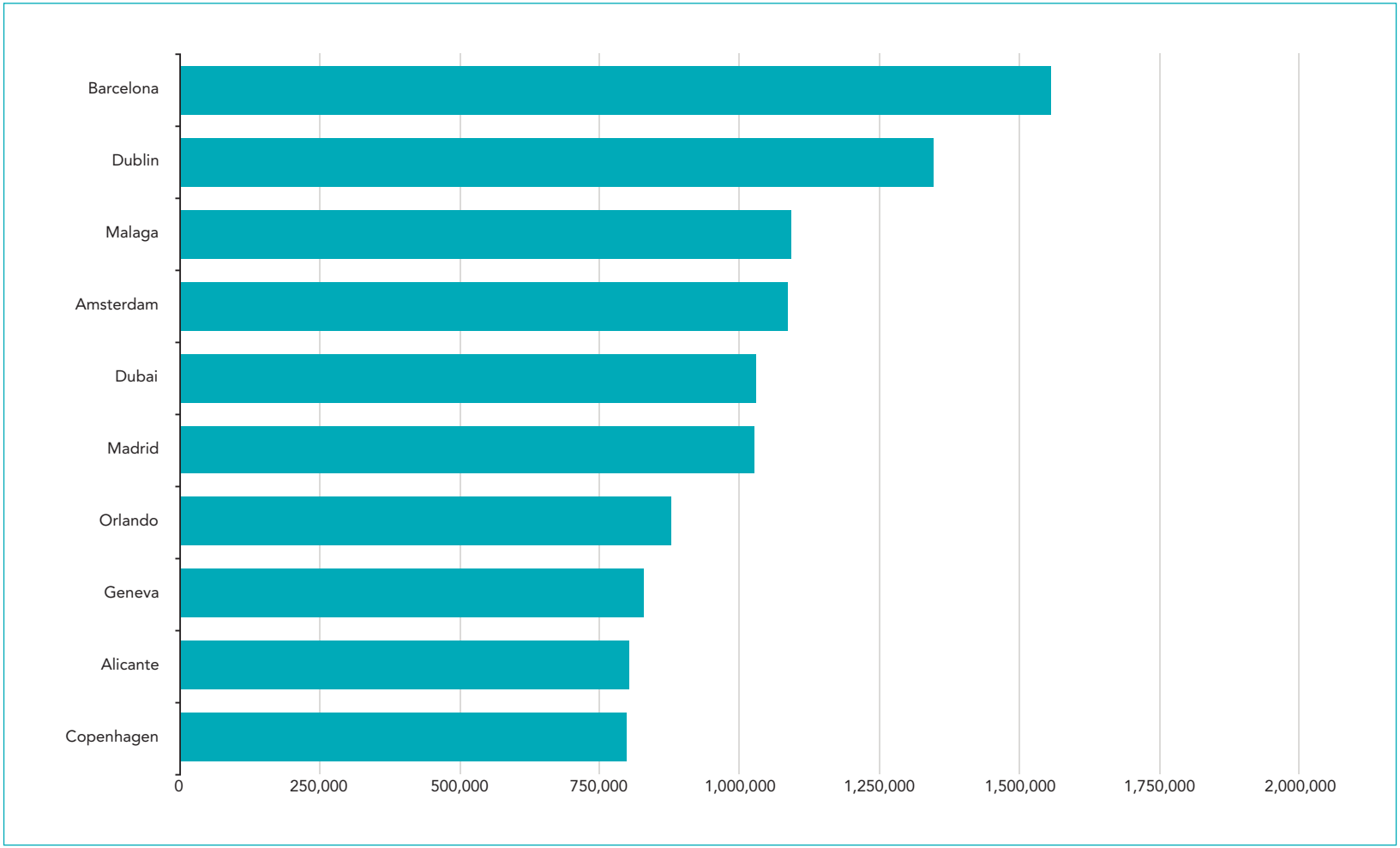
- **The Wildlife Trust** — Biodiversity Benchmark Award
- **Carbon Trust** — Best combined reduction of carbon, waste & water
- **Disability Smart Award** — Inclusive Service Provider of the Year
- **Future Travel Experience Europe** — Most Innovative Airport in Europe
- **London Transport Awards** — Airport of the Year
- **Loo of the Year** — Airports winner, England
  Transport sector winner
  Three platinum awards for toilets
- **National Technology Awards** — Mobile Innovation of the Year for our passenger app
- **Real IT awards** — Mobile App of the Year for passenger app
  Cloud Project of the Year
- **Royal Society for the Prevention of Accidents** — Gold Medal Award for five years of achieving Gold Standard
- **Security & Fire Excellence Awards** — Counter Terrorism Project of the Year
- **Top 50 companies for customer service** — Named in the top 50 UK companies for excellence in customer services
- **UK IT Industry Awards** — IT project team of the year for network refresh (with Hewlett Packard Enterprise)

16 | ANNEX SIXTEEN
KEY STATISTICS 2018

Top 10 Airlines by Passenger volume (2018)

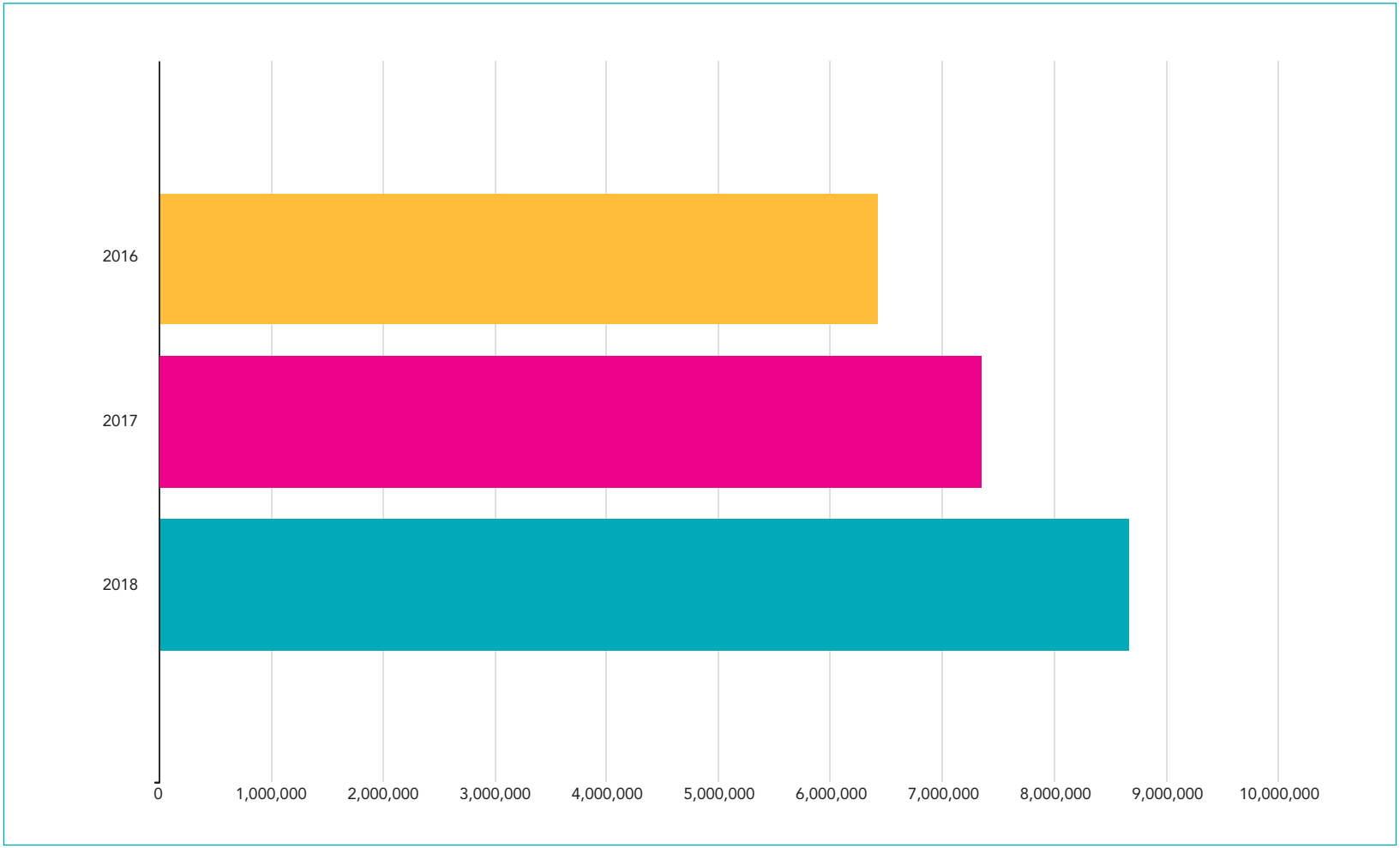


Top 10 Routes by Passenger volume (2018)

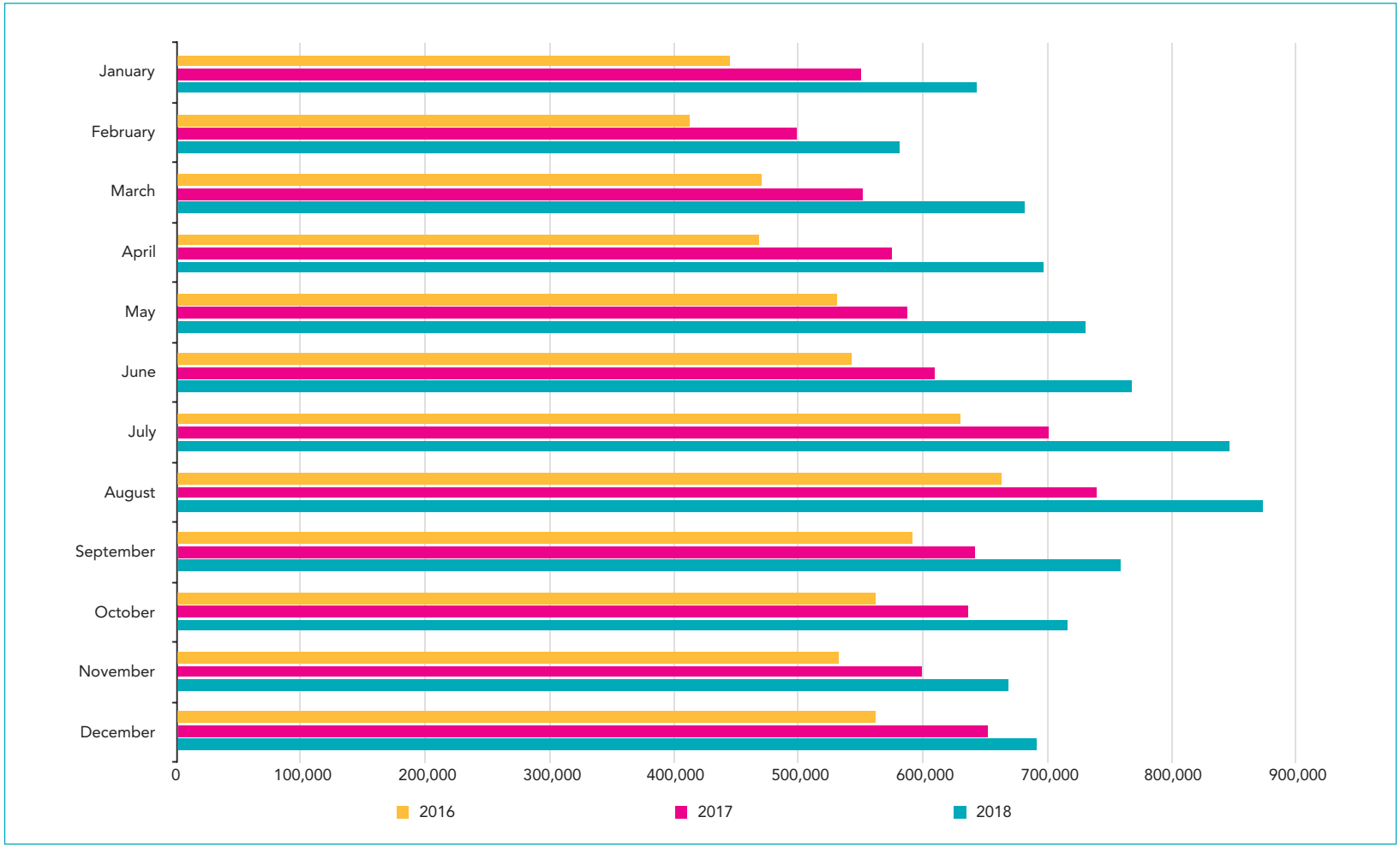


16 | ANNEX SIXTEEN
KEY STATISTICS 2018

Long haul passenger growth by year (2016-2018)

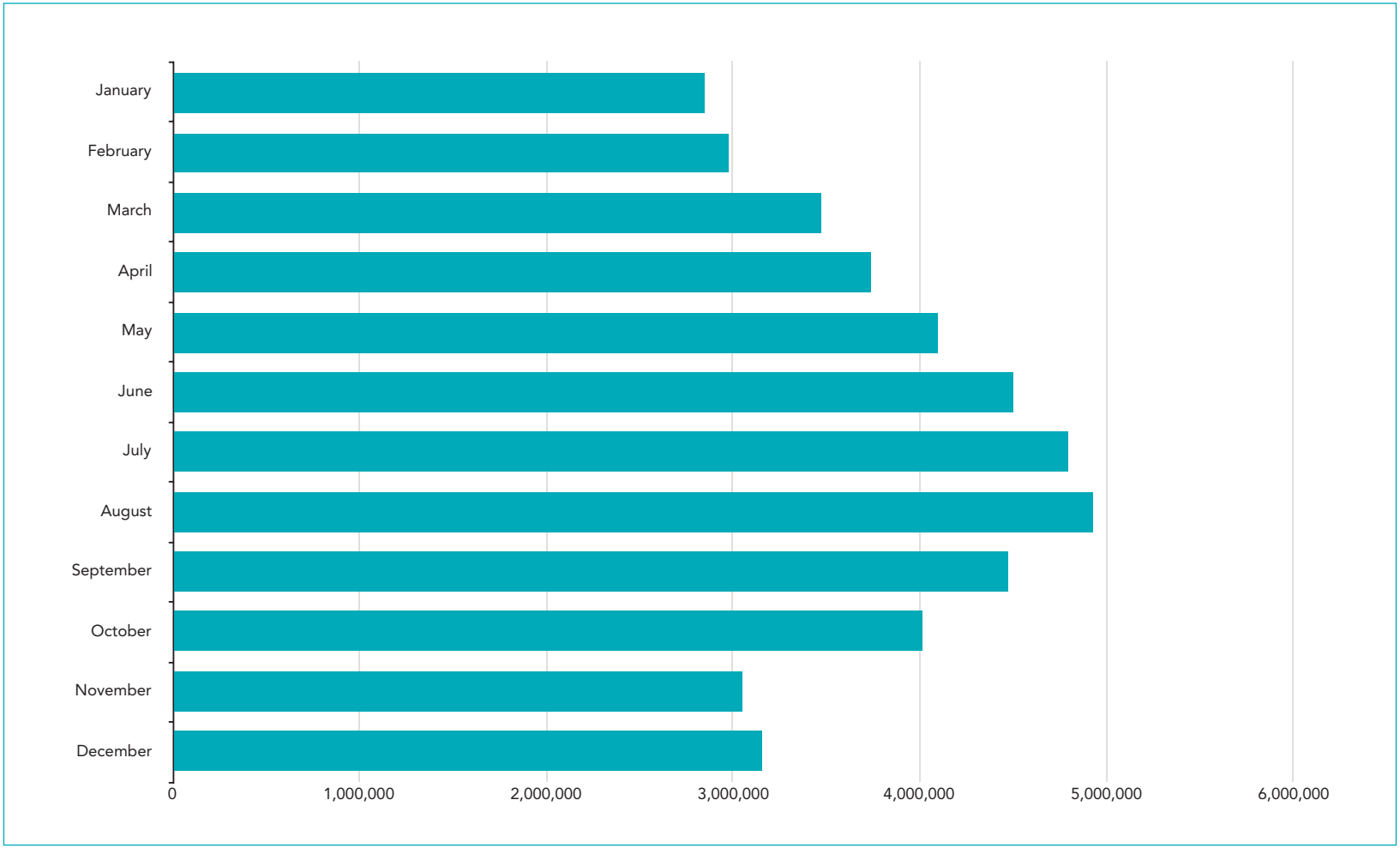


Long haul passenger growth by month (2016-2018)

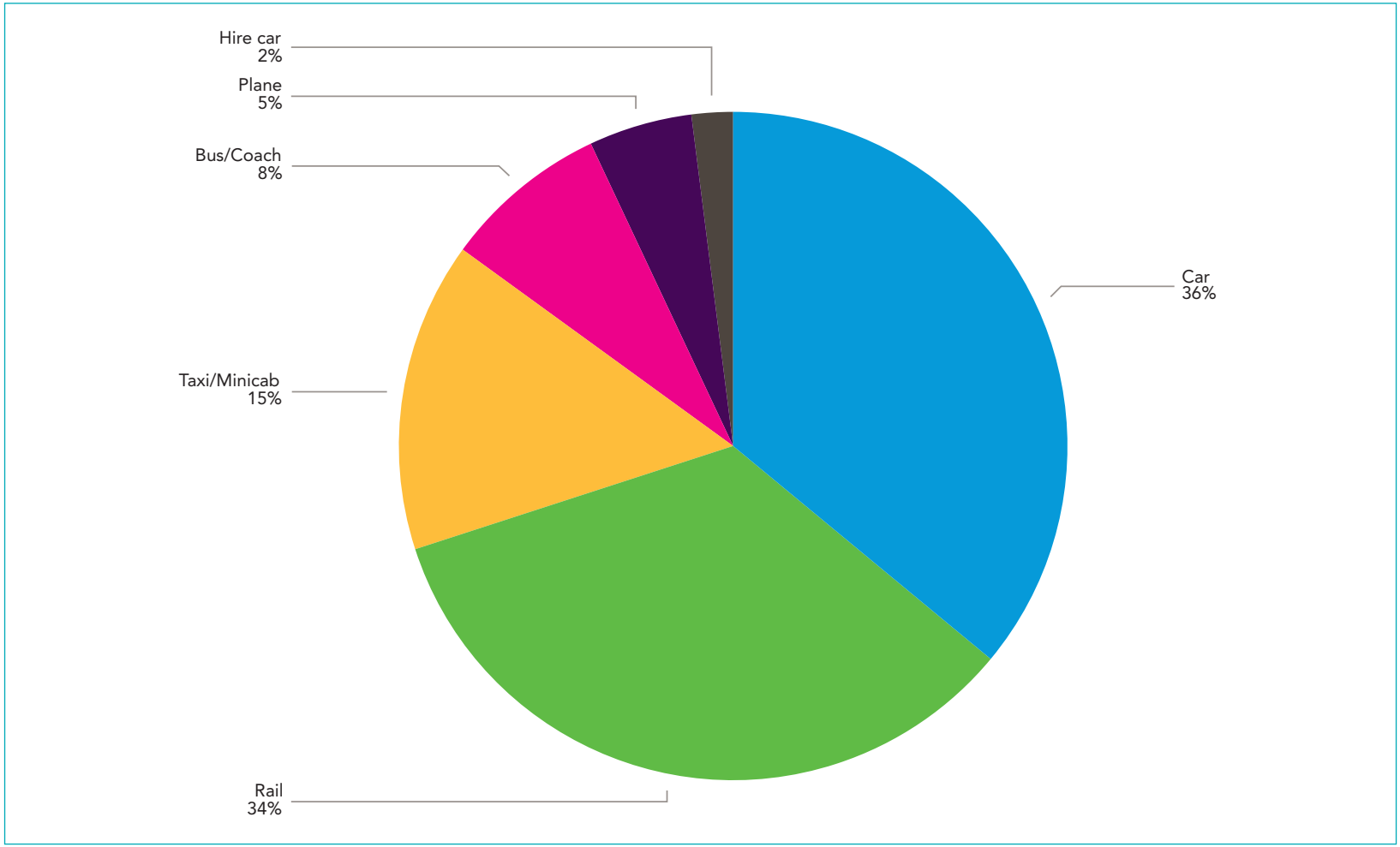


16 | ANNEX SIXTEEN
KEY STATISTICS 2018

Passenger volume by month (2018)



How passengers get to Gatwick



YOUR LONDON AIRPORT
Gatwick

ISSUED BY GATWICK AIRPORT LIMITED

Corporate Affairs, Planning and Sustainability
7th Floor Destinations Place
Gatwick Airport
West Sussex
RH6 0NP

www.gatwickairport.com/noise

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KMT 03/19

AIRPORT
EXPANSION
CONSULTATION

NOISE INSULATION POLICY

JUNE 2019

Heathrow

JACOBS®

8. Carbon: Baseline

Prepared for the Airports Commission

November 2014

Jacobs U.K. Limited

Contents

Executive Summary

This report provides a baseline to support the assessment of the three shortlisted airport schemes against the Airports Commission's objective of minimising carbon emissions in airport construction and operation. The three schemes are:

- Gatwick Airport Second Runway (Gatwick 2R) promoted by Gatwick Airport Limited (GAL);
- Heathrow Airport Northwest Runway (Heathrow NWR) promoted by Heathrow Airport Limited (HAL); and
- Heathrow Airport Extended Northern Runway (Heathrow ENR) promoted by Heathrow Hub (HH).

The module considers estimates of baseline ('do minimum') and future runway scheme ('do something') emissions as far as is possible given the detail available at this stage. The baseline assumes the 'do minimum' base case defined as *'how the airport will develop in the absence of a scheme to deliver an additional runway'*. Carbon emissions related to the future operation of Gatwick and Heathrow based on most recent 2030 master plans are considered and reported on separately. The Heathrow 2030 master plan is taken to be the baseline for both Heathrow Airport expansion schemes as it is identical in carbon terms for both development options.

In establishing the baseline for a 60 year appraisal, the do minimum has a base date of 2025 (Gatwick 2R) and 2026 (Heathrow NWR and ENR) in line with assumed opening dates of 'do something' development, and corresponding end dates at 2085 / 2086. Comparisons for the years 2030, 2040 and 2050 are considered.

Five areas are identified by the Appraisal Framework where emissions may change:

- increased airport capacity leading to a net change in air travel;
- departure and arrival route changes through altered flight operations;
- construction of new facilities and surface access infrastructure;
- airside ground movements and airport operations; and
- changes in non-aviation transport patterns brought about by a scheme's surface access strategy

Table A1 outlines the areas that have been considered within this appraisal.

Table A1: Areas covered by this appraisal

Appraisal Framework Emissions Area	Reported in:
Increased airport capacity	Total aircraft emissions from ATMs, including cruise.
Route changes	Departure and arrival route impacts [qualitative commentary only].
Construction	Carbon emissions from infrastructure construction.
Airside ground movements	Airside (aircraft) ground movement emissions [subset of aircraft emissions].
Airport operations	Airport operations emissions from energy and fuel use.
Changes in non-aviation transport	Passenger surface access emissions.

Gatwick Airport Baseline

Analysis of the Gatwick baseline carbon emissions is based on the published single runway masterplan through to 2030, and the Do Minimum passenger and ATM forecasts developed by the Airports Commission. This sees ATMs at broadly around the 280,000 level between 2020 and 2050, with a variance of up to 8,000 ATMs. There is limited construction of infrastructure during this period under the do minimum scenario. The most significant volume of emissions are related to air travel, but these decrease slightly over the period, linked to improved fuel efficiency of airline fleets. Surface access emissions remain the second largest source of CO2 and reduce over the assessment period, with fluctuations linked to annual passenger numbers. Emissions from buildings and airport operations also reduce over time, most significantly due to the presumed decarbonisation of grid electricity.

Table A2 outlines the carbon baseline for Gatwick Airport.

Table A2: Carbon assessment findings for the Gatwick Airport baseline

Area of Emissions	2030	2040	2050	60 year appraisal 2025-2085
	tonnes of carbon dioxide (tCO_2)			
Air travel (ATMs) (UK aviation total)	3,893,295 (39,193,204)	3,961,133 (39,489,040)	3,860,892 (37,514,764)	238,421,704 (2,327,372,378)
Airside ground movements	134,673	135,988	138,308	8,385,010
Passenger surface access journeys	288,863	297,307	308,530	18,541,500
Airport operations energy & fuel use	36,867	27,467	24,320	1,632,411
Total operational CO_2 emissions	**4,219,025**	**4,285,907**	**4,193,742**	**258,595,615**
Construction of infrastructure*	n/a	n/a	n/a	3,016,218

* Construction emissions are actually calculated as CO_2 equivalent, or CO_2e.

Air travel (Air Transport Movements)
The baseline level of emissions for air travel at Gatwick remains around 3.9 million tonnes CO_2 over the assessment period, reflecting some growth in Air Transport Movements (ATMs) from 277,000 in 2025 (up from approximately 265,000 in 2012) to 285,000 in 2050 and improved fuel efficiency.

Ground movements (Component of air travel)
These emissions should be considered a subset of air travel related emissions. Baseline emissions due to ground movements are forecast to increase slightly over the assessment period, with variation associated with the growth in ATMs.

Departure & arrival route impacts
Emissions impacts from route changes cannot be calculated at this stage of assessment. Greatest impact will be from airspace redesign above 7000ft.

Passenger surface access transport
Estimated using the currently assumed modal share between private vehicle, rail and coach, baseline emissions due to surface access passenger journeys have

been calculated to increase by almost 7% (against an increase in annual passengers of 13%) between 2030 and 2050. Freight emissions are not calculated.

Airport operations (fixed infrastructure and ground support equipment)
Baseline emissions due to energy use in operations are expected to reduce across the study period. This can be attributed to the anticipated decarbonisation of the grid, due to the dominance of electricity consumption in airport energy use. Local activity to manage energy and fuel use may reduce operational emissions further.

Construction of airport facilities & SA infrastructure
There is limited large scale construction at Gatwick Airport, as indicated within GAL's 2030 master plan. While full details of how the construction spend will be distributed is not available, calculated emissions due to construction activity overall are within the range expected for the construction indicated.

Heathrow Airport Baseline

Analysis of the Heathrow baseline carbon emissions is based on the published two runway masterplan through to 2030, and the Do Minimum passenger and ATM forecasts developed by the Airports Commission. This sees ATMs at broadly around the 480,000 level between 2020 and 2050, with a variance of up to 12,000 ATMs. There is significant construction of infrastructure during this period under the do minimum scenario, as the airport toastrack configuration is completed, replacing older terminals and expanding satellite capacity. The most significant volume of emissions are related to air travel, but these decrease over the period, linked to changes to the Heathrow fleet, improved fuel efficiency of aircraft present within that fleet. Surface access emissions remain the second largest source of CO2 and increase over the assessment period, with growth linked to annual passenger numbers and the proportion of those who use surface access to reach the airport. Emissions from buildings and airport operations also reduce over time, most significantly due to the presumed decarbonisation of grid electricity.

Table A3 outlines the carbon baseline for Heathrow Airport.

Table A3: Carbon assessment findings for the Heathrow Airport baseline

Area of Emissions	2030	2040	2050	60 year appraisal 2025-2085
	tonnes of carbon dioxide (tCO_2)			
Air travel (ATMs) (UK aviation total)	20,099,848 (39,193,204)	19,184,305 (39,489,040)	16,570,400 (37,514,764)	1,076,713,933 (2,327,372,378)
Ground movements (component of air travel)	396,313	396,855	385,891	23,795,682
Passenger surface access journeys	373,888	413,575	469,066	27,145,524
Airport operations energy & fuel use	125,336	91,962	81,007	5,377,172
Total operational CO_2 emissions	**20,599,072**	**19,689,842**	**17,120,473**	**1,109,236,629**
Construction of infrastructure*	n/a	n/a	n/a	13,514,607

* Construction emissions are calculated as CO_2 equivalent, or CO_2e.

Air Travel (Air Transport Movements)
The baseline level of emissions for air travel at Heathrow drops from 20 million tonnes CO_2 in 2030 to around 16.6 million tonnes in 2050. The decrease over time reflects a reduction in ATMs (from 484,000 in 2025 to 471,000 in 2050), and aircraft efficiency improvements.

Ground movements
These emissions should be considered a subset of air travel related emissions. Emissions due to airside ground movements reduce by 10,000 tonnes over the assessment period, associated with the reduction in ATMs.

Departure & arrival route impacts
Emissions impacts from route changes cannot be calculated at this stage of assessment. Greatest impact will be from airspace redesign above 7000ft.

Passenger surface access transport
Estimated using the currently assumed modal share between private vehicle, rail and coach, baseline emissions due to surface access passenger journeys have been calculated to increase by almost 25% (against a net increase in passengers of 10%) between 2030 and 2050. Freight emissions are not calculated.

Airport operations (fixed infrastructure and ground support equipment)
Baseline emissions due to energy use in operations are expected to reduce across the study period. This can be attributed to the anticipated decarbonisation of the grid, due to the dominance of electricity consumption in airport energy use. Local activity to manage energy and fuel use may reduce operational emissions further.

Carbon emissions from infrastructure construction
There will be significant construction at Heathrow Airport under the do minimum scenario as derived from HAL's 2030 master plan. Overall emissions due to construction activity are within the range expected for the construction planned.

1. Introduction

This report has been prepared to provide evidence to support Module 8: Carbon. Under this module the objective is to minimise carbon emissions in airport construction and operation.

This report identifies the baseline for carbon (dioxide) emissions for these schemes:

- Gatwick Airport Second Runway (Gatwick 2R) promoted by Gatwick Airport Limited (GAL);
- Heathrow Airport Northwest Runway (Heathrow NWR) promoted by Heathrow Airport Limited (HAL); and
- Heathrow Airport Extended Northern Runway (Heathrow ENR) promoted by Heathrow Hub (HH).

The module considers estimates of baseline ('do minimum') and future runway scheme ('do something') emissions as far as is possible given the detail available at this stage. The baseline assumes the 'do minimum' base case defined as *'how the airport will develop in the absence of a scheme to deliver an additional runway'*. Carbon emissions related to the future operation of Gatwick and Heathrow based on most recent 2030 master plans are considered and reported on separately. The Heathrow 2030 master plan is taken to be the baseline for both Heathrow Airport expansion schemes as it is identical in carbon terms for both development options.

In establishing the baseline for a 60 year appraisal, the do minimum has a base date of 2025 (Gatwick 2R) and 2026 (Heathrow NWR and ENR) in line with assumed opening dates of 'do something' development, and corresponding end dates at 2085 / 2086. Comparisons for the years 2030, 2040 and 2050 are considered.

Based on the United Nations Framework Convention on Climate Change approach to allocating emissions, those from aviation are attributed to a state from its domestic flights and allocated from international flights by departing state, using Bunker Fuel sales and agreed emissions factors[1]. By this measure, aviation emissions account for about 6% of the greenhouse gas (GHG) emissions in the UK (Dft, 2013), and also represent a similar percentage of total global aviation emissions, although the UK share is expected to fall over the next 20 – 30 years due to rapid growth in developing aviation markets such as China, India, and Latin America (Sustainable Aviation, 2012).

According to the Department for Transport's (DfT) published data "Total greenhouse gas emissions from transport" for 2011 (DfT, 2012), UK domestic / international aviation emissions represent 21.6 % of the transport sector's GHG contribution to the UK's carbon footprint. This compares to 67.5% of transport emissions being related to road vehicles (40% attributable to cars, 14% to heavy goods vehicles) and 10.9% to rail, domestic / international shipping and other[2].

Although a small proportion of UK GHG emissions, the absolute volume of those attributed to aviation has increased significantly since 1990; the importance of managing carbon emissions in aviation is thus understandably recognised by major stakeholders including the UK Government (DECC, 2012) and the European

[1] Other mechanisms for allocating emissions have been discussed: see e.g. Lee, David and Owen, Bethan (2006) and Southgate, (2013)
[2] Other mainly consists of 'military aircraft and shipping' and 'aircraft support vehicles'.

Commission (EC, 2011), the Committee on Climate Change (CCC), the aviation industry (e.g. Sustainable Aviation, ACI and IATA) (IATA, 2014) and environmental NGOs (Greenpeace 2009).

In terms of UK aviation GHG emissions from air transport movements (ATMs) dominate the CO_2 impacts of aviation. That said, all airport activities (construction and operation) have emissions implications. As well as the flights, surface access is a particularly significant source of airport carbon emissions (as noted in DfT Aviation Emissions Forecasts 2009 (DfT, 2009)). Energy used for day-to-day operations in buildings and on the airfield, together with water use, waste management and construction / demolition result in carbon emissions, either directly or (mostly) indirectly.

Therefore the Appraisal Framework identifies five areas where it is considered that there could be an emissions impact. The Appraisal Framework also highlights some other aspects of emissions that are not airport specific (such as non- CO_2 effects). Such effects are not quantified in this report due to calculation uncertainty.

Five areas are identified by the Appraisal Framework where emissions may change:

- increased airport capacity leading to a net change in air travel;
- departure and arrival route changes through altered flight operations;
- construction of new facilities and surface access infrastructure;
- airside ground movements and airport operations; and
- changes in non-aviation transport patterns brought about by a scheme's surface access strategy

Table 1.1 outlines the areas that have been considered within this appraisal.

Table 1.1: Areas covered by this appraisal

Appraisal Framework Emissions Area	Reported in:
Increased airport capacity	total aircraft emissions from ATMs, including cruise
Route changes	departure and arrival route impacts [qualitative commentary only]
Construction	carbon emissions from infrastructure construction.
Airside ground movements	airside (aircraft) ground movement emissions [subset of aircraft emissions]
Airport operations	airport operations emissions from energy and fuel use
Changes in non-aviation transport	passenger surface access emissions[3]

[3] Ideally all surface transport emissions would be reported; at this stage, emissions associated with freight have not been quantified as there are limited baseline data available.

2. Methodology and Legislation

This section covers:

- An outline of the baseline carbon emissions methodology across the different sources within the appraisal framework
- Key legislation and relevant guidance applicable to aviation carbon
- Summary of key assumptions and limitations

2.1 Methodology

Carbon dioxide (CO_2) emissions (often referred to by the shorthand of "carbon emissions") from anthropogenic sources are contributing to global warming. This contribution occurs irrespective of where the emissions are released; it is the magnitude that is important. Carbon is therefore different to air quality emissions, where spatiality is important. This affects how carbon emissions are investigated.

Due to the range of CO_2 emissions considered in this baseline assessment, a number of different methods and inputs have been used to calculate the emissions. In all cases, the driving data are those from the Airport Commission Demand Forecasts 2014 (both Passengers and ATMs). To address the five areas where emissions may change due to airport scheme development, this report applies the follow methodologies.

- Total aircraft emissions from ATMs, including cruise - have been estimated based on the methodology used by the UK Department for Transport (DfT) Aviation Forecasts (DfT, 2011b and DfT, 2013);
    - Departure and arrival route impacts – are not calculated here as there is currently insufficient input data available to support robust emissions calculation. Most emissions benefits will come from routes above 7000ft.
    - Airside (aircraft) ground movement emissions – are forecast on a pro-rata basis from historic reported emissions associated with the relevant components of the Landing and Take-Off (LTO) cycle from both Gatwick (GAL, 2014) and Heathrow (HAL, 2014), giving an emissions / ATM value, applied to future ATMs.
- Passenger surface access emissions – are calculated following the methodology as described in the DfT Aviation Forecast 2008, with some adjustments to account for surface access mode share from Jacobs analysis.
- Airport operational emissions from energy and fuel use – are forecast on a pro-rata basis using reported energy use / emissions and changes in passenger numbers or area of main buildings.
- Carbon emissions from infrastructure construction - are estimated based on indicative costs for master plan developments, using benchmarks from WRAP (2013)

The required timescale for this assessment is from the indicated opening year for each new runway option and then for a period of 60 years. The suggested opening year for the proposals is 2025 for Gatwick Airport and 2026 for Heathrow Airport. The Airports Commission Assessment of Need Carbon Capped (AoN Carbon Capped) provides forecasted carbon emissions for the period 2011 – 2050. It does not provide forecasted carbon emissions for the period 2051 to 2085 (Gatwick) or

2086 (Heathrow). Where sufficient information to forecast beyond 2050 does not exist, this has been assumed to remain static after 2050.

For clarity and brevity, only results for the opening year, 2030, 2040 and 2050 are displayed in the body of the report. For datasets from between the opening year and 2050 please refer to Appendix C.

The methods used to identify the carbon impacts are as follows (for a more detailed methodology, see Appendix B).

2.1.1 Total aircraft emissions from ATMs

These emissions have been calculated to provide data to understand the carbon effects of the Appraisal Framework's area of "*increased airport capacity leading to a net change in air travel*", based on the methodology used by the UK Department for Transport (DfT) Aviation Forecasts.

For forecasting of carbon emissions from flights, the UK Department for Transport (DfT) has developed a set of aviation carbon emissions forecast modelling tools. The DfT provides carbon emissions for each UK airport, alongside forecasts of passenger numbers and air transport movements, on a periodic basis (most recently in DfT, 2009, DfT, 2011b and DfT, 2013).

The Airports Commission Do Minimum (DM) and AoN Carbon Capped[4] 2014 are used as the major source for baseline and scheme assessment (they provide passenger numbers, ATMs and carbon outputs). The AoN Carbon Capped Forecast 2014 contains estimated carbon emissions for all UK airports each year from 2011 to 2050 for:

- A baseline (no new runway) scenario; and,
- The proposed new runway schemes (in different scenarios: this assessment uses AoN Carbon Capped as noted above[5]).

The following aspects of aircraft emissions are included in the model carbon output (DfT, 2009):

- All domestic passenger flights within the UK;
- All international passenger flights departing UK airports;
- All passenger aircraft while on the ground in the UK (e.g. taxi-ing);
- All domestic freighter aircraft within the UK;
- All international freighter aircraft departing UK airports; and
- All freighter aircraft while on the ground in the UK (e.g. taxi-ing).

2.1.2 Departure and arrival route impacts

Available data on departure and arrival routes has been reviewed to determine the possibility of estimating carbon emissions impacts of the Appraisal Framework's area of "*departure and arrival route changes through altered flight operations*". At

[4] The carbon capped forecast restricts demand for air travel to that which can be met under a UK aviation emissions total of circa 37.5 million tonnes CO_2 in line with the CCC recommendations.
[5] Alternative scenarios include Low Cost is King and Global Growth, which see different allocation of ATMs and fleet mixes. There is also a carbon traded interpretation of all scenarios, which considers the effect of trading carbon to allow the rest of the UK economy to address the total emissions cap, rather than restricting aviation demand. This assessment uses the AoN Carbon Capped scenario for clarity.

this stage of airport expansion proposals, route changes and flight operations are not developed in sufficient detail to estimate emissions impacts. Indicative routes (that were developed as a result of a workshop between the Commission, the CAA, NATS and the promoters, for noise modelling purposes) do not allow for any meaningful calculation of carbon emissions impacts to be assessed.

UK airspace, together with that of the rest of Europe is subject to redesign for enhanced safety, efficiency and environmental reasons (CAA, 2011). The Future Airspace Strategy (FAS) indicates that it will deliver 500,000 tonnes of CO_2 savings through more efficient aircraft routing. The major changes in routes that will offer emissions savings will partially come from routes to 7000ft but mostly above this altitude, as other environmental priorities (particularly around overflight of built up areas and noise management) take precedence below 7000ft (CAA, 2011). Further assessment of carbon emissions impacts of departure and arrival routes must be undertaken when sufficient information is available.

2.1.3 Airside (aircraft) ground movement emissions

These impacts have been assessed to provide data to understand the carbon effects of the Appraisal Framework's area of the first aspect of "*airside ground movements and airport operations.*" The calculation gives CO_2 emissions due to airside ground movements resulting from aircraft landing / take-off rolls, taxi, hold and at-stand engine (including auxiliary power units – APU) use.

These emissions are *not* additional to the total aircraft emissions from ATMs, as they are already included by the DfT methodology used. Ground movement emissions are calculated to show a key part of the Landing and Take Off (LTO) cycle that the airport can influence through e.g. terminal, stand and taxiway design; Collaborative Decision Making (CDM); and procedures such as reduced engine taxi (Sustainable Aviation, 2010) and provision of Fixed Electrical Ground Power (FEGP).

The method used for this basic assessment uses historic reported emissions associated with LTO from Gatwick (GAL, 2014) and Heathrow (HAL, 2014) and respective ATMs in those years in order to give LTO emissions / ATM. The proportion of the LTO which is ground based is then determined using ICAO Times-in-Mode (TIM) and thrust settings, resulting in an ICAO-Times estimate: a factor that is applied to the total LTO to determine the ground based proportion. A sensitivity is also generated utilising times in mode submitted by the proposers, which is presented within our results as "HAL/GAL Reported Times" forecast. This is then factored to reflect the AoN Carbon Capped Forecast ATMs for the different schemes.

2.1.4 Passenger surface access emissions

These impacts have been assessed to provide data to understand the carbon effects of the Appraisal Framework's area of the first aspect of "*changes in non-aviation transport patterns brought about by a scheme's surface access strategy.*" The full methodology used for passenger surface access emissions is explained in detail in Annex I of UK Air Passenger Demand and CO_2 Forecasts (DfT, 2009). Using figures provided by DfT, based on AoN Carbon Capped Forecast 2014, the model calculates vehicle-km (private car) and passenger-km (rail and coach) from UK origin / destinations on a regional basis, using a 2008 modal share forecast (derived from the CAA annual passenger survey) to generate activity data; carbon emissions are then calculated using factors derived from WebTAG 2014 (private

vehicle) or Defra 2014 (rail and coach). It is acknowledged that modal share of travel to the airports concerned has changed over the last six years and will change to reflect surface access strategies. For this reason, for Gatwick and Heathrow only, a supplementary calculation is presented, through adjusting the point of origin modal share to reflect the 2030 regional modal share identified in the Jacobs Surface Access analysis (Jacobs, 2014b 2014c 2014d).

WebTAG emissions factors may only be forecast to 2035 due to data limitations, and Defra emissions factors do not reflect future changes to the carbon intensity of rail or coach journeys. The output of the model gives five year interval data (2020 to 2050); surface access emissions are then forecast forwards to 2085 / 2086 presuming no change to passenger numbers, mode share or emissions factors.

2.1.5 Airport operations

These impacts have been assessed to provide data to understand the carbon effects of the Appraisal Framework's area of the second aspect of "*airside ground movements and airport operations*", through calculating emissions associated with the operation of an airport related to the day-to-day electricity, gas and other fuel usage of that airport. Other carbon emissions associated with consumables, such as refrigerants or operational waste, are acknowledged but have not been included in this assessment due to insufficient data being available for robust carbon analysis (although see the waste section of the Place Baseline and Assessment Reports for waste arisings) and as these are a relatively minor source of CO_2e emissions.

For the purposes of this forecast the following energy consumption drivers have been applied: electricity consumption is closely related to passenger numbers; gas consumption is closely related to the internal floor area of the airport terminals; and other fuel use (e.g. ground transportation) is closely related to the number of ATMs.

Future emissions factors for each of these consumables were identified. For electricity this utilised the tables produced by the Interdepartmental Analysts' Group (IAG) on Energy and Climate Change for long term emissions factors from energy generation (DECC, 2014). For gas and fuel, the current values reported in the Defra Greenhouse Gas Conversion Factor Repository were used and presumed to hold across the assessment period (in line with DfT Aviation Forecast 2009, Annex I).

2.1.6 Carbon emissions from infrastructure construction

These impacts have been assessed to provide data to understand the carbon effects of the Appraisal Framework's area of "*construction of new facilities and infrastructure*", and the forecasts are estimated based on indicative costs for master plan developments derived from the Cost and Revenue reports assessment of core construction (Jacobs, 2014a), using benchmarks from the WRAP Resource use benchmarks tool, for embodied carbon emissions (WRAP, 2013).

The estimation includes emissions that are a result of the energy expended in order to produce the materials used (embodied carbon) and the emissions due to fuel use on site.

Emissions that result from the transport of material to site and emissions that result from the removal of waste from the construction site are discussed but not quantified, as insufficient information exists at this stage to estimate construction transport fuel use in a robust manner.

It should be noted that construction emissions are by necessity reported as CO_2e, whereas aviation (aircraft and surface access) and estate operational emissions are reported as CO_2 (to be consistent with other DfT Aviation Forecast and CCC reporting: the difference in the CO_2 and CO_2e for these other emissions sets is always less than 1% and is not considered of significance given the assumptions and uncertainties in activity inputs required at this stage).

2.1.7 Monetisation of carbon emissions

Having established an emissions level for each assessment year, establishing a carbon value was accomplished through the use of the Green Book Supplementary Guidance (DECC-IAG, 2014) published by the Interdepartmental Analysts' Group (IAG) on Energy and Climate Change, which includes tables showing the projected carbon values within the European Union Emissions Trading Scheme (EU ETS). These forecast values are the recommended valuation method for incorporating carbon emissions assessments into benefit-cost analysis and other policy analysis.

The carbon emissions totals for a given year are multiplied by the carbon price for that year, and then discounted in accordance with Green Book guidance (HM Treasury, 2011). Due to the long term nature of this appraisal, with an assessment period of 60 years and looking 70 years into the future, the assumption of a declining long-term discount rate was utilised. For values in the years 2014 to 2044, the discount rate applied is 3.5%, for 2044 to the end of the assessment the discount rate applied is 3%. If the appraisal period were to extend beyond 2089 then a lower discount rate would be applied to that period.

No monetised values are presented in the baseline report, but are presented as covering change in emissions between baseline and scheme developments in the associated assessment report.

2.2 Legislation

The Climate Change Act 2008 ("the Act'') established a legally binding target to reduce the UK's greenhouse gas emissions by at least 80% below base year (1990) levels by 2050. The UK's carbon budgets as described within the Act set an envelope for UK emissions. However, while domestic aviation emissions are included within UK carbon budgets, international aviation emissions are excluded.

A number of problems with inclusion of international aviation (and shipping) emissions within the UK's carbon budgets and carbon target were identified. These difficulties remain broadly unresolved, and a decision on how to include international aviation carbon emissions within targets was deferred in 2012 (DECC, 2012).

The Committee on Climate Change (the CCC) has provided advice on the consequences of including international aviation emissions in UK carbon budgets and the 2050 target in the 2012 report "*Scope of carbon budgets – Statutory advice on inclusion of international aviation and shipping*", which recommended that such emissions be included in the 2050 target. The CCC has stated its position as follows:

- Long term aims for aviation emissions should reflect international/EU approaches rather than unilateral UK action, given risk of emissions leakage. However, planning assumptions are useful to inform the strategy for meeting the overall 2050 emissions target.

- An appropriate planning assumption for 2050 aviation emissions is to be around 2005 levels (i.e. 37.5 MtCO2). This is achievable through measures which are feasible, and is consistent with government and industry analysis, and objectives of the industry at UK and global levels.

The UK Government has noted that as "*aviation is predominantly international then a global regulatory framework is best placed to control aviation's carbon emissions*." (DECC 2012).The only currently agreed international regulatory framework is the European Union Emissions Trading Scheme (EU ETS) as applied to aviation. The EU-ETS is a carbon 'cap and trade' system launched in 2005 aimed at reducing industry's greenhouse gas emissions to a given level (cap) in the most cost-effective way (trade) amongst its participants. The level of the cap reduces over time.

Following Europe-wide agreement to EU Directive 2008/101/EC in 2008, aircraft operators were included in EU ETS from January 2012. All flights beginning and ending in Europe were included in ETS, although some exemptions applied. On 12 November 2012 the European Commission (EC) proposed to defer the requirement for airlines to surrender emission allowances for flights into and out of Europe until after the 2013 International Civil Aviation Organization (ICAO) General Assembly. The proposal was approved by the European Parliament and the Council on 24 April 2013. This became known as 'Stop the Clock'. After the ICAO General Assembly in September 2013, the EC proposed an amendment to the EU ETS for a European Regional Airspace Approach which was rejected by the European Parliament. A compromise agreement to limit the application of the scheme to an intra-European Economic Area (EEA) scheme came in to force on the 16th April 2014.

At a global level the International Civil Aviation Organization (ICAO) has committed to publish an agreed market-based measure (MBM) – carbon emissions trading or emissions offsetting – at its next General Assembly in 2016 with a view to the implementation from 2020.

Airports themselves are subject to carbon emissions and energy efficiency legislation. Larger airports are covered by the EU ETS if they have sufficient installed heat or power generation. Most airports in the UK are covered by the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme – a requirement to buy allowances based on qualifying carbon emissions, alongside other reporting and documentation requirements.

New buildings and major refurbishments are covered by 'Part L Conservation of fuel and power' in the UK Building Regulations, and may also be subject to local planning requirements in this regard (e.g. local planning policy responding to Greater London Authority requirements).

The Climate Change Act also included provisions for the Adaptation Reporting Power which required those responsible for national infrastructure to prepare climate change adaptation risk assessments and action plans. Both Gatwick and Heathrow Airports produced their first assessments and plans in 2011.

In addition to regulatory requirements, the international commercial aviation industry has developed a series of voluntary commitments to address carbon emissions. The industry umbrella group, the Air Transport Action Group (ATAG - an alliance of airlines, airports, aircraft manufacturers and air navigation service providers), has published three targets within a roadmap for aviation carbon emissions to 2050. ACI's Airport Carbon Accreditation Scheme has already been noted. In the UK, 'Sustainable Aviation' is a group, similar to ATAG but UK focused, which has

produced a roadmap of how carbon emissions from aviation may be reduced through increased fuel efficiency, the use of biofuels and market-based measures .

2.3 Assumptions and limitations

2.3.1 Total aircraft emissions from ATMs, including cruise

This appraisal uses ATMs, passenger and carbon data as generated by the AoN Carbon Capped. Sense checks have been undertaken, but no independent analysis of ATMs and carbon deriving from full flight has been attempted. The scenario that forms the basis of this appraisal is Do Minimum (DM) and AoN Carbon Capped (i.e. carbon emissions out-turn for UK aviation system in 2050 is circa 37.5 million tonnes). In the do minimum scenario, growth in ATMs is not constrained by planning caps, but practical available capacity.

For aircraft emissions, any increase or decrease in ATMs forecast under the other scenarios, or in the traded rather than capped carbon arena, results in broadly proportionate changes to carbon emissions, with minor variation due to changes in fleet mixes under the other scenarios. The full methodology for aviation emissions, including full assumptions, is presented in the DfT Aviation Forecast documents (DfT, 2011b and DfT, 2013).

2.3.2 Departure and arrival route impacts

At this stage of airport expansion proposals, route changes and flight operations are not developed in sufficient detail to estimate emissions impacts. Indicative routes (that were developed as a result of a workshop between the Commission, the CAA, NATS and the promoters, for noise modelling purposes) do not allow for any meaningful calculation of carbon emissions impacts to be assessed.

Further assessment of carbon emissions impacts of departure and arrival routes must be undertaken when sufficient information is available.

2.3.3 Airside (aircraft) ground movement emissions

ATMs are assumed as above. Emissions due to ground movements are included within the aircraft emissions figures as per the DfT Aviation Forecast methodology.

The estimations that have been made here for this portion of aircraft emissions are based on two calculations, as described in the methodology.

The first calculation uses the ICAO-Times Approach to calculation and a presumed ground movement factor derived from published information on LTO cycle at Gatwick and Heathrow Airports. This data source introduces a limitation in that ground based emissions per ATM are assumed to remain the same over time derived from a 2013 base, whereas local initiatives and technology improvements are expected to reduce the relative carbon intensity of this LTO aspect. These emissions are a subset of, and not in addition to, the overall ATM emissions.

The second calculation, applies the ICAO TIM and thrust setting information used for calculating air quality impacts, supplemented for sensitivity by using information supplied by Gatwick and Heathrow Airports regarding their existing / forecast baseline TIMs. In addition to assuming the accuracy of this data, this again introduces a limitation, as changes to airport design, and possibly aircraft fleets, will introduce variance.

2.3.4 Passenger surface access emissions

Passenger numbers are derived from AoN Carbon Capped Forecast.

Activity data are provided by DfT using the model as presented in Annex I of the DfT Aviation Forecast 2009. The full assumptions are presented in the original documentation. This method has a further limitation for this appraisal in using the 2008 “point of origin modal share” as derived from the CAA survey.

A sensitivity test was undertaken using adjusted 2030 modal share projection, derived from Surface Access analyses and the relevant assumptions (Jacobs, 2014b, 2014c, 2014d). The 2030 sensitivity test could only be applied to Gatwick and Heathrow, and not the remaining airports in the UK system, due to lack of data on forecast modal share.

Although it is acknowledged that both freight transport and staff travel to work may have some significance in terms of emissions footprints, emissions associated with these aspects of surface access have not been quantified as there are limited baseline data available. Given the uncertainty regarding freight tonnages and workforce, and distances travelled from and to airport, it was concluded that no robust pro-rata method could be identified at this stage, given the range of variables involved in activity data.

Emission Factors are derived from WebTAG 2014 and Defra Greenhouse Gas Conversion Factor Repository 2014. It is assumed that vehicle-km factors follow the WebTAG trajectory to 2035, at which point they are assumed static. Rail and Coach passenger-km factors are assumed to remain as 2014 in line with DfT 2009 method.

2.3.5 Airport operations emissions from energy and fuel use

The methodology as described assumes relationships between driving factors (passenger numbers, ATMs and floor area of terminals) based on publicly reported emissions and energy use. These are approximate only and are known to be subject to change due to efficiency improvements.

Emission factors are derived from IAG carbon valuation toolkit (Supporting Tables; Table 1 – Electricity and Table 2a - Fuels). Detailed assumptions regarding these factors are stated in other documents available from the Green Book supplementary guidance section of GOV.UK webpage.

2.3.6 Carbon emissions from infrastructure construction

The activity data for construction cost, phasing and footprints were taken from the Revenue and Cost Identification report (Jacobs, 2014a).

The emissions calculation method utilised WRAP benchmark factors; this places a limitation on the estimation as airport projects are not recorded in sufficient number to be part of the WRAP benchmark lists. For this reason, projected capital spend for each proposal was divided amongst different building / project types, assigned based on their use and similarity to the types listed in the WRAP benchmarking tool.

An estimation was made of an emissions factor for spend on runways and taxiways, derived from first principle estimation of materials used combined with materials factors from the Defra GHG repository. This is shown in Appendix B.

Several assumptions were made regarding the project phasing:

- The spend estimates were allocated into phases; as there was no clear indication about how the carbon intensity may vary across these phases it was decided to allocate the carbon emissions from fuel use and embodied carbon with the same ratio as spend per phase;
- Where construction is thought to occur prior to the assessment period it has been assumed to occur in the first year of the assessment period. It should be noted that this assumption this will impact the monetisation, as the real value of carbon over this time period fluctuates;
- Emissions although indicated as CO_2 are calculated as CO_2e.

2.3.7 Monetisation of carbon emissions

The monetisation has made use of the IAG supporting tables and Green Book discounting guidance in order to place a value upon the change in emissions brought about by each proposal. The core assumption is that EU ETS prices, as a way to value carbon-affecting projects, remain within the Low to High boundaries. While both the Central result and the Low to High range are presented for the baseline and the proposals, it is possible that there could be significant deviation from these values. For example, the demand scenario utilises the carbon capped assumption which assumes a given carbon price in order to deliver the required capped volume of emissions in 2050. Other scenarios are highly likely to result in different carbon prices to deliver a similar net impact across a wider carbon market.

2.3.8 Further limitations

As noted, emissions have been presented as CO_2 for consistency with Committee on Climate Change approaches and DfT Aviation Forecasts.

The variance between CO_2 and CO_2e (that is $CO_2 + CH_4 + N_2O$) is less than 1% in all cases, but is not reported for clarity and significance reasons.

The appraisal does not attempt to consider aviation non-carbon impacts (such as radiative forcing). Although this changes the overall emissions impact, the science regarding the effect remains uncertain, and these effects occur at high altitude and regardless of the scheme. Non-carbon impacts are not reported for clarity and uncertainty reasons.

3. Gatwick Airport

This section covers the following for Gatwick Airport:

- Study Area
- Baseline assessment for aircraft, surface access, operations and construction
- Conclusions

3.1 Study Area

For the Gatwick Airport Second Runway proposed development the study area is defined as Gatwick Airport, as developed in the published single runway master plan (GAL, 2012).

3.2 Baseline assessment

3.2.1 Total aircraft emissions from air transport movements (ATMs)

Table 3.1 presents the baseline (single runway, do minimum, carbon capped) carbon emissions from the DM Forecast 2014, for departing flights from Gatwick Airport for selected years between 2025 and 2050 alongside the total carbon emissions from all UK flights and the percentage of the UK total that occurs with flights from Gatwick. Figure 3.1 presents the full 25 year period emissions graphically.

Table 3.1 – Baseline CO_2 emissions: departing flights Gatwick Airport for 2025 – 2050

Year	Number of passengers	Numbers of ATMs	Gatwick Airport, tonnes CO_2	UK Total, tonnes CO_2	% of UK ATM emissions
2025	39,447,192	276,706	4,378,003	38,846,345	11.3
2030	41,082,700	277,919	3,893,295	39,193,204	9.9
2040	44,241,800	280,633	3,961,133	39,489,040	10.0
2050	46,589,192	285,420	3,860,892	37,514,764	10.3

While between 2025 and 2030, emissions are forecast to drop by about 11%, it can be seen that in the carbon capped scenario during the period 2030 to 2050 carbon emissions remain mostly steady (0.8% less in 2050 compared to 2030).

The explanation for this comes from the changes in the 3 drivers of aviation carbon emissions which are:

- distances flown by aircraft (determined by destination & route);
- fuel efficiency of the aircraft fleet (determined by airframe and engine); and
- type of fuel used (determined by carbon content of aviation fuel).

Figure 3.1 - Baseline CO_2 emissions: departing flights Gatwick Airport for 2025 – 2050

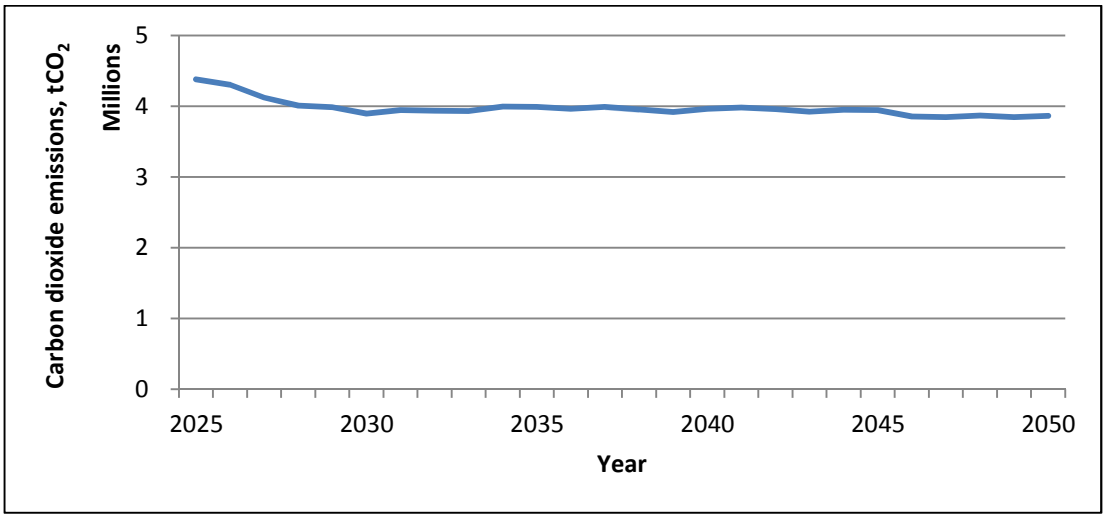


Figure 3.2 shows the changes in passenger numbers and ATMs during the period 2025 – 2050 at Gatwick Airport with one runway, as forecast in the AoN Carbon Capped.

Figure 3.2 – Gatwick Passenger numbers / ATMs 2030 – 2050

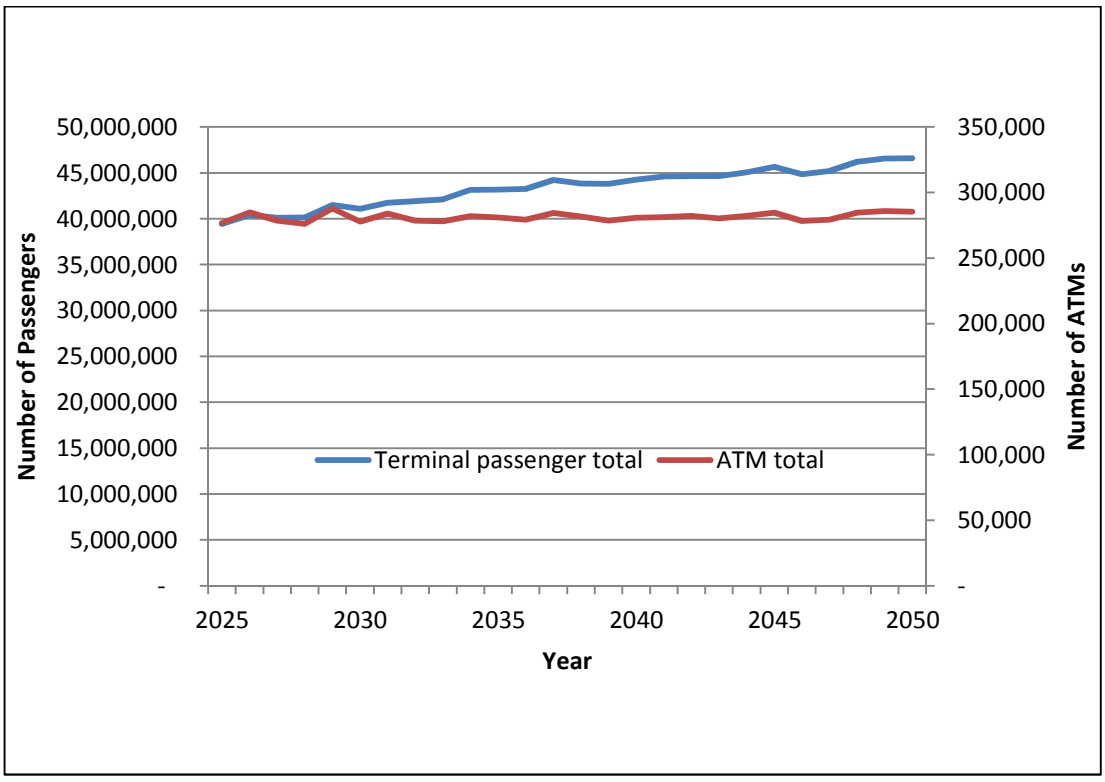


Figure 3.2 shows that the number of ATMs at Gatwick Airport (a key determinant of aviation carbon emissions) increases slightly during the period 2025-2050. Therefore, an increase in carbon emissions would be expected, if fuel burn per ATM remained the same. The reduction in carbon per ATM that is seen is due to a combination of aircraft fleet changes (from fleet mix and technological improvements) and alternative fuels. The model uses predictions of future fleets, of

which some of the emissions that would result from their use are currently known to be improved from current models.
The change in biofuel use is a modest increase of 2% over this period, suggesting that it is the aircraft fleet changes that are responsible for the majority of the carbon reduction per ATM seen in the 'do minimum' single runway baseline forecast. The baseline forecast is driven by a combination of these inputs; therefore the magnitude, and the relative contributions of each aspect, cannot be identified from the model output contained in the DM or AoN Carbon Capped Forecast 2014.

Carbon emissions from flights departing Gatwick Airport have not been modelled for the period 2050-2085, and so for analytical purposes are presumed to remain static. Biofuel use within aviation might be expected to increase further during this period. Future generation aircraft would also be expected to continue to become more fuel-efficient and it may be that we see some new aircraft designs and technology, such as blended-wing aircraft and open-rotor engines, which will give a step-change improvement in fuel efficiency and a commensurate reduction in carbon emissions.

There is significant uncertainty however over the magnitude and timing of these changes. A balance will also be made with increased passengers and the number of ATMs which could off-set the reduction in carbon per ATM. Again, there is significant uncertainty with passenger and ATM numbers so far in the future, so post-2050 forecasts are assumed to hold steady for the purpose of this assessment.

3.2.2 Airside ground movements

Using the predicted air traffic movements between 2025 and 2050, the emissions that result from airside ground movements at Gatwick have been estimated as detailed in the methodology. The results can be seen in Table 3.2.

Table 3.2 - Gatwick ground movement emissions over time, and baseline ATMs.

Year	Airside Ground Movements at Gatwick Airport, tonnes CO_2 (ICAO-Times)	Airside Ground Movements at Gatwick Airport, tonnes CO_2 (GAL Reported times)
2025	134,085	128,569
2030	134,673	129,132
2040	135,988	130,393
2050	138,308	132,617

Due to the relationship with ATMs, these emissions follow the path set by the DM demand forecast, with low variance over the period of 2025 to 2050 and a 3% increase in annual emissions between the start and end of the period.

It can be seen that using the promoter reported Times in Mode at Gatwick, rather than the ICAO TIMs, results in a slightly reduced volume of emissions associated with ground movements. Airport design and operational improvements can help manage this source of emissions.

3.2.3 Passenger surface access emissions

Using the outputs of the DfT's surface access model, updated with 2014 projected emissions factors, the passenger surface access emissions profile of Gatwick for five year periods between 2025 and 2050 was produced using the 2008 mode share and updated emissions factors. Selected emissions years are shown in Table 3.3.

Table 3.3 - Gatwick surface access emissions

Year	Emissions due to surface access to Gatwick Airport, tonnes CO_2	Emissions due to surface access to UK airports[6], tonnes CO_2	Gatwick % of total UK airport surface access carbon emissions
2025	335,167	1,886,064	17.8
2030	288,863	1,800,361	16.0
2040	297,307	2,003,151	14.8
2050	308,530	2,324,692	13.3

During the 2025 to 2050 period, Gatwick's emissions due to surface access initially reduce, aligned with emissions factor improvements for private road vehicles, before increasing again in line with passenger numbers. Emissions are therefore expected to fall significantly in the period between 2025 and 2030 but climb after this point.

Sensitivity: 2030 Modal split

A sensitivity scenario was developed in which the 2030 regional mode share as derived from the Surface Access Appraisal (Jacobs, 2014b) was used to adjust point of origin mode share. The result of utilising this adjustment can be seen in Table 3.4.

It can be seen that, in this alternative baseline, emissions attributed to Gatwick are lower, due to a significantly greater proportion of journeys being made by rail mode, compared to private vehicle.

Table 3.4 – Surface Access emissions from the 2030 Modal split baseline Gatwick.

Year	Baseline emissions due to surface access to Gatwick Airport, tonnes CO_2
2025	256,474
2030	247,490
2040	255,313
2050	264,012

The regional mode share can be seen in Table 3.5.

Table 3.5 - 2030 Modal split baseline Gatwick

Region	Rail	Bus / Coach	Private vehicle
Inner London	81%	10%	8%
Outer London	41%	10%	48%
South East (not London)	24%	7%	69%
East Midlands	22%	10%	68%
East of England	27%	18%	55%
North East	43%	25%	31%
North West	45%	16%	39%
Scotland	69%	9%	22%
South West	19%	16%	65%
Wales	16%	31%	54%
West Midlands	20%	32%	48%

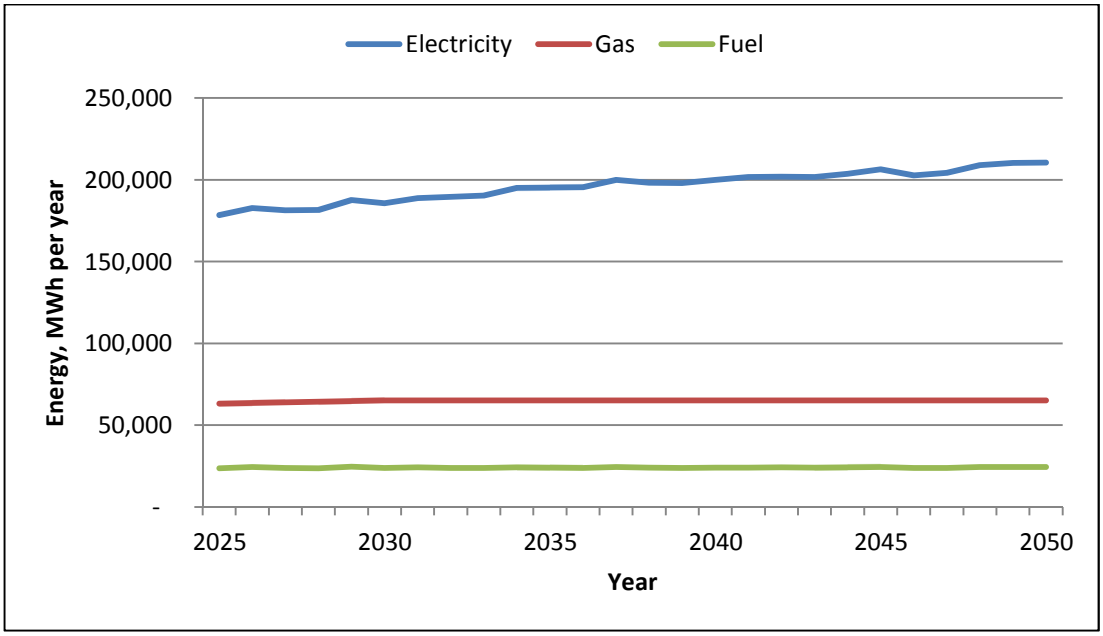
[6] The DfT derived surface access model uses a set of 28 Airports, as listed in Appendix B

Yorkshire and the Humber	39%	13%	48%

3.2.4 Airport operations emissions from energy and fuel use

As previously stated, the emissions that result from airport operations are calculated based on existing baseline energy consumption and predicted changes based on forecast changes to passenger numbers, building floor areas and ATMs. There is no defined construction plan for the single runway master plan between now and 2030; however the small amount of additional terminal space that has been estimated is assumed to be fully operational footprint by 2030.

Figure 3.3 - Energy use at Gatwick, by source, between 2025 - 2050



The resultant estimated energy levels between 2025 and 2050, as seen in Figure 3.3, are expected to be a reasonable estimate of the energy use at Gatwick, barring any major technological or policy changes. Gatwick has already published indicative targets for energy and emissions reduction over time (GAL, 2010), suggesting that energy savings and carbon are likely to be delivered compared to our assumptions.

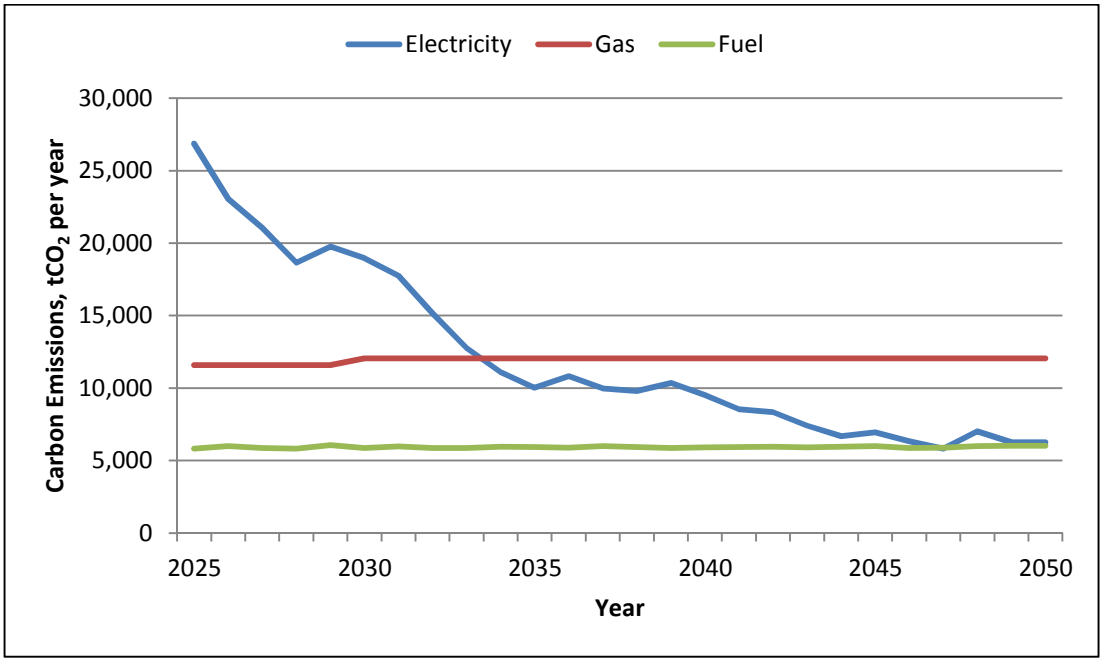
To present a conservative estimate, as the detail of the design and technology balance that would be required to meet the stated energy and carbon reduction ambitions is not available at this time, no such reductions have been assumed in this current analysis.

The resultant emissions that occur due to this energy use are shown in Table 3.5 and depicted graphically in Figure 3.4. Due to the assumed decarbonisation of the grid indicated by electricity emissions factors in the IAG “Valuation of energy use and greenhouse gas emissions for appraisal” toolkit, emissions are expected to decrease over time, despite increases in passenger numbers, ATMs and the airport’s terminal footprint.

Table 3.6 - Gatwick operational emissions 2025-2050.

Year	Emissions due to electricity use at Gatwick Airport, tonnes CO_2	Emissions due to gas use at Gatwick Airport, tonnes CO_2	Emissions due to fuel use at Gatwick Airport, tonnes CO_2	Emissions due to airport operation at Gatwick Airport, tonnes CO_2
2025	26,869	11,591	5,831	44,291
2030	18,969	12,041	5,857	36,867
2040	9,511	12,041	5,914	27,467
2050	6,264	12,041	6,015	24,320

Figure 3.4 - Gatwick operational emissions 2025-2050



3.2.5 Carbon emissions from infrastructure construction

Analysis of the Gatwick master plan (GAL, 2012) determined the core construction spend that is to occur at Gatwick between 2020 and 2030. The analysis (Jacobs, 2014b) for the core construction spend at Gatwick did not determine the split between different construction areas.

The total spend was entered into the benchmarks calculator as the category "Other buildings". This resulted in a total carbon footprint of 3,405,369 tCO_2.

Table 3.7 – Baseline Carbon emissions due to construction at Gatwick.

Emissions	Baseline (2025 – 2030)
Embodied Carbon	3,405,369
Carbon emissions due to fuel use in construction	25,281

3.3 Conclusion

Analysis of the Gatwick baseline carbon emissions is based on the published single runway masterplan through to 2030, and the Do Minimum passenger and ATM forecasts developed by the Airports Commission. This sees ATMs at broadly around the 280,000 level between 2020 and 2050, with a variance of up to 8,000 ATMs. There is limited construction of infrastructure during this period under the do minimum scenario. The most significant volume of emissions are related to air travel, but these decrease slightly over the period, linked to improved fuel efficiency of airline fleets. Surface access emissions remain the second largest source of CO2 and reduce over the assessment period, with fluctuations linked to annual passenger numbers. Emissions from buildings and airport operations also reduce over time, most significantly due to the presumed decarbonisation of grid electricity.

Annual carbon emissions for the Gatwick baseline in 2030, 2040 and 2050 are presented in the Table 3.8:

Table 3.8 – Baseline Carbon Emissions – Gatwick Single Runway Master Plan.

Area of Emissions	2030	2040	2050	60 year appraisal 2025-2085
	tonnes of carbon dioxide (tCO_2)			
Air travel (ATMs) (UK aviation total)	3,893,295 (39,193,204)	3,961,133 (39,489,040)	3,860,892 (37,514,764)	238,421,704 (2,327,372,378)
Airside ground movements	*134,673*	*135,988*	*138,308*	*8,385,010*
Passenger surface access journeys	288,863	297,307	308,530	18,541,500
Airport operations energy & fuel use	36,867	27,467	24,320	1,632,411
Total operational CO_2 emissions	**4,219,025**	**4,285,907**	**4,193,742**	**258,595,615**
Construction of infrastructure*	n/a	n/a	n/a	3,016,218

* Construction emissions are calculated as CO_2 equivalent, or CO_2e.

Surface access carbon emissions have been limited to passenger travel only, and emissions related to freight and staff travel have not been quantified, again due to insufficient data. The carbon emissions calculated for 'Construction of new facilities and infrastructure' are calculated as tCO_2e (tonnes of CO_2 equivalent). Emissions from air travel and surface access, and operational energy and fuel use are reported as CO_2. The difference between CO_2 and CO_2e for these sources is less than 1%. The 60 year appraisal period is the sum of the total carbon emissions in each of the 60 years from assumed scheme opening date (2025).

The greatest volume of carbon emissions in years 2030, 2040 and 2050 come from total aircraft emissions from ATMs due to air travel. Of this total, approximately 10% of the carbon emissions are produced from aircraft operations within the airport LTO (including APU use). The UK target for aviation emissions that has been proposed is 37.5MtCO_2 annually from 2050. The findings show that this will be met in 2050 (UK total 37.515MtCO_2), because the carbon price assumed in the model run was adjusted for this outcome (the 'carbon capped' scenario). Aircraft emissions show no clear trend over the period of analysis, remaining around 3.9Mt CO_2.

Emissions from ground movements grow slightly from around 135,000 tonnes in 2030 to 138,000 tonnes in 2050; broadly linked to the reduction in ATMs and aircraft

fleet changes. This represents only around 3.5% of the total aircraft related CO_2 emissions.

The carbon emissions arising from passenger surface access are the second highest source category after those from air travel, 288,863tCO_2 in 2030. The carbon emissions from passenger journeys increase in 2040 and again in 2050 to 308,530tCO_2, an increase of 6.8% compared to 2030. This reflects a 20% increase in passenger numbers and modelling results that suggest a slightly increased number of passengers accessing the airport via surface modes (from 94% to 99%), together with a slight offset from fuel efficiency benefits in road vehicles .

Airport operations emissions from energy and fuel use at the airport total 36,867tCO_2 in 2030 and decrease in 2040 and again in 2050. This reduction in carbon emissions over time (34% reduction in 2050 compared to 2030) is driven by the decarbonisation of grid electricity supply.

The carbon emissions from infrastructure construction for the baseline do minimum scenario (Gatwick Airport's master plan to 2030 and no second runway) from construction is 3,430,651 tCO_2 in total. Approximately a third of this construction has been estimated to occur in the period of 2017 to 2025.

4. Heathrow Airport

This section covers the following for Heathrow Airport:

- Study Area
- Baseline assessment for aircraft, surface access, operations and construction
- Conclusions

4.1 Study Area

For the alternative schemes proposed at Heathrow Airport the study area is defined as Heathrow Airport, as developed to 2030 in the most recently published (draft) two runway master plan (HAL, 2013).

4.2 Baseline assessment

4.2.1 Total aircraft emissions from air transport movements (ATMs)

Table 4.1 presents the carbon emissions from the AoN Carbon Capped for all departing flights from Heathrow Airport between 2026 and 2050, with the current two runways, alongside the total carbon emissions from all UK flights and the percentage of the UK total that occurs with flights from Heathrow. Figure 4.1 presents the same carbon emissions graphically.

Table 4.1 – CO_2 emissions: departing flights Heathrow Airport 2025 – 2050

Year	Number of passengers	Numbers of ATMs	Heathrow Airport, tonnes CO2	UK Total, tonnes CO2	% of UK ATM emissions
2025	81,099,696	480,532	20,265,433	38,846,345	52.2
2030	84,919,152	483,856	20,099,848	39,193,204	51.3
2040	88,614,304	484,517	19,184,305	39,489,040	48.6
2050	93,533,736	471,132	16,570,400	37,514,764	44.2

Across the 2025 to 2050 period, carbon emissions decrease by approximately 18%. Between 2025 and 2035 emissions remain steady, while it can be seen that in the carbon capped scenario during the period 2035 to 2050 carbon emissions reduce more significantly. This reflects both a slight reduction in ATMs (although more passengers are served) and improvements to aircraft technology.

The explanation for this comes from the changes in the 3 drivers of aviation carbon emissions which are:

- distances flown by aircraft (determined by destination & route);
- fuel efficiency of the aircraft fleet (determined by airframe and engine); and,
- type of fuel used (determined by carbon content of aviation fuel).

Figure 4.1 - CO_2 emissions: departing flights at Heathrow Airport for 2025 – 2050

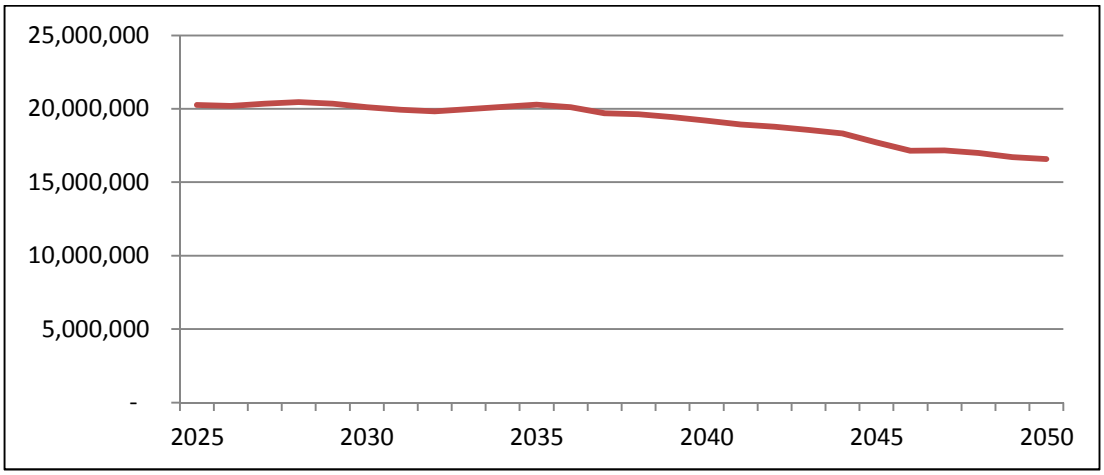
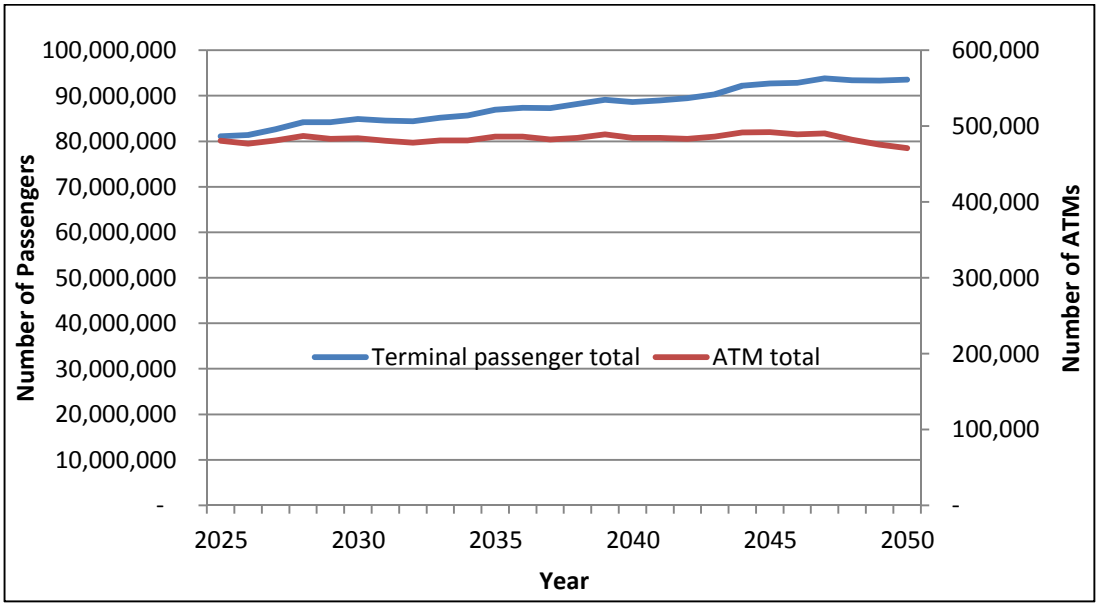


Figure 4.2 shows the changes in passenger numbers and ATMs at Heathrow Airport during the period 2025 – 2050.

Figure 4.2 - Passenger numbers / air transport movements (ATMs) 2030 – 2050



The number of ATMs at Heathrow Airport increases during the period 2025-2047 (from 480,000 to 490,000) but then falls in the remaining 3 years (3.9% - to 471,000). Passenger numbers continue to increase. Therefore, a similar increase in carbon emissions would be expected over the period 2025-2047, if fuel burn per ATM remained the same. The reduction in carbon per ATM that is seen is due to a combination of aircraft fleet changes (from fleet mix and technological improvements) and alternative fuels.

The change in biofuel use is a modest increase of 2% over this period, suggesting that it is the aircraft fleet changes that are responsible for the majority of the carbon reduction per ATM seen in the 'do minimum' two runway baseline forecast. The baseline forecast is driven by a combination of these inputs; therefore the magnitude, and the relative contributions of each aspect, cannot be identified from the model output contained in the DM or AoN Carbon Capped Forecast 2014.

Carbon emissions from flights departing Heathrow Airport have not been modelled for the period 2050-2085, and so for analytical purposes are presumed to remain static. Biofuel use within aviation might be expected to increase further during this period. Future generation aircraft would also be expected to continue to become more fuel-efficient and it may be that we see some new aircraft designs and technology, such as blended-wing aircraft and open-rotor engines, which will give a step-change improvement in fuel efficiency and a commensurate reduction in carbon emissions.

There is significant uncertainty however over the magnitude and timing of these changes. A balance will also be made with increased passengers and the number of ATMs which could off-set the reduction in carbon per ATM. Again, there is significant uncertainty with passenger and ATM numbers so far in the future, so post-2050 forecasts are assumed to hold steady for the purpose of this assessment.

4.2.2 Ground movements

Using the forecast air traffic movements between 2025 and 2050, the emissions that result from airside ground movements at Heathrow have been estimated. These can be seen in Table 4.2.

Table 4.2: Heathrow airside (aircraft) ground movement emissions.

Year	Airside Ground Movements at Heathrow Airport, tonnes CO_2 (ICAO-Times)	Airside Ground Movements at Heathrow Airport, tonnes CO_2 (HAL Reported times)
2025	390,677	311,963
2030	396,313	314,121
2040	396,855	314,550
2050	385,891	305,860

Due to the relationship with ATMs, these emissions follow the path set by the DM Forecast, with low variance over the period of 2025 to 2047 with a 2% increase over this period, followed by a reduction, down 2% from 2025, and 4% from the 2047 peak. It can be seen that the methodology that utilised the reported TIMs at Heathrow results in reduced emissions associated with ground movements, compared to the ICAO-Times approach. This is due to the locally informed ground times being shorter than those assumed in ICAO-Times Approach.

4.2.3 Passenger surface access emissions

Using the outputs of the DfT's surface access model, updated with 2014 projected emissions factors, the emissions profile of Heathrow between 2025 and 2050 was produced using the 2008 mode share and updated emissions factors. This is shown in Table 4.3.

Table 4.3 - Heathrow surface access emissions 2025 - 2050

Year	Emissions due to surface access to Heathrow Airport, tonnes CO_2	Emissions due to surface access to all airports, tonnes CO_2	Heathrow % of total carbon emissions due to surface access
2025	372,712	1,813,730	20.5
2030	373,888	1,800,361	20.8
2040	413,575	2,003,151	20.6
2050	469,066	2,324,692	20.2

The general trend of surface access emissions, assuming the 2008 modal share, is for growth over the period from 2025 to 2050 of just under 100,000 tonnes. The change in emissions broadly reflects the growth in passenger numbers that reach the airport by surface access, which causes this emission area to increase even while total passenger numbers are constrained.

Sensitivity: 2030 Modal split

A sensitivity scenario was developed in which the 2030 regional mode share as derived from the Jacobs Surface Access Analysis (Jacobs, 2014c and 2014d) was used to adjust point of origin mode share. The result of utilising this adjustment can be seen in Table 4.4.

Table 4.4 - 2030 Modal split baseline Heathrow

Region	Rail	Bus / Coach	Private vehicle
Inner London	64%	4%	33%
Outer London	30%	6%	64%
South East (not London)	32%	21%	47%
East Midlands	24%	24%	52%
East of England	39%	13%	49%
North East	66%	10%	24%
North West	85%	5%	10%
Scotland	43%	9%	48%
South West	17%	25%	58%
Wales	15%	36%	49%
West Midlands	26%	25%	50%
Yorkshire and the Humber	68%	19%	13%

It can be seen that, in this alternative baseline, emissions attributed to Heathrow are lower, due to a significantly greater proportion of journeys being made by rail mode, compared to road by private vehicle. Nevertheless the trajectory in emissions growth (of c. 90,000 tonnes) remains dominated by passenger numbers as the determining variable.

The regional mode share can be seen in Table 4.5

Table 4.5 – Surface Access emissions with 2030 mode share

Year	Baseline emissions due to surface access to Heathrow Airport, tonnes CO_2
2025	315,545
2030	321,635
2040	358,267
2050	406,562

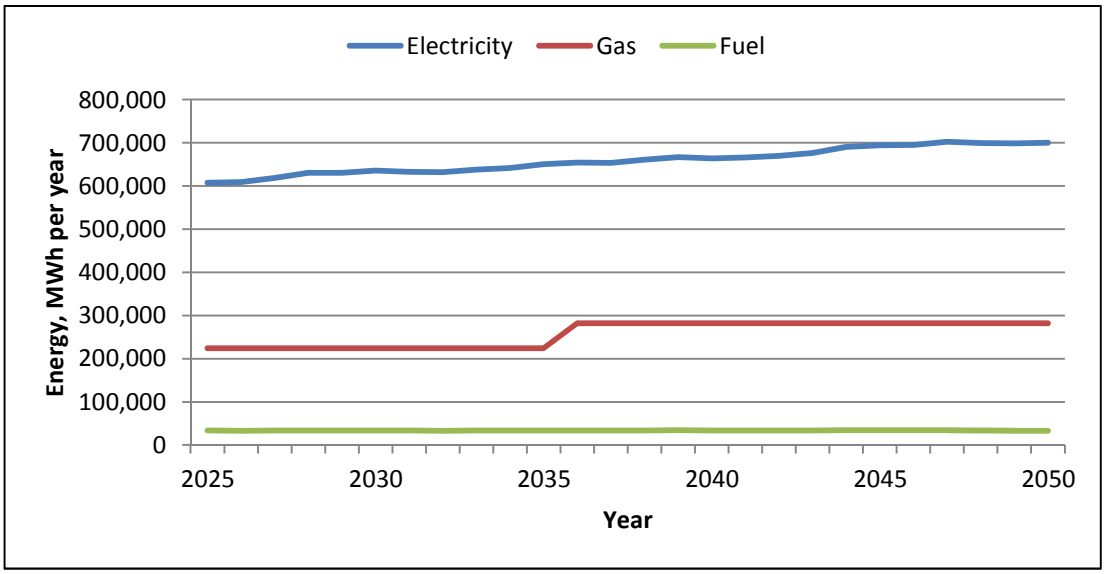
4.2.4 Airport operations emissions from energy and fuel use

As previously stated, the emissions that result from airport operations are calculated based on existing baseline energy consumption and predicted changes based on forecast changes to passenger numbers, building floor areas and ATMs. Construction on additional terminal space, in the baseline scenario, is thought to end

by 2036. Therefore indicative operational emissions linked to development are assumed to be fully operational by 2036.

The resultant estimated energy levels between 2025 and 2050, as seen in Figure 4.3, are expected to be a reasonable estimate of the energy use at Heathrow, barring any major technological or policy changes. Heathrow has already published indicative targets for energy and emissions reduction over time (HAL, 2014), suggesting that energy savings and carbon are likely to be delivered compared to our assumptions. However, as the detail of the design and technology balance that would be required to meet the stated ambitions is not available at this time, no such reductions have been assumed in this current analysis.

Figure 4.3 - Energy use at Heathrow, by source, between 2025 and 2050

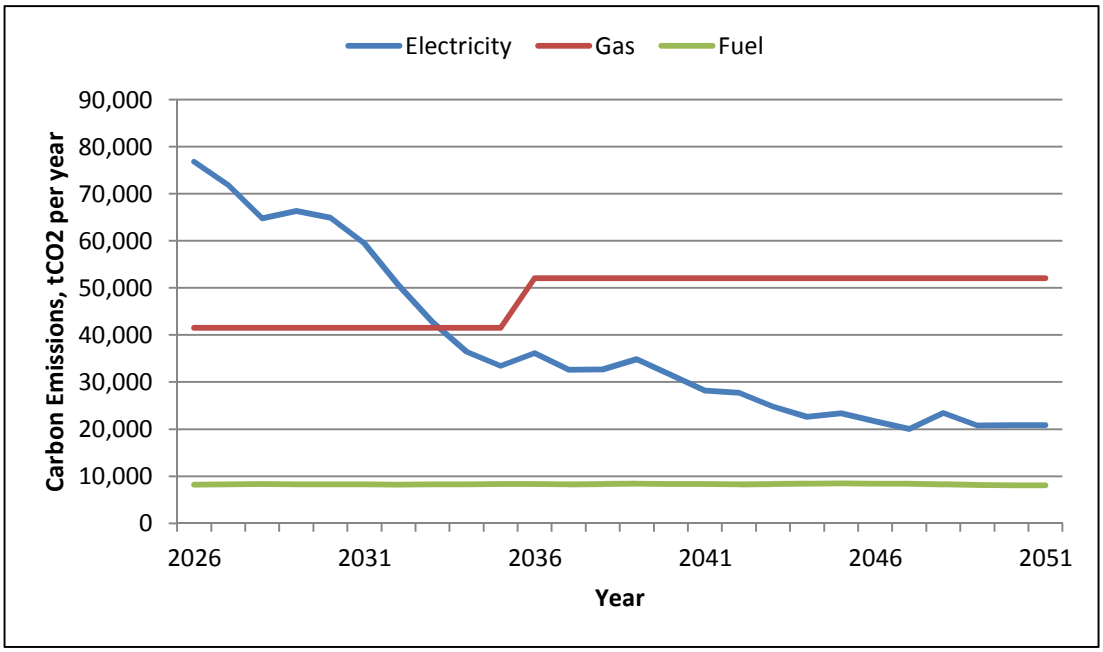


The resultant emissions that occur due to this energy use are shown in Table 4.6 and depicted graphically in Figure 4.4. Due to the assumed decarbonisation of the grid indicated by electricity emissions factors in the IAG "Valuation of energy use and greenhouse gas emissions for appraisal" toolkit, emissions are expected to decrease over time, despite increases in passenger numbers, ATMs and the airport's terminal footprint.

Table 4.6 - Heathrow operational emissions 2025-2050.

Year	Emissions due to electricity use at Heathrow Airport, tonnes CO_2	Emissions due to gas use at Heathrow Airport, tonnes CO_2	Emissions due to fuel use at Heathrow Airport, tonnes CO_2	Emissions due to airport operation at Heathrow Airport, tonnes CO_2
2025	91,490	41,520	8,242	141,251
2030	64,937	41,520	8,299	114,756
2040	31,552	52,099	8,310	91,962
2050	20,827	52,099	8,081	81,007

Figure 4.4 - Heathrow operational emissions over time



4.2.5 Carbon emissions from infrastructure construction

The analysis of the Heathrow master plan (HAL, 2014) determined the core construction spend that is to occur at Heathrow. The analysis (Jacobs, 2014b) for the core construction spend at Heathrow allocated spend between different construction areas. The total spend was entered into the benchmarks calculator, assigned to the appropriate categories. This resulted in a total carbon footprint of 13,514,607 tCO_2.

The embodied carbon and emissions due to fuel use that are thought to occur during this period can be seen in Table 4.7

Table 4.7 - Carbon emissions from infrastructure construction at Heathrow

Year	Baseline
Embodied Carbon	13,325,975
Carbon emissions due to fuel use in construction	188,633

4.3 Conclusion

Analysis of the Heathrow baseline carbon emissions is based on the published two runway masterplan through to 2030, and the Do Minimum passenger and ATM forecasts developed by the Airports Commission. This sees ATMs at broadly around the 480,000 level between 2020 and 2050, with a variance of up to 12,000 ATMs. There is significant construction of infrastructure during this period under the do minimum scenario, as the airport toastrack configuration is completed, replacing older terminals and expanding satellite capacity. The most significant volume of emissions are related to air travel, but these decrease over the period, linked to changes to the Heathrow fleet, improved fuel efficiency of aircraft present within that fleet. Surface access emissions remain the second largest source of CO2 and increase over the assessment period, with growth linked to annual passenger numbers and the proportion of those who use surface access to reach the airport.

Emissions from buildings and airport operations also reduce over time, most significantly due to the presumed decarbonisation of grid electricity.

Annual carbon emissions for the Heathrow baseline in 2030, 2040 and 2050 are presented in Table 4.8:

Table 4.8 – Baseline Carbon Emissions – Heathrow Do Minimum Master plan

Area of Emissions	2030	2040	2050	60 year appraisal 2025-2085
	tonnes of carbon dioxide (tCO_2)			
Air travel (ATMs) (UK aviation total)	20,099,848 (39,193,204)	19,184,305 (39,489,040)	16,570,400 (37,514,764)	1,076,713,933 (2,327,372,378)
Ground movements (component of air travel)	*396,313*	*396,855*	*385,891*	*23,795,682*
Passenger surface access journeys	373,888	413,575	469,066	27,145,524
Airport operations energy & fuel use	125,336	91,962	81,007	5,377,172
Total operational CO_2 emissions	**20,599,072**	**19,689,842**	**17,120,473**	**1,109,236,629**
Construction of infrastructure*	n/a	n/a	n/a	13,514,607

* Construction emissions are calculated as CO_2 equivalent, or CO_2e.

In addition, the surface access carbon emissions have been limited to passenger travel only, and emissions related to freight and staff travel have not been quantified, again due to insufficient data. The carbon emissions calculated for 'Construction of new facilities and infrastructure' are calculated as tCO_2e (tonnes of CO_2 equivalent). Emissions from air travel and surface access, and operational energy and fuel use are reported as CO_2 The difference between CO_2 and CO_2e for these sources is less than 1%. The 60 year appraisal period is the sum of the total carbon emissions in each of the 60 years from assumed scheme opening date (2025).

The greatest volume of carbon emissions in years 2030, 2040 and 2050 come from total aircraft emissions from ATMs due to air travel. Of this total, approximately 2% of the carbon emissions are produced from aircraft operations within the airport LTO (including APU use). The UK target for aviation emissions that has been proposed is $37.5MtCO_2$ annually from 2050. The findings show that this will be met in 2050 (UK total $37.515MtCO_2$), because the carbon price assumed in the model run was adjusted for this outcome (the 'carbon capped' scenario). Aircraft emissions reduce over the period of analysis, from just over 20.0 million tonnes CO_2 to around 16.5 million tonnes CO_2, reflecting reduced ATMs and increased fuel efficiency from fleet changes.

Emissions from ground movements fall from around 396,000 tonnes in 2030 to 386,000 tonnes in 2050; broadly linked to the reduction in ATMs and aircraft fleet changes. This represents a significant on airport emissions source, but is only around 2% of the total aircraft related CO_2 emissions.

The carbon emissions arising from passenger surface access are the second highest source category after those from air travel, $373,888tCO_2$ in 2030. The carbon emissions from passenger journeys increase in 2040 and again in 2050 to

469,066tCO_2, an increase of 25.5% compared to 2030. This reflects a 10% increase in passenger numbers and modelling results that suggest a significantly increased number of passengers accessing the airport via surface modes (from 66% to 90%).

Airport operations emissions from energy and fuel use at the airport total 125,336tCO_2 in 2030 and decrease in 2040 and again in 2050. This reduction in carbon emissions over time (35.4% reduction in 2050 compared to 2030) is driven by the decarbonisation of grid electricity supply.

The carbon emissions from infrastructure construction for the baseline do minimum scenario (Heathrow Airport's master plan to 2030 and no additional runway) from construction is 3,803,046tCO_2 in total. There are no emissions associated with this source in 2040 and 2050 because the baseline master plan considered does not extend beyond 2030.

Glossary

The following table lists and explains key technical terms used in this report.

AC	Airports Commission
AMSL	Above Mean Sea Level
ATM	Air Transport Movement
CAA	Civil Aviation Authority
Carbon capped	The demand modelling scenario that presumes that flights will be limited to levels which emit less than 37.5 MtCO2
Carbon dioxide (CO2	The principal anthropogenic greenhouse gas that affects the Earth's radiative balance. It is the reference gas against which other greenhouse gases are measured and therefore has a Global Warming Potential of 1
Carbon traded	The demand modelling scenario that presumes that air travel will fall within the European Union's Emissions Trading Scheme.
Collaborative Decision Making (CDM)	A process aimed to aims to improve the operational efficiency of all airport operators, involving real time information sharing between airport operators, aircraft operators, ground handlers and air traffic control.
Defra	Department for Environment Food and Rural Affairs
DfT	Department for Transport
Emissions	In the climate change context, emissions refer to the release of greenhouse gases and/or their precursors and aerosols into the atmosphere over a specified area and period of time.
Equivalent CO2 (carbon dioxide)	The concentration of carbon dioxide that would cause the same amount of radiative forcing as a given mixture of carbon dioxide and other greenhouse gases.
LCY	London City Airport
LTN	Luton Airport
NATS	The provider of UK national air traffic control services
NO2	Nitrogen Dioxide
NOx	Generic term for mono-nitrogen oxides NO and NO2
O&D	Origination and Destination Passengers, i.e. passengers beginning or ending their journey at that airport
PM2.5 & PM10	Concentrations of Particulate Matter for which the European Union has set limits
Radiative forcing	Radiative forcing is the change in the net vertical irradiance (expressed in Wm-2) at the tropopause due to an internal change or a change in the external forcing of the climate system, such as, for example, a change in the concentration of carbon dioxide or the output of the Sun. Usually radiative forcing is computed after allowing for stratospheric temperatures to readjust to radiative equilibrium, but with all tropospheric properties held fixed at their unperturbed values
Renewables	Energy sources that are, within a short time frame relative to the

	Earth's natural cycles, sustainable, and include non-carbon technologies such as solar energy, hydropower, and wind, as well as carbon-neutral technologies such as biomass
SEN	Southend Airport
STN	Stansted Airport
tCO2e	Tonnes of carbon equivalent
TIM	Time in mode

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Appendix A Carbon Assessment Background

This report has been prepared to provide evidence to support the Airports Commission's Appraisal Framework Module 8: Carbon. The purpose of this module is to minimise the carbon emissions associated with construction and with the day-to-day ground operations associated with infrastructure once it has been delivered.

The module considers estimates of baseline ('do minimum') and future runway scheme ('do something') emissions as far as is possible given the detail available at this stage. The baseline assumes the 'do minimum' base case defined as *'how the airport will develop in the absence of a scheme to deliver an additional runway'*. This takes account of any proposed changes to the airports as indicated in their respective current master plans.

This report identifies the carbon (dioxide) emissions associated with the development of these schemes:

- Gatwick Airport Second Runway promoted by Gatwick Airport Limited (GAL)
- Heathrow Airport Northwest Runway promoted by Heathrow Airport Limited (HAL)
- Heathrow Airport Extended Northern Runway promoted by Heathrow Hub (HH)

In establishing the baseline for a 60 year appraisal, the do minimum has a base date of 2025 (GAL) and 2026 (HAL & HH) in line with assumed opening dates of 'do something' development, and an end date at 2085 / 2086. Comparisons for the years 2030, 2040 and 2050 are considered.

Aviation emissions account for about 6% of the greenhouse gas (GHG) emissions in the UK (Department for Transport, January 2013), and the UK also accounts for a similar percentage of total global aviation emissions, although it is expected to fall over the 20 – 30 years due to rapid growth in developing aviation markets such as China, India, and Latin America (Sustainable Aviation, 2012).

According to the Department for Transport's published data "Total greenhouse gas emissions from transport" for 2011, UK domestic / international aviation emissions represent 21.6% of the transport sector's GHG contribution to the UK's carbon footprint. This compares to 67.5% of transport emissions being related to road vehicles (40% attributable to cars, 14% to heavy goods vehicles) and 10.9% to rail, domestic / international shipping and other[7].

However, whilst aviation represents relatively small proportion of UK Greenhouse gas emissions the absolute volume has increased significantly since 1990; the importance of managing carbon emissions in aviation is thus understandably recognised by major stakeholders including the UK Government (DfT, 2011a) and the European Commission (European Commission, 2011), the Committee on Climate Change (CCC), the aviation industry (e.g. Sustainable Aviation, ACI and IATA) (IATA, 2014) and environmental NGOs (Greenpeace, 2009).

In terms of UK aviation GHG emissions from air transport movements (ATMs) dominate the CO_2 impacts of aviation. That said, all activities associated with the

[7] Other mainly consists of 'military aircraft and shipping' and 'aircraft support vehicles'.

construction and operation of an airport have carbon emissions implications. As well as the flights, surface access is a particularly significant source of carbon emissions (as noted in DfT Aviation Emissions Forecasts 2009). Additionally, energy used for day-to-day operations in buildings and across the airfield results in carbon emissions. Finally, energy and materials used in construction result in an embodied carbon emissions impact, similar to any other major construction activity.

Therefore the Appraisal Framework identifies five areas where it is considered that there could be an emissions impact. The Appraisal Framework also highlights some other aspects of emissions that are not airport specific (such as non-CO2 effects). These effects are not quantified in either baseline or assessment, due to calculation uncertainty, and their non-applicability to options appraisal at this stage.

The Appraisal Framework identifies five areas where carbon emissions may change as a result of an airport scheme, which are:

- increased airport capacity leading to a net change in air travel;
- departure and arrival route changes through altered flight operations;
- construction of new facilities and surface access infrastructure;
- airside ground movements and airport operations; and
- changes in non-aviation transport patterns brought about by a scheme's surface access strategy i.e. passenger surface access journeys to and from a UK airport; and, where possible, freight journeys.

Although the Appraisal Framework carbon module does not make reference to it, there is an established method for reporting airport carbon emissions in accordance with the internationally recognised Greenhouse Gas (GHG) Protocol (Greenhouse Gas protocol, 2012)

This allocates emissions to 'Scopes' dependent on the degree of control the airport operator has over their management.

- Scope 1 refers to emissions resultant from direct fuel burn locally (e.g. oil, gas);
- Scope 2 refers to emissions resultant from on-site use of electricity that has been generated elsewhere.
- Scope 3 refers to emissions resultant from others energy use (e.g. aircraft engine fuel, third party vehicles, construction, waste).

The GHG Protocol as applied to Aviation is well explained by Airports Council International (ACI) Europe and through the ACI the Airports Carbon Accreditation Scheme (ACAS) (ACI, 2009). For clarity the equivalent GHG scopes of emissions from different sources assessed within the Appraisal Framework module are shown below.

Within this baseline report and in the assessment of the schemes, emissions areas are considered according to the significance of their effect: aviation transport related emissions (ATMs and surface access); airport facilities operational emissions and airport and surface access infrastructure construction emissions.

They are reported as follows:

- total airport aviation emissions from ATMs, including cruise; [Scope 3]
  - departure and arrival route impacts; [Scope 3]
  - airside (aircraft) ground movement emissions [Scope 3]

- passenger surface access emissions[8] [Scope 3]
- airport operations emissions from energy and fuel use [Scope 1, 2; some 3]
- embodied carbon emissions from infrastructure construction [Scope 3].

Carbon emissions related to the future operation of Gatwick and Heathrow based on a 2030 master plan are considered and reported on separately. The Heathrow 2030 master plan is taken to be the baseline for both Heathrow Airport expansion schemes as it is identical in carbon terms for both development options.

The focus of this baseline carbon assessment is based on the documents identified in the Appraisal Framework, supplemented by the use of information on Scheme Designs submitted to the Commission by promoters, supported by publicly available information where appropriate. The baseline report appraisal chapters are structured as follows:

- *Study area*
- *Areas of carbon emissions*
- *Conclusion*

The Climate Change Act 2008 (''the Act'') established a legally binding target to reduce the UK's greenhouse gas emissions by at least 80% below base year (1990) levels by 2050. The UK's carbon budgets as described within the Act set an envelope for UK emissions. However, while domestic aviation emissions are included within carbon budgets, international aviation emissions are excluded.

A number of problems with inclusion of international aviation (and shipping) emissions within the UK's carbon budgets and carbon target were identified. These difficulties remain broadly unresolved, and a decision on how to include international aviation carbon emissions within targets was deferred in 2012 (DECC, 2012).

The Committee on Climate Change (the CCC) has provided advice on the consequences of including international aviation emissions in UK carbon budgets and the 2050 target in the 2012 report "*Scope of carbon budgets – Statutory advice on inclusion of international aviation and shipping*", which recommended that such emissions be included in the 2050 target. The CCC has stated its position as follows (CCC, 2013):

- Long term aims for aviation emissions should reflect international/EU approaches rather than unilateral UK action, given risk of emissions leakage. However, planning assumptions are useful to inform the strategy for meeting the overall 2050 emissions target.
- An appropriate planning assumption for 2050 aviation emissions is to be around 2005 levels (i.e. 37.5 MtCO2). This is achievable through measures which are feasible, and is consistent with government and industry analysis, and objectives of the industry at UK and global levels.

The UK Government has noted that as "aviation is predominantly international then a global regulatory framework is best placed to control aviation's carbon emissions." (DECC 2012).The only currently agreed international regulatory framework is the European Union Emissions Trading Scheme (EU ETS) as applied to aviation. The EU-ETS is a carbon 'cap and trade' system launched in 2005 aimed at reducing

[8]Ideally all surface transport emissions would be reported; at this stage, emissions associated with freight and staff travel have not been quantified as there are limited baseline data available.

industry's greenhouse gas emissions to a given level (cap) in the most cost-effective way (trade) amongst its participants. The level of the cap reduces over time.

Following Europe-wide agreement to EU Directive 2008/101/EC in 2008, aircraft operators were included in EU ETS from January 2012. All flights beginning and ending in Europe were included in ETS, although some exemptions applied. On 12 November 2012 the European Commission (EC) proposed to defer the requirement for airlines to surrender emission allowances for flights into and out of Europe until after the 2013 International Civil Aviation Organization (ICAO) General Assembly. The proposal was approved by the European Parliament and the Council on 24 April 2013. This became known as 'Stop the Clock'. After the ICAO General Assembly in September 2013, the EC proposed an amendment to the EU ETS for a European Regional Airspace Approach which was rejected by the European Parliament. A compromise agreement to limit the application of the scheme to an intra European Economic Area (EEA) scheme came in to force on the 16th April 2014.

At a global level the International Civil Aviation Organization (ICAO) has committed to publish an agreed market-based measure (MBM) – carbon emissions trading or emissions offsetting – at its next General Assembly in 2016 with a view to the implementation from 2020.

Airports themselves are subject to carbon emissions and energy efficiency legislation. Larger airports are covered by the EU ETS if they have sufficient installed heat or power generation. Most airports in the UK are covered by the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme – a requirement to buy allowances based on qualifying carbon emissions, alongside other reporting and documentation requirements.

New buildings and major refurbishments are covered by 'Part L Conservation of fuel and power' in the UK Building Regulations, and may also be subject to local planning requirements in this regard (e.g. local planning policy responding to Greater London Authority requirements).

The Climate Change Act also included provisions for the Adaptation Reporting Power which required those responsible for national infrastructure to prepare climate change adaptation risk assessments and action plans. Both Gatwick and Heathrow Airports produced their first assessments and plans in 2011.

In addition to regulatory requirements, the international commercial aviation industry has developed a series of voluntary commitments to address carbon emissions. The industry umbrella group, the Air Transport Action Group (ATAG - an alliance of airlines, airports, aircraft manufacturers and air navigation service providers), has published three targets within a roadmap for aviation carbon emissions to 2050. ACI's Airport Carbon Accreditation Scheme has already been noted. In the UK, 'Sustainable Aviation' is a group, similar to ATAG but UK focused, which has produced a roadmap of how carbon emissions from aviation may be reduced through increased fuel efficiency, the use of biofuels and market-based measures.

Appendix B Methodologies and limitations

Carbon dioxide (CO_2) emissions (often referred to as just carbon) from anthropogenic sources are contributing to global warming, leading to climate changes. This contribution occurs irrespective of where the carbon emissions are released; it is the magnitude of emissions that is important. Carbon is therefore different to air quality and noise, where spatiality is important. This affects how carbon emissions are investigated.

Due to the range of CO_2 emissions considered in this baseline assessment, a number of different methods and inputs have been used to calculate the emissions. The largest volume of emissions (aircraft movements and surface access) have been estimated based on the methodology used by the UK Department for Transport (DfT) Aviation Forecasts: aviation emissions are assessed as described in the DfT Aviation Forecast 2011 (DfT, 2011b) and the DfT Aviation Forecast 2013 (DfT 2013) and surface access as described in the DfT Aviation Forecast 2009 (DfT, 2009) (with some adjustments to take account of indicated 2030 mode share). Emissions associated with altered flight operations have not been calculated because there is insufficient information on air space routing and management changes for the future runway 'do something' proposals. Operational emissions have been forecast based on reported energy use / emissions and changes in passenger numbers or area of main buildings. Construction emissions have been estimated based on indicative costs for master plan developments, using benchmarks from the WRAP AggRegain CO_2 Carbon Emissions Calculator Tool (WRAP, 2010), for embodied carbon emissions.

Increased airport capacity leading to a net change in air travel

The DfT modelling tools have been used to produce a forecast of passengers, ATMs and carbon emissions for the Airports Commission, which will be referred to within this document as the AoN Carbon Capped. For forecasting of carbon emissions from flights, the UK Department for Transport (DfT) has developed a set of aviation carbon emissions forecast modelling tools which utilise data from various sources, including the UK National Atmospheric Emissions Inventory (UK NAEI), which provides annual carbon emissions for UK airports based on 'bunker' fuel sales i.e. jet fuel sold to aircraft operators. Using this model the DfT provides carbon emissions for each UK airport, alongside forecasts of passenger numbers and air transport movements, on a periodic basis and recently in 2011 (DfT, 2011b) and 2013 (DfT, 2013).

The AoN Carbon Capped contains estimated carbon emission for all UK airports each year from 2011 to 2050 for:

- a baseline (no new runway) scenario; and,
- a series of assessment of the proposed new runway scenarios.

This data has been used to provide carbon emissions data for this assessment (the Jacobs assessment). For each of the three proposed new runway schemes, a comparison is made in this assessment of the 'do something' with the baseline scenarios. The AoN Carbon Capped, which uses DfT modelling, has been used because:

- it enables a common approach to be applied across the 2 airports and 3 new runway options;

- it has also been run for each of the runway 'do something' options' (carbon capped) so that a comparison can be made with data produced by the same model;
- it has been subject to development over a number of years, and adjusted to take account of external views;
- it has been tested against historical carbon emissions reported through the NAEI for which it provides good agreement;
- there is a thorough and transparent description of the forecasting methodology and the assumptions made provided in the DfT reports; and,
- it provides consistency with existing carbon forecasts that the DfT have produced and are used elsewhere, such as by the UK Committee on Climate Change (CCC).

The required timescale for this assessment is from the indicated opening year for each new runway option and then for a period of 60 years. The suggested opening year is 2025 for a second runway at Gatwick Airport and 2026 for a third runway at Heathrow Airport. The AoN Carbon Capped provides forecasted carbon emissions for the period 2011 – 2050. It does not provide forecasted carbon emissions for the period 2051 to 2085 (Gatwick) or 2086 (Heathrow). Some commentary of how carbon emissions may change during this period is provided in this assessment. Further modelling has not been undertaken for the period 2051 – 2086 because it is considered that there is too much uncertainty this far in the future.

Carbon emissions from aircraft are a direct result of the type and amount of fuel burnt. The three drivers of aviation carbon emissions are the:

1. distances flown by aircraft – the number of flights (ATMs), the destination, the routing including any stacking or other delays;
2. fuel efficiency of the aircraft – this changes with time through the introduction of new technologies and aircraft types; and,
3. type of fuel used – the amount of carbon associated with a tonne of fuel burnt is different, and lower, for alternative fuels.

The AoN Carbon Capped is based on the DfT forecasting methodology. Very simply, the DfT modelling estimates:

- the national demand for air passengers;
- allocates this demand to airports/routes;
- then allocates these passengers to Air Traffic Movements (ATMs) (number and type); and calculates carbon emissions for these ATMs based on a number of assumptions.

The DfT Aviation Forecasts reports for 2011 and 2013 provide a detailed description of the methods, models and assumptions used to calculate forecasted UK aviation carbon emissions. Figure A1 presents a summary of the framework of the modelling process. The AoN Carbon Capped carbon emissions used in this assessment are based on the assumptions used in the DfT central forecast range. Table A1 presents the assumptions used for the central demand growth scenario.

Figure A1: UK aviation forecasting framework. Department for Transport, UK Aviation Forecasts 2011, August 2011, Figure 2.2

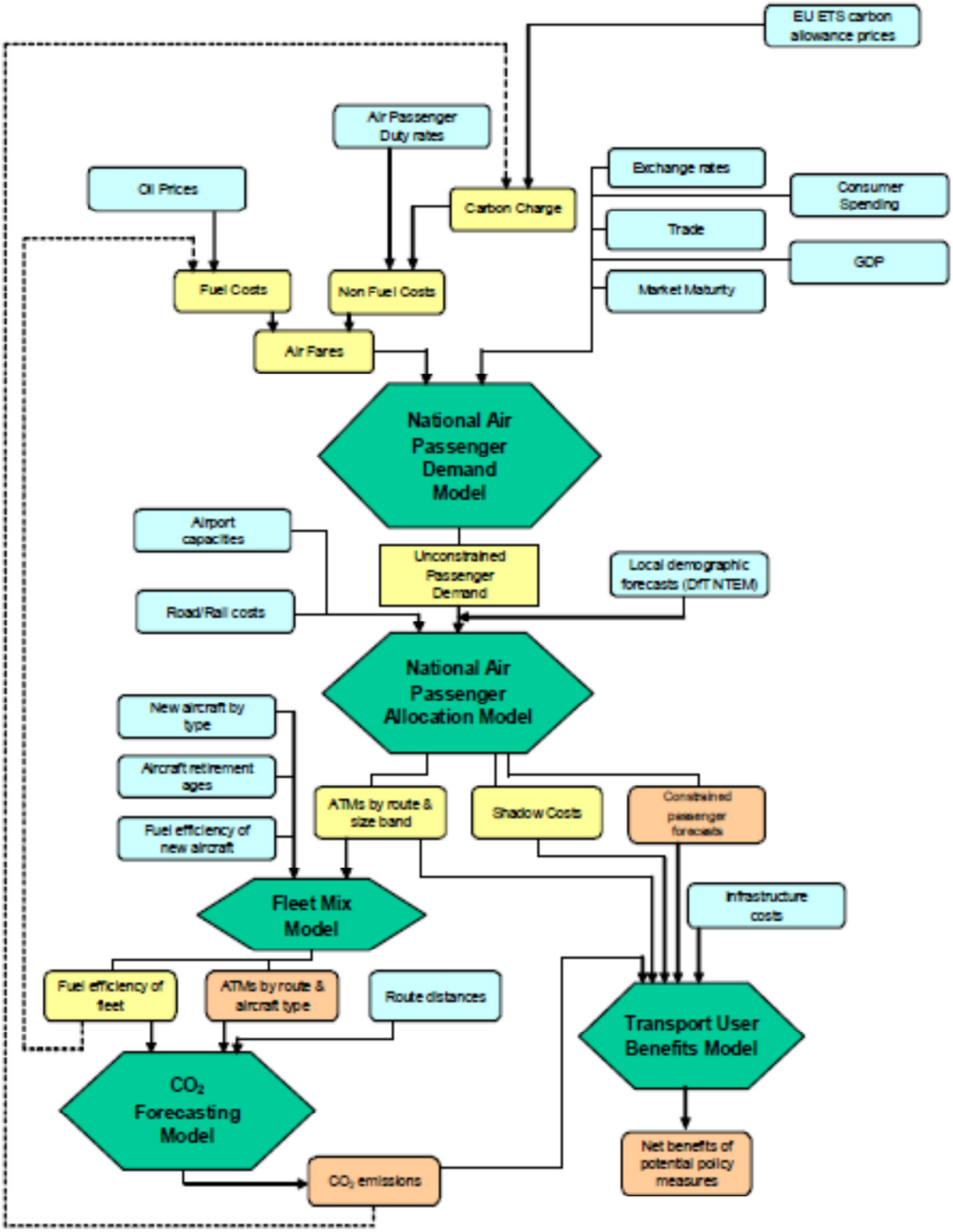


Table A1: Department for Transport, UK Aviation Forecasts 2013, January 2013, Table 3.12: CO_2 emissions variable range assumptions, Central: central demand growth +.

Central: central demand growth +
• No regulatory CO_2 standard; • Standard DfT aircraft retirement ages of 22 years; • No retro-fitting; • 2020 future generation having a 17.5-21.5% fuel burn improvement on 2000 standard types, the 2030 future generation having a 24.5-27.5% improvement and the 2040 future generation having a 29.5-31.5% improvement; • No net air traffic management system gains as improvements from SESAR and other programmes are assumed to accommodate the growth in ATMs without further deterioration in levels of service; • No improvement from airline operational efficiency practices; and, • 0.5% biofuel use in 2030 rising to 2.5% by 2050.

The forecast is also based on a 'carbon capped' scenario in which the DfT modelling assumes a higher carbon price to ensure that the forecast aviation carbon emissions meet the current UK target of a return to 2005 carbon emissions from UK aviation by 2050 (37.5 $MtCO_2$ per year). The same methodology and assumptions are used for the 'do minimum' and 'do something' forecast scenarios other than changes in the number of passengers, number of ATMs and aircraft fleet mix. Table A2 presents the assumptions made in the AoN Carbon Capped for the ATM capacity of new runways at Gatwick and Heathrow.

Table A2: Airports Commission: Appraisal Framework, April 2014

Proposer	Descriptor	Assumption	Scenario reference
Gatwick Airport Limited	Gatwick Second Runway (Gatwick-2R)	Additional runway capacity of 260,000 ATMs is provided in 2025 (540,000 ATMs in total), though there is a phasing of associated infrastructure	s06
Heathrow Airport Limited	Heathrow North West (Heathrow-NWR)	Additional runway capacity of 260,000 ATMs is provided in 2026 (740,000 ATMs in total), though there is a phasing of associated infrastructure	s05
Heathrow Hub Ltd	Heathrow Hub (Heathrow-ENR)	Additional runway capacity of 220,000 ATMs is provided in 2026 (700,000 ATMs in total), though there is a phasing of associated infrastructure	s04

The AoN Carbon Capped contains carbon emissions for flights departing each UK airport for each year. The other greenhouse gases, N_2O and CH_4, are not included in this forecast or DfT model calculations. The DfT report states that this is because about 99% of the climate impact of aviation is a result of CO_2 emissions, with about 1% being made up by these other greenhouse gases (DfT, 2011a). Using the 2014 emissions factors provided by the UK Department for Environment, Food and Rural

Affairs (DEFRA), CO_2 is calculated to be 95% of the total greenhouse gas emissions and 5% comes from N_2O and CH_4. In order for consistency with other DfT work, and that of the CCC, we consider CO_2 only in this analysis. No recalculations have been made for N_2O and CH_4. If this had been done, it would increase the carbon emissions reported here, represented as CO_2 equivalent, by about 5%.

Aircraft engine emissions released at high altitude have warming and cooling effects, depending on the emission and a variety of other factors, which are thought to almost double the climate change impact of aviation compared to CO_2 alone (Lee, 2010). However, there is considerable uncertainty over the magnitude of these impacts. A more thorough discussion is given in the Airports Commission Discussion Paper on aviation and climate change (Airports Commission, 2013). The non-CO_2 effects of aircraft at high altitude are not included in the AoN Carbon Capped or in this assessment.

The assessment described in the following sections by Jacobs is based on the AoN Carbon Capped which provides commonality across the two airports and three new runway proposals. Each of the three proposers of a new runway option (Gatwick Airport Limited (GAL), Heathrow Airport Limited (HAL) and Heathrow Hub Limited (HH)) have provided to the Airports Commission some carbon emissions data which is also discussed in this report, and a comparison is made in the carbon assessment report between the two approaches where possible.

Airside ground movements

Emissions due to airside ground movements result from aircraft taxi, hold and at stand engine use (including auxiliary power units – APUs). These are considered within this assessment as both reduced delays from avoided congestion and airport design issues (e.g. taxiways and stand locations) to determine the level of emissions that result due to these movements if all else (i.e. aircraft type, engine type and fuel type) is equal.

These emissions (like those from arrival and departure route changes as indicated by the delays proxy) are included as part of increased airport capacity leading to a change in demand, but are calculated separately in order to determine their significance.

The method used for this basic assessment uses the reported emissions associated with Landing and Take-Off (LTO) from both Heathrow (Heathrow Airport Ltd, 2014a) and Gatwick (Gatwick Airport Ltd, 2014) and the reported ATMs in those years in order to create a factor representing LTO emissions per ATM.

The proportion of this LTO which can be attributed to ground movements must then be determined. Information from the International Civil Aviation Organization (ICAO) (ICAO, 2011) indicated the average time spent in the LTO cycle and the average time spent at each of the four modes of aircraft thrust levels covered by the LTO cycle (Taxi-in/out, Take-off, Climb-out and Approach) – these are referred to as the Time in Mode. Using both these figures allowed for the generation of a thrust-seconds value, and allowed for taxiing as a proportion of the whole LTO cycle to be determined. The ground movement factor used was 33% of the total LTO cycle when calculated with the ICAO times. Conducting the same analysis of the provided times in mode for Heathrow Airport and Gatwick Airport, augmented by ICAO thrust setting data and times where required, found the ground emission factors to be 26% and 31% respectively. It is acknowledged that the master plan design of the airports, in terms of potential reductions to taxi time (e.g. through the implementation of

Rapid Exit Taxiways), will reduce the emissions per ATM, however this has not been assessed at this time due to limited data in both baseline and development scenarios and to the scale of reduction that these changes may make.

The ground based emissions per ATM are then multiplied by the ATMs per year as forecast for that proposal within the AoN Carbon Capped as an indicative projection of ground emissions.

Altered flight operations

The available data on departure and arrival routes has been reviewed to determine the possibility of estimating carbon emissions impacts of the Appraisal Framework's area of "*departure and arrival route changes through altered flight operations*". Unfortunately, at this stage of airport expansion proposals, route changes and flight operations are not developed in sufficient detail to estimate emissions impacts. Indicative routes (that were developed as a result of a workshop between the Commission, the CAA, NATS and the promoters, for noise modelling purposes) are not suitably defined for airspace design, and do not extend far enough to allow for any meaningful calculation of carbon emissions impacts to be assessed.

UK airspace, together with that of the rest of Europe is subject to redesign for enhanced safety, efficiency and environmental reasons (CAA). The Future Airspace Strategy (FAS) indicates that it will deliver 500,000 tonnes of CO_2 savings through more efficient aircraft routing. The major changes in routes that will offer emissions savings will partially come from routes to 7,000ft but mostly above this altitude, as other environmental priorities (particularly around overflight of built up areas and noise management) take precedence below 7,000ft (DfT, 2014).

Further assessment of carbon emissions impacts of departure and arrival routes must be undertaken when sufficient information is available.

Non-aviation emissions resultant from airport operation

The non-aviation emissions resultant from airport operations is defined as the emissions due to passenger travel, and other surface access to the airport. In order to calculate changes in non-aviation transport patterns brought about by a scheme's surface access strategy it is necessary to calculate a baseline on passenger surface access journeys to / from the airport. Due to limited availability of data, and no widely recognised methodology, freight journey emissions are not quantified. Similarly, due to uncertainty regarding the workforce, and the distances that would be travelled to and from the airport, on staff journeys to work, it was concluded that no robust pro-rata method could be identified at this stage, given the range of variables involved in activity data, although such information is available in sustainability performance data published by GAL and HAL.

The full methodology used for passenger surface access emissions is explained in detail in Annex I of UK Air Passenger Demand and CO_2 Forecasts (DfT, 2009).

The model makes use of forecasts of demand for travel to each of the UK's airports[9], from UK origin / destinations on a regional basis, and by using a 2008

[9] The airports used are: Aberdeen, Birmingham, Bournemouth, Bristol, Cardiff, East Midlands, Edinburgh, Exeter, Gatwick, Glasgow, Heathrow, Humberside, Leeds/Bradford, Liverpool, London City, Luton, Manchester,

modal share forecast (derived from the CAA annual passenger survey) then calculates an estimate of emissions due to surface access. As this modal share was the latest used in DfT's CO_2 estimates it has been applied to the modelling. However, it is acknowledged that modal share in the relevant areas have changed over the last six years, and are likely to continue to change. For this reason, for Gatwick and Heathrow only, a 2030 modal share calculation has been undertaken, by adjusting the local point of origin modal share to reflect the 2030 modal share as identified within the Jacobs Surface Access analysis (Jacobs, 2014b, 2014c, 2014d). What this means is that each Origin-Destination pair was individually factored based on the overall mode share calculation. This allows for a sensitivity to be produced utilising the 2030 modal share.

The emissions factors within the model were checked and where necessary replaced with the most up to date emissions factors derived from Webtag 2014 and CarbonSmart GHG Reporting factors from Defra, which were not available in the original data set.

The output of the model was a set of emissions for five year intervals between 2020 and 2050. In order to generate the expected emissions in the intervening years, a simplifying assumption has been made that emissions follow a linear progression between these data points

It is assumed that the 2030 modal split calculated in the Surface Access Report applies to Heathrow and Gatwick from 2025, as some enabling works and policies that cause the shift to the 2030 modal split may already be in place.

Airport operations

Emissions associated with the operation of an airport primarily relate to the day-to-day electricity, gas and other fuel usage of that airport. Other carbon emissions impacting consumables, such as refrigerants or operational waste, are acknowledged but have not been included in this assessment as these are a relatively minor source of carbon dioxide equivalent.

An assessment was made of current electricity, gas and fuel usage. This was done using the figures reported by GAL and HAL both as part of their submission to the Airports Commission and as part of their normal annual reporting processes. The current emissions of Heathrow Airport, as reported by Heathrow Hub, were also from HAL's reporting. Where required, these usages were converted to approximate energy demand through reverse calculation using reported emissions and the relevant Defra emissions factors.

Airports Council International (ACI) (ACI, 2012) identifies a key environmental indicator of energy performance per m^2 of Terminal, and the related Airports Carbon Accreditation Scheme (ACI, 2009) identifies a key indicator of carbon performance per passenger. Based on these agreed indicators, and Jacobs' experience and observations a series of correlations were determined between these operational emissions and key airport inputs to estimate baseline and scheme emissions in a comparative manner. For the purposes of this forecast the following energy consumption drivers have been applied: electricity consumption is most closely related to passenger numbers; gas consumption is most closely related to the

Newcastle, Newquay, Norwich, Southend, Southampton, Stansted, Teesside, Blackpool, Doncaster Sheffield, Prestwick

footprint area of the airport terminals; and other fuel use is most closely related to the number of ATMs. For passenger numbers and ATMs the figures reported in the DfT Aviation forecasts under the different proposals were used, while for the terminal footprint the assumptions related to project phasing used in the construction assessment were used with the difference that the terminal area, and therefore the associated gas use, would not be completed until the end of the phase. This results in a stepped increase in footprint as different phases are completed.

Future emissions factors for each of these consumables were identified. For electricity this utilised the tables produced by the Interdepartmental Analysts' Group (IAG) for long term emissions factors from energy generation[10]. For gas and fuel, the current values reported in the Defra conversion factors repository were used and projected forward, although it is recognised that some small variance might be anticipated in fossil fuel carbon intensity.

Construction of new facilities and infrastructure

Carbon emissions due to construction have been estimated from the airport's planned construction based on their proposal master plans. The estimation includes the carbon emissions that are a result of the energy expended in order to produce the materials used ("embodied carbon") and the emissions due to fuel use on site. The emissions that result from the transport of material to site and emissions that result from the removal of waste from the construction site are qualitively discussed but not quantified. Insufficient information existed to measure these effectively, as described below. It should be noted that construction emissions are reported as CO_2e, whereas aviation and surface access emissions are reported as CO_2 (to be consistent with other DfT Aviation Forecast and CCC reporting).

When estimating embodied emissions, the primary resource is the University of Bath's Inventory of Carbon and Energy (University of Bath, 2011), and/or the Defra Greenhouse Gas Conversion Factor Repository (DEFRA, 2014), or a bespoke tool that utilises these sources such as the Environment Agency Construction Carbon Calculator[11]. However, these require relatively detailed breakdowns of materials that can be identified in a comparable manner across the 'do minimum' and 'with development' scenarios; however, comparable materials schedules are not currently available. The WRAP tool "Resource efficiency benchmarks for construction projects" (WRAP, 2013) was identified as an industry recognised method that allows a level of comparable analysis between baselines and schemes. The tool uses embodied carbon factors that have been calculated for a variety of infrastructure and building projects, with the possibility of entering inputs in terms of construction value and internal floor area. In addition, there are carbon outputs for fuel use on a project calculated using construction value, and so these aspects of the tool were applied to calculating the carbon associated with construction of the proposals.

The WRAP tool also allows for a calculation of construction, demolition and excavation (CDE) waste. However, due to the variable nature of this data and the emissions factors for these categories it has not been included in any of the totals for this category. Where indicative calculations were done, it showed that the emissions associated with CDE waste would be between 1% and 10% of the construction total.

[10] Table 1: Electricity emissions factors to 2100, kgCO2e/kWh, DECC IAG, "Tables 1-20: supporting the toolkit and the guidance"
[11] The promoters have used such an approach where they have provided estimated construction emissions associated with their schemes

It is acknowledged by WRAP (WRAP, 2013) that the WRAP benchmarking tool's factors are of variable robustness. In order to minimise the impact of this variability the 50% percentile value has been taken in each case.

Due to the large proportion of the project footprint that would be made up from runway, taxiway and stand space (with considerable taxiway construction expected even under baseline scenarios), bespoke factors were developed for these categories. This was done through the use of material factors from Defra Greenhouse Gas Conversion Factor Repository applied to the expected material volumes in Taxiways, Aprons and Stands, and in Runways and Shoulders, and can be seen in Table A3.

Table A3: Carbon factors constructed for Taxiways and Runways

	Material	Volume (m^3)	t CO_2e
Taxiway, Aprons, Stands	Dry Lean Concrete (DLC)	0.30	0.09
	Pavement Quality Concrete (PQC)	0.40	0.12
	tCO_2e per £100k		67.86
Runway and Shoulders	Mastic Asphalt wearing course	0.05	0.00
	Base Course	0.14	0.00
	Reinforced concrete	0.20	0.06
	Lean Concrete	0.15	0.04
	Granular fill	0.30	0.01
	tCO_2e per £100k		60.68

In order to calculate emissions associated with the baseline an estimate was made utilising the Gatwick Airports Limited and Heathrow Airports Limited master plans (Jacobs, 2014a). These costs were allocated within construction types benchmarked in the WRAP benchmarking tool. In addition to a comparison with the proposers' submissions, a sense check was performed by comparing with other estimates for airports and large infrastructure projects (Building.co.uk).

The spend estimates for airport infrastructure was allocated into phases with information on spend, by category of construction available; as there was no clear indication about how the carbon intensity may vary within these phases it was decided to allocate the carbon emissions from fuel use and embodied carbon equally across the years of the phase. For surface access construction, spend estimates were available by year for each proposal, so they were allocated appropriately. During the reviews of the updated scheme designs, it is considered to be unlikely that sufficient additional detail about the phasing of construction will be developed in order to significantly improve these assumptions. However, should information become available this assumption could be refined and improved. For the purposes of absolute emissions, construction that is thought to occur prior to the assessment period has been added to the emissions total for the assessment period. For valuation purposes, emissions prior to the assessment period are

valued according to the year of emission and added to the total costs; this prevents over-valuing early emissions.

Monetisation of carbon emissions

Having established an emissions level for each assessment year, establishing a carbon value was accomplished through the use of the Interdepartmental Analysis Group's Green Book Supplementary Guidance, which includes tables showing the future expected carbon values within the European Union Emissions Trading Scheme (DECC, 2014) (EU ETS). These predicted values are the recommended valuation method for incorporating carbon emissions assessments into benefit-cost analysis and other policy analysis.

The carbon emissions totals for a given year are multiplied by the carbon price for that year, and then discounted in accordance with Green Book guidance (HM Treasury, 2011). Due to the long term nature of this appraisal, with an assessment period of 60 years and looking 70 years into the future, the assumption of a declining long-term discount rate was utilised. For values in the years 2014 to 2044, the discount rate applied is 3.5%, for 2044 to the end of the assessment the discount rate applied in 3%. If the appraisal period were to extend beyond 2089 then a lower discount rate would be applied to that period.

The presented values are the DECC Central forecast for the EU ETS prices, and also the range of Low to High.

Assumptions and limitations

Total emissions from ATMs

The carbon assessment of this topic relies upon the AC adjusted DfT aviation forecasts. While a sense check was applied to the results, the model is necessarily built upon assumptions. Among assumptions which lie behind this data are:

- Assumptions of predicted aircraft sizes (in order to determine "seat-kilometres");
- An uplift of 8% to the seat-kilometres level to represent sub-optimal routeing and stacking at airports during periods of congestions; and
- Assumptions of the level of fuel burn by different aircraft types, derived from an adjusted "CORINAIR Emission Inventory Guidebook" (EMEP/EEA, 2009 and 2013).

In addition, the input assumptions utilised for the prediction demand forecasts themselves, which result in the ATMs and passenger numbers used within this assessment, include factors such as economic performance, oil price, exchange rate movements, carbon costs, fuel efficiency changes, tax rates and potential trip length. A fuller explanation of these assumptions can be found in the original texts (DfT, 2011b).

It should be noted that the modelled demand scenario utilised for the baseline assessment and for all proposal assessments has been the carbon capped (37.5 $MtCO_2$) and the central demand growth forecast.

Departure and arrival route impacts

Available data on departure and arrival routes has been reviewed to determine the possibility of estimating carbon emissions impacts of the Appraisal Framework's area of "*departure and arrival route changes through altered flight operations*". At this stage of airport expansion proposals, route changes and flight operations are

not developed in sufficient detail to estimate emissions impacts. Indicative routes (that were developed as a result of a workshop between the Commission, the CAA, NATS and the promoters, for noise modelling purposes) do not allow for any meaningful calculation of carbon emissions impacts to be assessed.

UK airspace, together with that of the rest of Europe is subject to redesign for enhanced safety, efficiency and environmental reasons (CAA). The Future Airspace Strategy (FAS) indicates that it will deliver 500,000 tonnes of CO_2 savings through more efficient aircraft routing. The major changes in routes that will offer emissions savings will partially come from routes to 7000ft but mostly above this altitude, as other environmental priorities (particularly around overflight of built up areas and noise management) take precedence below 7000ft (DfT, 2014). Further assessment of carbon emissions impacts of departure and arrival routes must be undertaken when sufficient information is available.

Ground movement emissions

It should first be remembered that, as explained in the methodology, aircraft ground movements are already incorporated within the overall emissions from ATMs.

The estimations that have been made here for this portion of aviation carbon are based on two calculations, as described in the methodology. For the first calculation, the ATMs predicted within the AC adjusted DfT aviation forecasts, and the carbon emissions for the LTO cycle, as reported by Heathrow Airport and Gatwick Airport are used. This latter data source also builds a limitation into the predictions made – that, even if operating an entirely newly designed runway, the average emissions per ATM will remain the same. In addition to the potential change that runway design and management would affect upon this value, considerations of the increase in the use of biofuels and other fuel-use reduction measures do not affect the prediction. For the second calculation, the ICAO TIM and thrust setting information, used for calculating air quality impacts, were utilised, in conjunction with information supplied by HAL and GAL regarding their existing TIMs. In addition to assuming the accuracy of this data, this again places a limit on the predictions, as potential improvements in runway design can change the amount of time spent in groundside modes.

Passenger surface access journeys

The methodology used for calculating the emissions from passenger surface access journeys is described in more detail in the methodology section, and the original documentation (DfT, 2009). In summary, the method utilises the outputs of the demand forecasting process, in terms of travel demand from each UK zone to each airport. The mode share used is that reported in the CAA 2007/2008 passenger interview survey. For this analysis, the emission factors were updated using WebTAG and the Defra GHG repository. The use of these sources assume that emissions factors for road transport will follow the path predicted and that emissions factors for rail and bus / coach travel will remain relatively static.

The method used assumes that the 2008 mode shares are both valid currently, and that they will remain approximately stable throughout the assessment period. It is acknowledged that this is unlikely, and a limitation to the assessment. As described in the methodology, a 2030 sensitivity was developed. This could not be used as a substitute for the 2008 mode shares, however, as the 2030 levels were only determined for Heathrow and Gatwick, and not any other airports.

Airport operational emissions

The methodology that was adopted to calculate the operational emissions implies the assumptions that have been made. These are as repeated here.

- That there is a relationship between electricity use and passenger numbers (kWh/ PAX);
- That there is a relationship between heating (gas) use and terminal floor space (kWh/m^2), and;
- That there is a relationship between airport fuel use and the number of flights (kWh/ATM).

The numbers used to determine these factors were either directly from public reports and proposal documentation from HAL and GAL, or derived from information in those documents. Use of these factors places a limit of the predictions, as it assumes that this relationship will remain valid throughout the assessment period. If emissions were to decouple from these indicators this would not be modelled in this assessment (an example would be the substitution of gas heating for electric heating, or alternative generation).

In order to determine the carbon emissions from these energy uses, use was made of the IAG supporting tables and the Defra GHG repository in order to determine the carbon emission factors of electricity and fuel use. The use of the Defra emission factors for fuel and gas for the entire assessment period implies that the efficiency of fuel and gas is unlikely to significantly change in this time.

Embodied carbon emissions from infrastructure construction

The estimation of the carbon emissions made use of the estimates made for construction cost, phasing and footprints through the Jacobs Revenue and cost identification report.

The method used utilised WRAP benchmark factors; as acknowledged in the methodology, this places a limitation on the estimation as airport projects are not recorded in sufficient number to be part of the WRAP benchmark lists. For this reason, the spend for each proposal was divided amongst different building / project types, assigned based on their use and similarity to the types listed in the WRAP benchmarking tool.

An estimation was made of an emissions factor for spend on runways and taxiways, derived from first principle estimation of materials used combined with materials factors from the Defra GHG repository.

Several assumptions were made regarding the project phasing:
For the Heathrow baseline, spend by year and construction category has been estimated; this spend is allocated through the tool as described above.
For the Gatwick baseline, spend by year was only assessed as a total. In order to use this, an analysis of the Gatwick Masterplan was conducted, which identified land-use changes. Using the proportion of land-use change, augmented through the descriptions of projects, allowed for a split between spend on taxiways/stands and spend on ancillary buildings.

Monetisation of carbon emissions

The monetisation has made use of the IAG supporting tables and Green Book discounting guidance in order to place a value upon the change in emissions brought about by each proposal. The core assumption is that EU ETS prices, as a way to value carbon-affecting projects, remain within the Low to High boundaries. While both the Central result and the Low to High range are presented for the baseline and the proposals, it is possible that there could be significant deviation from these values. For example, the demand scenario utilised the carbon capped assumption – this carbon cap may have a knock-on impact to carbon prices over the assessment period, dependent on how they have been derived.
No monetisation is included within the baseline report. This is presented in the assessment report, comparing the baseline against the scheme development impacts.

Further limitations

As noted, emissions have been presented as CO_2 for consistency with Committee on Climate Change approaches and DfT Aviation Forecasts.

The variance between CO_2 and CO_2e (that is CO_2 + CH_4 + N_2O) is less than 1% in all cases, but is not reported for clarity and significance reasons.

The appraisal does not attempt to consider aviation non-carbon impacts (such as radiative forcing). Although this changes the overall emissions impact, the science regarding the effect remains uncertain, and these effects occur at high altitude and regardless of the scheme. Non-carbon impacts are not reported for clarity and uncertainty reasons.

Appendix C Full Tables

Gatwick Airport

Table C1 – Baseline CO_2 emissions for flights at Gatwick Airport for 2025 – 2050

Year	Number of passengers	Numbers of ATMs	Gatwick Airport, tonnes CO_2	UK Total, tonnes CO_2	% of UK ATM emissions
2025	39,447,192	276,706	4,378,003	38,846,345	11.3
2026	40,416,144	284,865	4,303,039	38,953,641	11.0
2027	40,103,888	278,460	4,122,703	39,046,762	10.6
2028	40,153,040	276,160	4,007,941	39,297,453	10.2
2029	41,504,760	287,843	3,984,513	39,269,477	10.1
2030	41,082,700	277,919	3,893,295	39,193,204	9.9
2031	41,742,044	283,949	3,946,395	39,178,500	10.1
2032	41,924,976	278,474	3,935,045	39,168,898	10.0
2033	42,107,912	277,984	3,931,140	39,386,017	10.0
2034	43,156,656	282,063	3,994,040	39,823,762	10.0
2035	43,182,224	281,052	3,988,466	40,099,757	9.9
2036	43,250,640	279,287	3,961,122	40,073,885	9.9
2037	44,223,944	284,448	3,991,509	39,739,856	10.0
2038	43,838,808	281,665	3,954,443	39,717,424	10.0
2039	43,793,728	278,613	3,916,736	39,587,773	9.9
2040	44,241,800	280,633	3,961,133	39,489,040	10.0
2041	44,606,632	281,295	3,981,130	39,397,436	10.1
2042	44,642,696	282,151	3,957,375	39,256,244	10.1
2043	44,633,376	280,338	3,921,082	39,128,328	10.0
2044	45,062,960	282,224	3,947,604	38,868,876	10.2
2045	45,663,888	284,534	3,944,532	38,366,080	10.3
2046	44,848,640	278,261	3,852,920	37,790,912	10.2
2047	45,195,152	279,279	3,843,823	37,941,245	10.1
2048	46,216,776	284,542	3,866,189	37,744,332	10.2
2049	46,543,632	285,962	3,845,414	37,475,627	10.3
2050	46,589,192	285,420	3,860,892	37,514,764	10.3

Table C2 - Gatwick ground movement emissions over time, and baseline ATMs.

Year	Airside Ground Movements at Gatwick Airport, tonnes CO_2 (ICAO-Times)	Airside Ground Movements at Gatwick Airport, tonnes CO_2 (GAL Reported times)
2025	134,085	128,569
2026	138,039	132,360
2027	134,935	129,384
2028	133,820	128,315
2029	139,482	133,743

Year	Airside Ground Movements at Gatwick Airport, tonnes CO_2 (ICAO-Times)	Airside Ground Movements at Gatwick Airport, tonnes CO_2 (GAL Reported times)
2030	134,673	129,132
2031	137,595	131,934
2032	134,942	129,390
2033	134,704	129,162
2034	136,681	131,058
2035	136,191	130,588
2036	135,336	129,768
2037	137,837	132,166
2038	136,488	130,873
2039	135,009	129,455
2040	135,988	130,393
2041	136,309	130,701
2042	136,723	131,099
2043	135,845	130,256
2044	136,759	131,132
2045	137,878	132,206
2046	134,838	129,291
2047	135,332	129,764
2048	137,882	132,209
2049	138,570	132,869
2050	138,308	132,617

Table C3 - Gatwick surface access emissions

Year	Emissions due to surface access to Gatwick Airport, tonnes CO_2	Emissions due to surface access to UK airports, tonnes CO_2	Gatwick % of total UK airport surface access carbon emissions
2025	335,167	1,886,064	17.8
2026	325,906	1,868,923	17.4
2027	316,646	1,851,783	17.1
2028	307,385	1,834,642	16.8
2029	298,124	1,817,501	16.4
2030	288,863	1,800,361	16.0
2031	289,751	1,814,236	16.0
2032	290,639	1,828,111	15.9
2033	291,527	1,841,987	15.8
2034	292,415	1,855,862	15.8
2035	293,302	1,869,737	15.7
2036	294,103	1,896,420	15.5
2037	294,904	1,923,103	15.3
2038	295,705	1,949,785	15.2
2039	296,506	1,976,468	15.0
2040	297,307	2,003,151	14.8

Year	Emissions due to surface access to Gatwick Airport, tonnes CO_2	Emissions due to surface access to UK airports, tonnes CO_2	Gatwick % of total UK airport surface access carbon emissions
2041	298,214	2,029,207	14.7
2042	299,120	2,055,263	14.6
2043	300,027	2,081,319	14.4
2044	300,934	2,107,375	14.3
2045	301,840	2,133,431	14.1
2046	303,178	2,171,683	14.0
2047	304,516	2,209,935	13.8
2048	305,854	2,248,187	13.6
2049	307,192	2,286,440	13.4
2050	308,530	2,324,692	13.3

Table C4 – Surface Access emissions from the 2030 Modal split baseline Gatwick.

Year	Baseline emissions due to surface access to Gatwick Airport, tonnes CO_2
2025	256,474
2026	254,678
2027	252,881
2028	251,084
2029	249,287
2030	247,490
2031	248,466
2032	249,441
2033	250,416
2034	251,392
2035	252,367
2036	252,956
2037	253,545
2038	254,134
2039	254,723
2040	255,313
2041	255,944
2042	256,575
2043	257,206
2044	257,838
2045	258,469
2046	259,578
2047	260,686
2048	261,795
2049	262,904
2050	264,012

Table C5 - Gatwick operational emissions 2025-2050.

Year	Emissions due to electricity use at Gatwick Airport, tonnes CO_2	Emissions due to gas use at Gatwick Airport, tonnes CO_2	Emissions due to fuel use at Gatwick Airport, tonnes CO_2	Emissions due to airport operation at Gatwick Airport, tonnes CO_2
2025	26,869	11,591	5,831	44,291
2026	23,040	11,591	6,003	40,634
2027	21,057	11,591	5,868	38,516
2028	18,662	11,591	5,820	36,072
2029	19,759	11,591	6,066	37,415
2030	18,969	12,041	5,857	36,867
2031	17,744	12,041	5,984	35,769
2032	15,157	12,041	5,868	33,066
2033	12,753	12,041	5,858	30,652
2034	11,090	12,041	5,944	29,075
2035	10,019	12,041	5,923	27,983
2036	10,804	12,041	5,885	28,731
2037	9,977	12,041	5,994	28,012
2038	9,799	12,041	5,936	27,776
2039	10,342	12,041	5,871	28,255
2040	9,511	12,041	5,914	27,467
2041	8,540	12,041	5,928	26,509
2042	8,347	12,041	5,946	26,334
2043	7,406	12,041	5,908	25,355
2044	6,676	12,041	5,947	24,665
2045	6,948	12,041	5,996	24,985
2046	6,320	12,041	5,864	24,226
2047	5,822	12,041	5,885	23,749
2048	7,007	12,041	5,996	25,044
2049	6,258	12,041	6,026	24,325
2050	6,264	12,041	6,015	24,320

Heathrow Airport

Table C6 – CO_2 emissions: departing flights Heathrow Airport 2025 – 2050

Year	Passenger numbers	Numbers of ATMs	Heathrow Airport, tonnes CO_2	UK Total, tonnes CO_2	% of UK ATM emissions
2025	81,099,696	480,532	20,265,433	38,846,345	52.2
2026	81,351,320	476,975	20,204,599	38,953,641	51.9
2027	82,655,128	480,962	20,342,023	39,046,762	52.1
2028	84,185,600	487,113	20,459,874	39,297,453	52.1
2029	84,189,488	483,026	20,336,902	39,269,477	51.8
2030	84,919,152	483,856	20,099,848	39,193,204	51.3
2031	84,513,368	480,553	19,928,335	39,178,500	50.9
2032	84,430,592	477,917	19,820,408	39,168,898	50.6
2033	85,170,368	481,251	19,973,802	39,386,017	50.7
2034	85,642,456	481,178	20,137,089	39,823,762	50.6
2035	86,917,336	486,188	20,289,779	40,099,757	50.6
2036	87,367,408	486,311	20,116,734	40,073,885	50.2
2037	87,267,448	482,402	19,692,333	39,739,856	49.6
2038	88,216,296	484,506	19,617,253	39,717,424	49.4
2039	89,081,304	488,880	19,435,975	39,587,773	49.1
2040	88,614,304	484,517	19,184,305	39,489,040	48.6
2041	88,979,848	484,430	18,931,814	39,397,436	48.1
2042	89,473,080	483,076	18,767,864	39,256,244	47.8
2043	90,318,584	485,965	18,567,747	39,128,328	47.5
2044	92,192,896	491,781	18,311,565	38,868,876	47.1
2045	92,683,728	492,155	17,706,780	38,366,080	46.2
2046	92,813,600	489,153	17,134,355	37,790,912	45.3
2047	93,797,064	490,259	17,164,010	37,941,245	45.2
2048	93,422,864	482,063	16,984,573	37,744,332	45.0
2049	93,312,432	475,577	16,706,133	37,475,627	44.6
2050	93,533,736	471,132	16,570,400	37,514,764	44.2

Table C7: Heathrow airside (aircraft) ground movement emissions

Year	Airside Ground Movements at Heathrow Airport, tonnes CO_2 (ICAO-Times)	Airside Ground Movements at Heathrow Airport, tonnes CO_2 (HAL Reported times)
2025	390,677	311,963
2026	390,677	309,654
2027	393,943	312,242
2028	398,981	316,235
2029	395,633	313,582
2030	396,313	314,121
2031	393,608	311,976
2032	391,449	310,265
2033	394,180	312,430
2034	394,120	312,382
2035	398,223	315,635
2036	398,324	315,715
2037	395,122	313,177
2038	396,846	314,543
2039	400,428	317,382
2040	396,855	314,550
2041	396,783	314,493
2042	395,674	313,614
2043	398,041	315,490
2044	402,804	319,266
2045	403,111	319,509
2046	400,652	317,560
2047	401,558	318,278
2048	394,845	312,957
2049	389,532	308,746
2050	385,891	305,860

Table C8 - Heathrow surface access emissions 2025 - 2050

Year	Emissions due to surface access to Heathrow Airport, tonnes CO_2	Emissions due to surface access to all airports, tonnes CO_2	Heathrow % of total carbon emissions due to surface access
2025	372,712	1,813,730	20.5
2026	384,112	1,868,923	20.6
2027	381,556	1,851,783	20.6
2028	379,000	1,834,642	20.7
2029	376,444	1,817,501	20.7
2030	373,888	1,800,361	20.8
2031	376,700	1,814,236	20.8
2032	379,511	1,828,111	20.8
2033	382,323	1,841,987	20.8
2034	385,134	1,855,862	20.8
2035	387,946	1,869,737	20.7
2036	393,072	1,896,420	20.7
2037	398,197	1,923,103	20.7
2038	403,323	1,949,785	20.7
2039	408,449	1,976,468	20.7
2040	413,575	2,003,151	20.6
2041	420,039	2,029,207	20.7
2042	426,503	2,055,263	20.8
2043	432,967	2,081,319	20.8
2044	439,431	2,107,375	20.9
2045	445,895	2,133,431	20.9
2046	450,529	2,171,683	20.7
2047	455,163	2,209,935	20.6
2048	459,798	2,248,187	20.5
2049	464,432	2,286,440	20.3
2050	469,066	2,324,692	20.2
2051	469,066	2,324,692	20.2

Table C9 – Surface Access emissions with 2030 mode share

Year	Baseline emissions due to surface access to Heathrow Airport, tonne CO_2
2025	315,545
2026	316,763
2027	317,981
2028	319,199
2029	320,417
2030	321,635
2031	324,479
2032	327,323
2033	330,167
2034	333,012
2035	335,856
2036	340,338
2037	344,820
2038	349,303
2039	353,785
2040	358,267
2041	363,884
2042	369,500
2043	375,117
2044	380,734
2045	386,350
2046	390,393
2047	394,435
2048	398,477
2049	402,519
2050	406,562

Table C10 - Heathrow operational emissions 2025-2050.

Year	Emissions due to electricity use at Heathrow Airport, tonnes CO_2	Emissions due to gas use at Heathrow Airport, tonnes CO_2	Emissions due to fuel use at Heathrow Airport, tonnes CO_2	Emissions due to airport operation at Heathrow Airport, tonnes CO_2
2025	91,490	41,520	8,242	141,251
2026	76,808	41,520	8,181	126,509
2027	71,877	41,520	8,249	121,646
2028	64,802	41,520	8,355	114,677
2029	66,380	41,520	8,285	116,185
2030	64,937	41,520	8,299	114,756
2031	59,498	41,520	8,242	109,260
2032	50,552	41,520	8,197	100,269
2033	42,720	41,520	8,254	92,494
2034	36,447	41,520	8,253	86,220
2035	33,399	41,520	8,339	83,258
2036	36,146	52,099	8,341	96,587
2037	32,605	52,099	8,274	92,979
2038	32,657	52,099	8,310	93,067
2039	34,842	52,099	8,385	95,327
2040	31,552	52,099	8,310	91,962
2041	28,213	52,099	8,309	88,621
2042	27,705	52,099	8,286	88,091
2043	24,820	52,099	8,335	85,254
2044	22,620	52,099	8,435	83,154
2045	23,355	52,099	8,441	83,896
2046	21,663	52,099	8,390	82,152
2047	20,012	52,099	8,409	80,520
2048	23,457	52,099	8,268	83,825
2049	20,778	52,099	8,157	81,034
2050	20,827	52,099	8,081	81,007

Appendix D Data and Factors Used

Defra energy and fuel use CO_2 factors		
Aviation turbine fuel	3.150 tCO2/t	Emissions factor used in AoC Carbon model
Natural Gas Carbon Factor	0.18497 kgCO2/kWh	Defra (2014), assumed to remain static 2014 - 2086
Gasoil Carbon Factor	0.25359 kgCO2/kWh	
Diesel Carbon Factor	0.24615 $kgCO_2$/kWh	
Webtag derived & Defra surface access CO2 factors		
Road (personal car) 2020	0.000102 tCO_2/veh.km	Derived from Webtag 2014
Road (personal car) 2025	0.000087 tCO_2/veh.km	
Road (personal car) 2030	0.000077 tCO_2/veh.km	
Road (personal car) 2035 on	0.000074 tCO_2/veh.km	
Rail Travel	0.000047 tCO_2/pass.km	Defra (2014), assumed to remain static 2014 - 2086
Coach & Bus Travel	0.000029 tCO_2/pass.km	
Defra embodied CO2e factors		
Aggregates	11.0 $kgCO_{2e}$/t	Defra (2014), used in make-up of Taxiway and Runway factors
Average construction	74.0 $kgCO_{2e}$/t	
Asbestos	27.0 $kgCO_{2e}$/t	
Asphalt	39.2 $kgCO_{2e}$/t	
Concrete	134.8 $kgCO_{2e}$/t	
WRAP Embodied Construction Factors (WRAP 2013)		
All (average)	115.8493	tCO2e / £100k Embodied carbon emissions by construction project value
All Infrastructure	50.88447	
All Buildings	135.9155	
All linear infrastructure	51.834	
Infrastructure (other)	40.38125	
Buildings (other)	142.01	
Linear infrastructure (highway)	51.834	
Infrastructure (utilities)	38.30584	
Buildings (offices)	156.2633	
Buildings (health)	1.26	
Buildings (residential)	17.31603	
Buildings (retail)	0.53	
Buildings (education)	0.63	
All Buildings	1.060961	tCO2e / £100k Fuel consumption per construction project value
Buildings (houses)	1.309454	
Buildings (other)	1.054277	
Infrastructure (other)	3.805276	
Buildings (office)	1.1146	
Buildings (retail)	1.645876	
Buildings (health)	0.929652	
Buildings (education)	1.054944	
Buildings (residential)	0.5229	

Buildings (industrial)	1.382853	
Data used to derive energy and carbon activity data		
Total LTO cycle emissions (Heathrow)	1.2 MtCO2	2010: 477,000 ATMs Heathrow Expansion Carbon Footprint
Total LTO cycle emissions (Gatwick)	393,660 tCO2	2012 “Aircraft” emissions Gatwick A11 Carbon
Gatwick - Regulated Gas (MWh)	62,661	Gatwick (Appendix A 32)
Gatwick - Total Electricity (MWh)	153,700	
Gatwick - Regulated Electricity (MWh)	86,700	
Gatwick - Unregulated electricity (MWh)	67,000	
Gatwick - Total Energy (MWh)	216,361	
Gatwick - Fuel Consumption (MWh)	62,661	Appendix A11 Calculated from Fuel CO2
Heathrow - Regulated Gas (MWh)	224,464	Heathrow (2013) Heathrow calculated from CO2 split on total energy presented in proposal
Heathrow - Total Electricity (MWh)	519,596	Heathrow (2013) Heathrow calculated from CO2 presented in proposal
Heathrow - Total Energy	744,060	Heathrow (2013)

AIRPORT EXPANSION CONSULTATION (JUNE 2019)

Heathrow is consulting on proposals for an expanded airport.

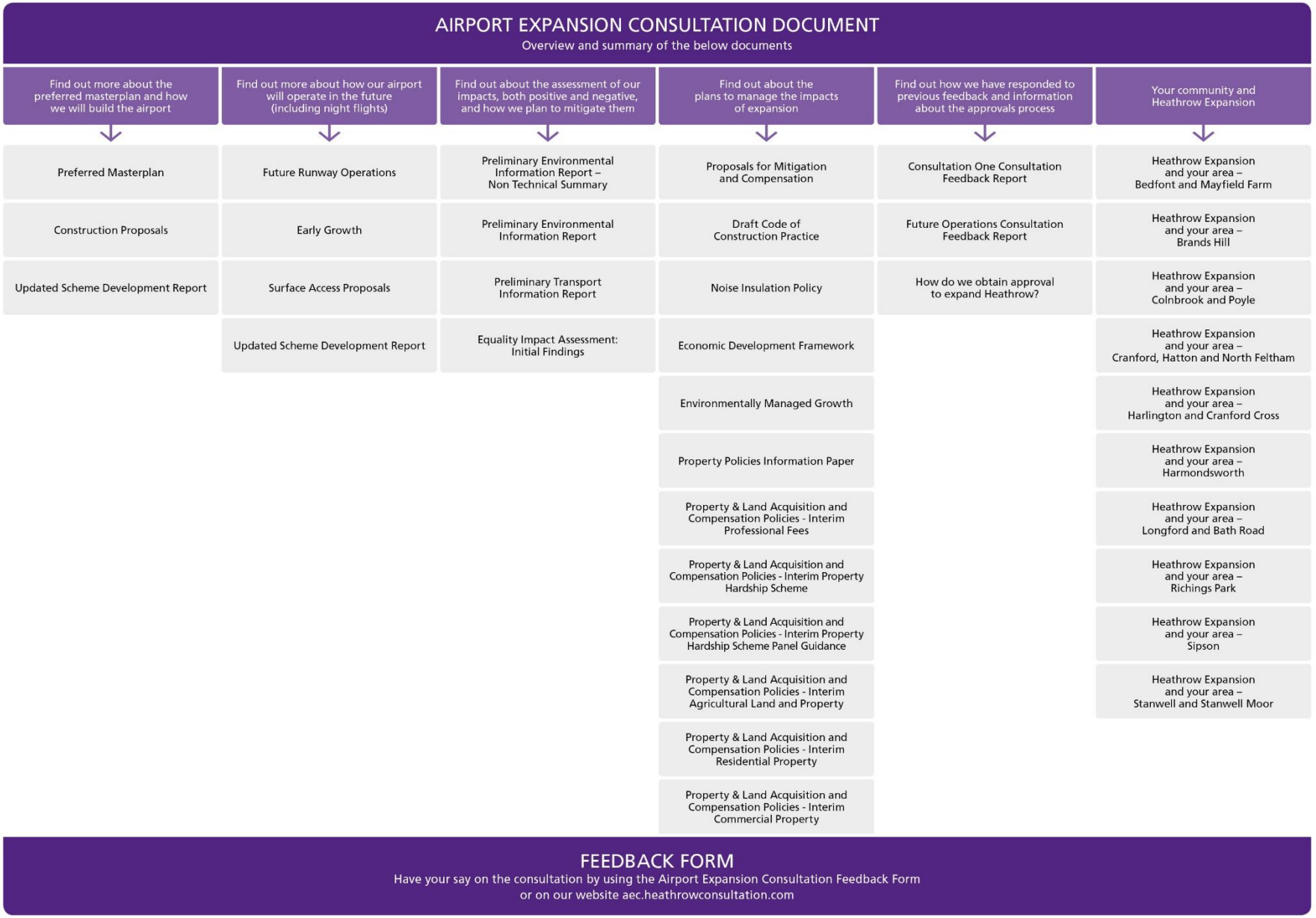
The Airport Expansion Consultation is our statutory consultation and we will be seeking your view on four key areas:

- Heathrow's preferred masterplan for expansion: our proposals for the future layout of the airport including the runway and other airport infrastructure such as terminals and road access. The masterplan will also reveal the airport's growth in phases – from runway opening in around 2026, to the end masterplan in approximately 2050;
- Plans to operate the future airport: how the future three runway airport will be operated, including important elements such as night flights, as well as how potential additional flights before the new runway opens could be operated on our existing two runways;
- Assessment of impacts of the airport's growth: our preliminary assessment of the likely impacts of expansion on the environment and local communities;
- Plans to manage the impacts of expansion: we will set out the airport's plans for mitigating the effects of expansion, including property compensation, our Noise Insulation Policy, a Community Fund, and measures to mitigate against air pollution, carbon, and other environmental effects.

We are grateful for feedback provided at previous consultations and have considered these responses in developing our proposals. We now ask for your views on our preferred proposals, so that we can further improve our project before we apply for development consent next year. You can provide feedback:

- online using the feedback form on our website aec.heathrowconsultation.com
- complete a feedback form, available at events or on request calling 0800 307 7996
- email us at feedback@heathrowconsultation.com
- write to us at Freepost LHR AIRPORT EXPANSION CONSULTATION

We have set out our proposals in a number of documents covering different topics and different levels of detail. All of these are available on our website, at Document Inspection Locations and at consultation events.


AIRPORT EXPANSION CONSULTATION DOCUMENT
Overview and summary of the below documents
Find out more about the preferred masterplan and how we will build the airport
Find out more about how our airport will operate in the future (including night flights)
Find out about the assessment of our impacts, both positive and negative, and how we plan to mitigate them
Find out about the plans to manage the impacts of expansion
Find out how we have responded to previous feedback and information about the approvals process
Your community and Heathrow Expansion
Preferred Masterplan
Construction Proposals
Updated Scheme Development Report
Future Runway Operations
Early Growth
Surface Access Proposals
Updated Scheme Development Report
Preliminary Environmental Information Report – Non Technical Summary
Preliminary Environmental Information Report
Preliminary Transport Information Report
Equality Impact Assessment: Initial Findings
Proposals for Mitigation and Compensation
Draft Code of Construction Practice
Noise Insulation Policy
Economic Development Framework
Environmentally Managed Growth
Property Policies Information Paper
Property & Land Acquisition and Compensation Policies - Interim Professional Fees
Property & Land Acquisition and Compensation Policies - Interim Property Hardship Scheme
Property & Land Acquisition and Compensation Policies - Interim Property Hardship Scheme Panel Guidance
Property & Land Acquisition and Compensation Policies - Interim Agricultural Land and Property
Property & Land Acquisition and Compensation Policies - Interim Residential Property
Property & Land Acquisition and Compensation Policies - Interim Commercial Property
Consultation One Consultation Feedback Report
Future Operations Consultation Feedback Report
How do we obtain approval to expand Heathrow?
Heathrow Expansion and your area – Bedfont and Mayfield Farm
Heathrow Expansion and your area – Brands Hill
Heathrow Expansion and your area – Colnbrook and Poyle
Heathrow Expansion and your area – Cranford, Hatton and North Feltham
Heathrow Expansion and your area – Harlington and Cranford Cross
Heathrow Expansion and your area – Harmondsworth
Heathrow Expansion and your area – Longford and Bath Road
Heathrow Expansion and your area – Richings Park
Heathrow Expansion and your area – Sipson
Heathrow Expansion and your area – Stanwell and Stanwell Moor
FEEDBACK FORM
Have your say on the consultation by using the Airport Expansion Consultation Feedback Form
or on our website aec.heathrowconsultation.com

NOISE INSULATION POLICY (DRAFT FOR CONSULTATION)

Non-Technical Summary

This document sets out the Noise Insulation Policy for the Heathrow Expansion Programme (the Project) to address the requirements of the Government policy - "*Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England*" 2018 (Airports NPS).

This policy will address noise from aircraft movements in the air and on the ground, road, rail and construction noise associated with the Project.

The Noise Insulation Policy forms part of the extensive noise control measures included in the expansion Project to meet the aims of Government noise policy. The control measures on the aircraft fleet and operations first mitigate and minimise potential adverse noise effects arising from expansion and reduce existing noise from the airport. In a complementary manner, noise insulation provides compensatory control measures that aim to avoid residual significant adverse effects on health and quality of life from existing and predicted noise. This approach meets the aims of Government noise policy as stated in the Airports NPS.

For home owners, three levels of scheme will be offered, depending on the existing or predicted noise exposure level, as indicated by the relevant noise contour, source of noise and if confirmed through third-party assessment:

Scheme 1	Full cost of noise insulation fitout, potentially including new acoustic double glazing or secondary glazing, loft or ceiling insulation, ceiling over-boarding, external door upgrades and ventilation for aircraft noise.
Scheme 2	A package of noise insulation to exposed facades, potentially including acoustic double glazing or secondary glazing to windows, external door upgrades and attenuated ventilation for road, rail and construction noise exposure.
Scheme 3	A fixed £3,000 contribution to approved noise insulation works.

Eligibility for schemes will be based on published noise contours of the defined Action Levels, or thresholds, as set out in the government Airports NPS for aircraft noise, extended to include road, rail and construction noise.

Noise Insulation Schemes will be made available before defined Action Levels are expected to occur as a result of the expansion project.

In the lead up to Development Consent Order (DCO) approval, we plan to insulate homes that will be exposed to the highest noise from the Project and that are already exposed to similar noise from existing Heathrow operations. This will be via a replacement of our existing noise insulation schemes expanded in the light of changing Government policy. Homes expected to be exposed to early construction noise from the Project as well as existing high levels of aircraft noise will also be prioritised. This will help develop and test our systems and suppliers, also avoid long waiting times between applications and fit outs. Once the DCO is approved we will prioritise those forecast to be newly affected by construction, road and rail traffic and aircraft noise. We will ensure that the insulation is offered and, if accepted, installed before the new noise occurs.

Home and community building owners identified as being within the eligibility contours will be contacted and invited to apply for the schemes. We will use a seven-stage awareness process to ensure property owners are aware of their eligibility and are encouraged to apply.

Once we have received an application, an assessment will be conducted to confirm eligibility. Approved contractors will deliver a standard package of noise insulation measures, within a quality management scheme including sample completion testing.

For the very few properties that will be newly exposed to very high noise levels, where an application is not received or an offer accepted, we may need to obtain compulsory rights to provide treatments to prevent unacceptable noise exposure levels.

A dedicated support team will be provided to assist applicants throughout the process, including investigation of complaints during and after completion. Applicants will also be able to appeal to an Independent Panel.

The schemes will remain open until they cease to be relevant (for example, at the end of the construction period for the construction noise insulation), or the scheme is updated (for example if noise mitigation means that a property is no longer within a relevant contour).

These schemes will replace the existing noise insulation schemes currently offered by Heathrow including the Quieter Homes Scheme, the Day Scheme and the Night Scheme. Before existing schemes are closed, properties in those areas will be informed and advised of the scheme closure and possible eligibility for the replacement schemes. The contact period, of at least 12 months, will allow time for applications under the existing schemes before they close.

Heathrow's Community Buildings Noise Insulation Scheme will be extended to include the impacts of Expansion.

In addition to the noise insulation schemes in this draft Noise Insulation Policy, Heathrow has two other existing noise and vortex related schemes that will be refreshed. These are the Home Relocation Assistance Scheme which offers financial help to eligible homeowners living in the noisiest areas around Heathrow to move away from the area if they wish; and the Vortex Protection Scheme which is designed to protect and repair homes from around the airport damaged by wind currents from aircraft wings.

Heathrow will also introduce a Temporary Home Relocation Scheme for those most impacted by short term construction noise.

These schemes are summarised at the end of the draft Noise Insulation Policy for reference.

PREFACE: DEVELOPMENT OF THE NOISE INSULATION POLICY

1. The remainder of this document sets out the draft policy relating to noise insulation schemes to be provided in connection with the development and operation of a new north-west runway and associated infrastructure to expand Heathrow Airport. This draft policy is subject to consultation.

2. Once finalised taking into account feedback from consultation and draft policy would form the basis for the implementation of our Noise Insulation programme, if development consent is granted and we proceed with construction,

3. If the DCO application is granted, this document would become the basis for the implementation of our Noise Insulation programme. It was thought helpful, therefore, to provide a working draft of the document for this consultation in order that stakeholders could understand the terms on which Heathrow proposes to commit and comment on them whilst they remain in draft.

4. Within the document itself, there are passages which represent explanatory text for the purposes of this consultation and which will be deleted from the version published before and submitted with the DCO application. Those passages are highlighted in grey.

5. With the benefit of this explanation, hopefully this draft document is clear in its purpose and we would be pleased to receive feedback on its content and approach.

CONTENTS

1. INTRODUCTION

1.1 The Noise Insulation Policy for Heathrow Expansion Programme

1.1.1 This document sets out the Noise Insulation Policy for the Heathrow Expansion Programme (the Project) to address the requirements of the *Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England 2018* (Airports NPS).

1.1.2 The Noise Insulation Policy forms part of the extensive noise control measures included in the Project, to meet the aims of Government noise policy, as laid out in the Airports NPS at paragraph 5.68 (see below). Firstly, there are the mitigation control measures which cover actions ranging from aircraft fleet development, operational procedures, airport layout, airspace design, and night flight management, to managed respite through runway and airspace alternation. These control measures mitigate and minimise potential new adverse noise effects arising from expansion and, for many areas, reduce existing noise from the airport, within the context of Government policy on sustainable development. This Noise Insulation Policy provides compensatory control measures, which in combination with the mitigation controls, sets out to achieve the following:

- Firstly: to meet the Government noise policy to avoid significant adverse effects on health and quality of life that would otherwise newly arise from the expansion proposals, including preventing unacceptable adverse noise effects;
- Secondly: to avoid significant adverse effects on health and quality of life that would otherwise occur after expansion, but would also have occurred if Heathrow did not expand; and
- Thirdly: to more widely compensate for the adverse effects of aircraft noise both newly arising from expansion and that would have occurred if Heathrow did not expand, in line with Heathrow's committed community compensation scheme as set out in the Airports NPS (paragraph 5.245).

1.1.3 The objectives of this Noise Insulation Policy are to achieve the following:

- Set out the basis for Heathrow's noise insulation strategy and the definition and delivery of the Noise Insulation Schemes.
- Address noise from:
    - aircraft movements in the air and activity on the ground,
    - changes to road traffic associated with the airport expansion,
    - changes to rail traffic associated with the airport expansion, and,

- construction noise associated with the expansion programme.

- Describe how the package of Noise Insulation Schemes addresses the requirements of the Airports NPS and specifically the aim set out in paragraph 5.68 to avoid significant adverse effects on health and quality of life.

1.1.4 This document is structured to cover the following:

- the national, international and local policy, standards and guidance background,
- the assessment metrics and action levels that will be used to identify properties eligible for noise insulation,
- the Noise Insulation Schemes, and
- the staged delivery of these Schemes.

1.1.5 This document also includes outlines of the related, non-insulation programmes with respect to the Project – the Construction Temporary Rehousing Scheme, the Home Relocation Assistance Scheme (HRAS), and the Vortex Protection Scheme.

1.2 Heathrow's Noise Insulation Strategy

1.2.1 This Noise Insulation Policy for the Project can be viewed as a part of Heathrow's long-term noise insulation strategy which has three major policy components.

1. Development of our existing noise insulation schemes designed to address our current operations and changing Government policy.
2. Processes are now underway for certain non-expansion (two-runway) airspace changes such as Independent Parallel Approaches (IPA), easterly alternation and redesigning of the Compton departure route.
3. The Noise Insulation Policy for the Heathrow Expansion Programme (the Project) which includes the development of a new third runway and insulation mitigation options required by the Airports NPS.

1.2.2 The same Noise Insulation Schemes and processes will be used to deliver each of these policy components.

2. CONTEXT: POLICY, STANDARDS AND GUIDANCE

2.1 Airports National Policy Statement

2.1.1 The Government designated the "Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England" (Airports NPS) in June 2018.

2.1.2 The Airports NPS addresses a range of issues including Heathrow airport expansion and noise insulation. For noise impacts Airports NPS says:

"5.47 The Government wants to strike a fair balance between the negative impacts of noise (on health, amenity, quality of life and productivity) and the positive impacts of flights…

"5.48 The International Civil Aviation Organisation introduced the concept of a 'Balanced Approach' to noise management (resolution A33/7). This is given legal effect in the UK through EU Regulation 598/2014.

…

"5.68 Development consent should not be granted unless the Secretary of State is satisfied that the proposals will meet the following aims for the effective management and control of noise, within the context of Government policy on sustainable development:
- Avoid significant adverse impacts on health and quality of life from noise;
- Mitigate and minimise adverse impacts on health and quality of life from noise; and
- Where possible, contribute to improvements to health and quality of life.

…

"5.244 People are entitled to know what steps will be taken to help protect them against aircraft noise and, where appropriate, to help them to move house.

"5.245 In addition to statutory requirements, Heathrow Airport has publicly committed to a community compensation package comprising a number of more generous offers:

- *…*
- *Following a third-party assessment, to provide full acoustic insulation for residential property within the full single mode easterly and westerly 60dB $L_{Aeq,16hr}$ noise contour of an expanded airport;*
- *Following a third-party assessment, to provide a contribution of up to £3,000 for acoustic insulation for residential properties within the full single mode easterly*

and westerly 57dB $L_{Aeq,16hr}$ or the full 55dB L_{den} noise contours of an expanded airport, whichever is the bigger; and

- *To deliver a programme of noise insulation and ventilation for schools and community buildings within the 60dB $L_{Aeq,16hr}$ contour."*

2.2 Aviation Policy Framework

2.2.1 The Government published the Aviation Policy Framework (APF) in March 2013 which included the statement:

"3.17 We will continue to treat the 57dB $L_{Aeq,16\ hr}$ contour as the average level of daytime aircraft noise marking the approximate onset of significant community annoyance. However, this does not mean that all people within this contour will experience significant adverse effects from aircraft noise. Nor does it mean that no-one outside of this contour will consider themselves annoyed by aircraft noise."

2.2.2 The Draft UK Airspace policy published by the Department for Transport (DfT) in February 2017 and the consultation response that the DfT published in October 2017 has modified the APF.

"Consistent with the Noise Policy Statement for England, our objectives in implementing this policy are to: … limit and, where possible, reduce the number of people in the UK significantly affected by the adverse impacts from aircraft noise." (para 2.69 Oct 2017)

"The government acknowledges the evidence from recent research which shows that sensitivity to aircraft noise has increased, with the same percentage of people reporting to be highly annoyed at a level of 54dB $L_{Aeq,16hr}$ as occurred at 57dB $L_{Aeq,16hr}$ in the past. The research also showed that some adverse effects of annoyance can be seen to occur down to 51dB $L_{Aeq,16hr}$." (para 2.70 Oct 2017)

"We will set a LOAEL at 51dB $L_{Aeq,16hr}$ for daytime and based on feedback and further discussion with CAA we are making one minor change to the LOAEL night metric to be 45dB $L_{Aeq,8hr}$ rather than L_{night} to be consistent with the daytime metric." (para 2.72 Oct 2017).

2.2.3 The Consultation Response also states that the Government:

- *"expects airport operators to offer acoustic insulation to noise sensitive buildings, such as schools and hospitals, exposed to levels of noise of 63dB $L_{Aeq,16hr}$ or more*
- *expects airport operators to offer financial assistance towards acoustic insulation to residential properties exposed to levels of noise of 63dB $L_{Aeq,16hr}$ or more."*

2.2.4 However, the government published the Aviation 2050 consultation in December 2018 which proposes the following noise insulation measures:

- *"to extend the noise insulation policy threshold beyond the current $L_{Aeq,16hr}$ 63dB contour to $L_{Aeq,16hr}$ 60dB.*
- *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 ICCAN to issue new guidance to airports on best practice for noise insulation schemes, to improve consistency*
- *for airspace changes which lead to significantly increased overflight, to set a new minimum threshold of an increase of L_{AeqT} 3dB, which leaves a household in the $L_{Aeq,16hr}$ 54dB contour or above as a new eligibility criterion for assistance with noise insulation."*

2.2.5 These proposals have not yet been adopted by government but may need to be considered in the final Noise Insulation Policy submitted with the DCO if they would increase the area of eligibility. The progression of these Government policies (and draft policies) is summarised in Appendix B.

2.3 Noise Policy Statement for England

2.3.1 The Government published the Noise Policy Statement for England (NPSE) in March 2010 and refers to it in the Airports NPS. The NPSE policy aims, that are repeated in the Airports NPS at paragraph 5.68, are:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.*"

2.3.2 The NPSE explanatory notes provide guidance on significant and adverse impacts:

"2.20 LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

2.22 It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

2.3.3 In addition to the above, Planning Practice Guidance-Noise (2014) includes the concept of Unacceptable Adverse Effect Level (UAEL). This is a level of noise exposure that would be perceived as "*intrusive and very disruptive*" and that "*at the highest extreme, noise exposure would cause extensive and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of activity causing noise, this situation should be prevented from occurring*."

2.3.4 The LOAEL, SOAEL and UAEL values being applied to the Project are provided in Chapter 17 of the Preliminary Environmental Information Report (PEIR) and will be adopted in this document when published. They are also summarised in Appendix B of this document.

2.3.5 We consider that this Noise Insulation Policy is one aspect of "avoiding" significant adverse noise effects on health and quality of life and "preventing" unacceptable noise effects.

2.4 World Health Organisation Guidelines for Community Noise (1999)

2.4.1 In 1999, the World Health Organisation (WHO) released Guidelines for Community Noise (GCN). These guidelines have informed a wide range of UK standards and guidelines, and contain recommended values for internal noise for specific environments and maximum night time noise levels that remain current.

2.4.2 WHO has also published:

- Night Noise Guidelines 2009 (NNG) which recommend a LOAEL and refer to GCN guideline text as remaining valid, and

- Environmental Noise Guidelines for the European Region 2018 (ENG) which recommend Noise Guideline values which are defined for L_{den} (which includes penalty for evening and night period) and L_{night}.

2.4.3 The WHO publications are guidance only and do not take precedence over Government legislation or policy.

2.5 Noise Insulation Regulations (1975)

2.5.1 The Noise Insulation Regulations provide a schedule of noise insulation measures to be provided if noise levels from a highway or road development are predicted to exceed action levels predicted using the Government method, Calculation of Road Traffic Noise (CRTN). CRTN is a historic calculation method which uses a different metric to those normally used for aircraft noise, $L_{A10,18hr}$, but this metric can be converted to $L_{Aeq,T}$ for normal highway noise and this conversion is described in the PEIR.

2.6 The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996

2.6.1 The Noise Insulation (Railways etc) Regulations provide a schedule of noise insulation measures to be provided if noise levels for a rail or similar development are predicted to exceed action levels predicted using the Government method, Calculation of Rail Noise (CRN).

2.7 Guidance on sound insulation and noise reduction for buildings: BS8233:2014

2.7.1 British Standard BS8233 provides guidance on the control of sound in and around new buildings, including noise from aircraft, roads and construction sites.

2.7.2 For residential buildings guideline internal noise levels are provided as annual average levels. BS8233 recognises that it may be desirable to build houses or flats above the guideline values for other reasons, such as access to transport, shopping etc, and that a relaxation of the guidance values may provide reasonable living conditions.

2.7.3 For non-residential buildings, BS8233 refers to a number of sector guidelines, including Building Bulleting BB93 for schools and Health Technical Memorandum HTM 08-01 for hospitals and recommends that a suitably qualified acoustician is retained for specialist uses, such as theatres, concert halls and cinemas.

2.8 Code of practice for noise and vibration control on construction and open sites. Noise BS5228-1:2009 and A1:2014

2.8.1 British Standard BS5228-1 provides guidance on the calculation and control of noise at construction sites and is widely used on minor and major development sites. Annex E of the Code addresses significance of effects with Example 1 being the "A-B-C" method that produces a table of threshold levels at various times of the day and night.

2.9 Airports NPS Tests

2.9.1 This Noise Insulation Policy has been designed so that the DCO will meet the first aim of the Airports NPS 5.68 (and NPSE), which is "*within the context of Government policy on sustainable development: to avoid significant adverse impacts on health and quality of life from noise*."

2.9.2 The Airports NPS refers to the "Noise Mitigation – Noise Control Hierarchy" and this is discussed in more detail in the PEIR associated with this Airport Expansion Consultation. Within the control hierarchy, noise insulation will be relied upon where other higher priority mitigation is not practical or sustainable. To avoid significant adverse noise impacts, the Noise Insulation Policy will prioritise those properties and populations which will be newly exposed to noise levels above the SOAEL, including any properties which will be newly exposed to noise levels above UAEL.

2.9.3 The SOAEL values for aircraft noise, as identified in the PEIR, are daytime 63dB $L_{Aeq,16hr}$ and night-time 55dB $L_{Aeq,8hr}$ or one additional awakening. The daytime UAEL is 71dB $L_{Aeq,16hr}$ and the night-time UAEL is 66dB $L_{Aeq,8hr}$. All these values are 92-day summer averages. See Appendix A for a glossary of terms and Appendix B for references to night time aircraft noise and other noise sources.

2.9.4 As quoted above, Airports NPS (paragraph 5.245) explicitly reiterates public commitments for noise insulation made by Heathrow which are a key part of the strategy to avoid significant noise impacts for areas newly above the SOAEL.

2.9.5 This Noise Insulation Policy will meet or exceed the minimum requirements of the first aim of Airports NPS 5.68 for the following reasons:

- Homes that will be newly exposed above any SOAEL value in the opening year, will have insulation offered (and installed, if accepted) in advance of the new runway opening.
- As the number of aircraft movements increases after the opening year to a point when the airport's noise impact is forecast to be highest, homes that will

be newly exposed above the SOAEL values will have insulation offered (and installed, if accepted) in advance of the SOAEL value being exceeded.

- Heathrow will extend the offer of noise insulation to homes that are already exposed to levels above the SOAEL values and will continue to be exposed above the SOAEL values after the new runway opens and as the air traffic to and from the expanded airport increases.
- After opening of the new runway, full insulation (Scheme 1) will be progressively offered to homes out to the Action Level of 60dB $L_{Aeq,16hr}$. As this is lower than the 63dB SOAEL for aircraft, this means more people and properties will be eligible for insulation.
- We have also made a commitment to use a combined contour based on both full, single mode contours, namely the easterly and westerly mode contours. This will produce a noise contour area larger than the area for the actual averaged east-west operations and effectively will treat areas impacted by one mode as if it occurred for the entire year.
- As use of the new runway grows after its 2026 opening, further areas for insulation will be sequenced to treat homes in advance of any air traffic growth and any associated noise forecast to newly exceed SOAEL.

2.9.6 As described in the PEIR, the other two aims of para 5.68 will be addressed by other mitigations, compensations and outcomes.

2.9.7 The second aim to mitigate and minimise adverse impacts on health and quality of life from noise will be addressed by a whole spectrum of noise mitigation measures. These range from promoting the aircraft fleet at Heathrow as the newest and quietest aircraft possible, and operational procedures including runway and airspace alternation to minimise noise levels and maximise predictable respite for communities.

2.9.8 The third aim is to, where possible, contribute to improvements to health and quality of life will be best addressed by our commitment that the expansion programme will achieve fewer people impacted by significant noise than “today” (i.e., 2013, the noise ‘policy baseline’ set by the Airports NPS).

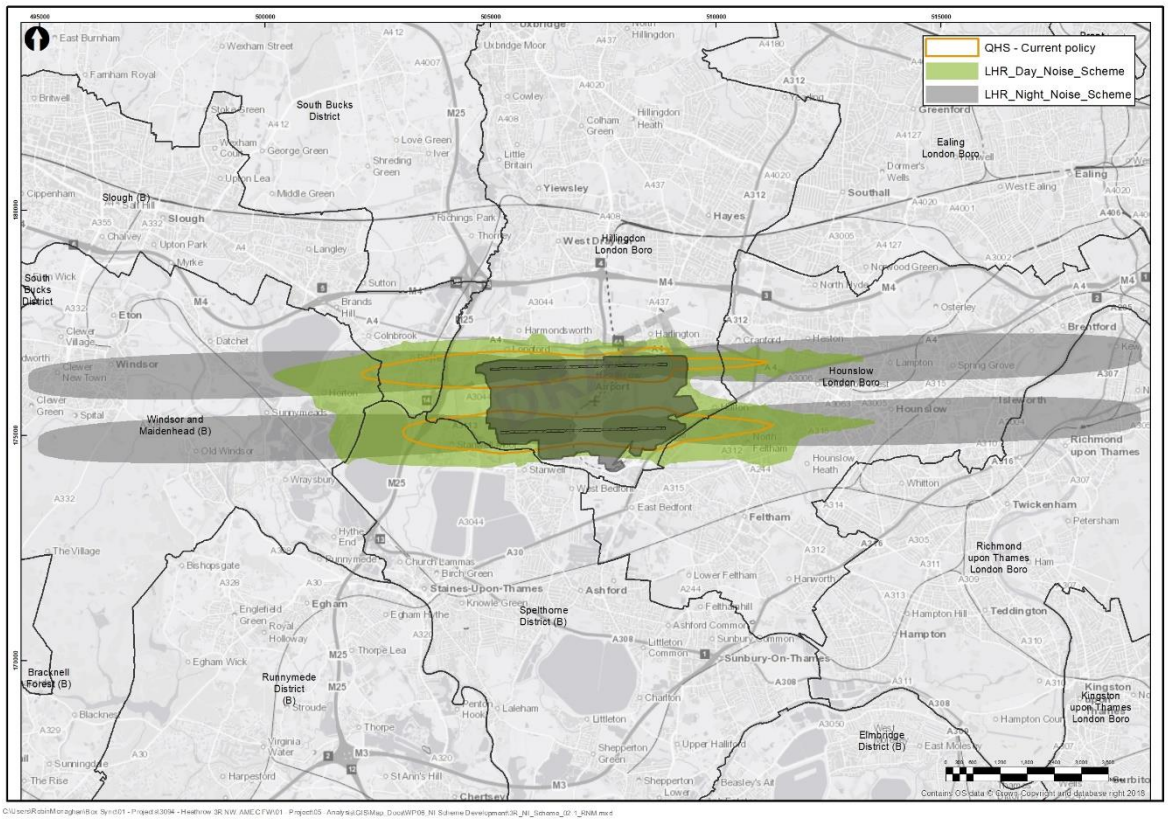
3. OUR NOISE INSULATION SCHEMES

3.1 Existing Noise Insulation Schemes

3.1.1 The new Noise Insulation Schemes associated with the Project will replace the existing noise home insulation schemes including the Quieter Homes Scheme, the Day Scheme and the Night Scheme. The existing scheme boundaries are shown in Figure 3.1 below.

- The Quieter Homes Scheme (QHS) applies to homes based on the 2011 69dB $L_{Aeq,16hr}$ contour. It covers the full cost of carrying out the work which can include loft and ceiling insulation, double-glazing or external door replacements and loft and ceiling over-boarding. (This is practically the same as the new Scheme 1.)
- The (Residential) Day Noise Insulation Scheme (or Day Scheme) is based on the 1994 69dB $L_{Aeq,18hr}$ contour and is designed to protect those homes exposed to the aircraft noise in the day, including in the early morning arrival period before 06:00. These properties are eligible to receive 50% of the cost of replacement windows and external doors, or free secondary-glazing, and free loft insulation and ventilation.
- The Night Noise Insulation Scheme (or Night Scheme) is designed to address the impact of night flights on local residents. The scheme boundary is based on the footprint of the noisiest aircraft regularly operating between 23:30 and 06:00. These properties are eligible to receive 50% of the cost of replacement bedroom or bedsitting room windows, or free secondary-glazing of bedroom or bedsitting room windows, and free loft insulation and ventilation.

Figure 3.1 Boundaries for Existing Noise Insulation Schemes



3.1.2 The Community Buildings Noise Insulation Scheme applies to noise-sensitive buildings around Heathrow that are exposed to a medium to high level of noise (within the 2002 63dB $L_{Aeq,16hr}$ noise contour). This includes hospitals, schools and colleges, nurseries attached to schools and hospices, nursing homes, registered nurseries, libraries and community halls. The scheme pays for buildings to make noise-insulating modifications such as double-glazing, replacement windows and ventilation. Eligible buildings are those in widespread use within the community, where people spend long periods of time, or where they are vulnerable.

3.1.3 Heathrow has two other schemes to assist home owners that are not directly related to noise insulation. The Home Relocation Assistance Scheme which offers financial help to eligible homeowners living in the noisiest areas around Heathrow to move away from the area if they wish. The Vortex Protection Scheme is designed to protect and repair homes around the airport damaged by wind currents from aircraft wing. These are discussed in more detail in Section 6.

3.2 Proposed New Residential Noise Insulation Schemes

3.2.1 The Noise Insulation Schemes are designed to ensure a suitable internal acoustic amenity for habitable rooms as summarised in the table below.

Table 3.1 New Residential Noise Insulation Schemes

Scheme	Noise Source	Description
Scheme 1	Aircraft noise	This includes a full package of noise insulation to habitable rooms, including bedrooms, living rooms, and dining rooms. This may include kitchens, toilets, bathrooms, but does not including porches, conservatories, out buildings and rooms solely for leisure activities. Windows may be upgraded to acoustic double glazing or by the addition of secondary glazing or both. External doors to habitable rooms may be upgraded. Ceilings or lofts may be over-boarded with additional lining. Acoustic thermal insulation batts (or equivalent) may be installed above ceilings in lofts. Suitable ventilation may be provided so that windows can be kept closed in warm weather. The scheme will be prioritised in the following order to: a) prevent exposure above UAEL due to the Project, b) avoid exposure newly above SOAEL due to the project, c) avoid exposure above SOAEL due to the project or existing operations, and d) deliver Heathrow's wider noise insulation commitments
Scheme 2	Road, rail and construction noise	Existing windows may be upgraded with replacement acoustic double-glazed units with "acoustic ventilation" or by the addition of secondary glazing, and external doors to habitable rooms may be replaced with doors that comply with the requirements of the Noise Insulation Regulations. Works are usually only to the façade (side) of the house that is closest to (or has line of sight of) the road or construction site.
Scheme 3	Aircraft noise	This is a £3000 contribution to a package of noise insulation treatment. For example, an owner might choose to replace certain windows or external doors, or install ventilation.

3.2.2 The Noise Insulation Schemes will provide additional noise insulation within properties that are exposed, or likely to be exposed, above the Action Levels set out below in Section 4.2.

3.2.3 Insulation aims to improve the internal acoustic amenity of the property in accordance with NPSE and the Airports NPS. The scheme is not intended to improve the noise environment outside of the property or building e.g. gardens.

3.2.4 To ensure the schemes are sustainable and will provide lasting benefit for people and properties, Heathrow will provide work packages from agreed suppliers with

suitable quality management procedures and aim to meet or exceed the minimum requirements of Airports NPS as set out above.

3.2.5 The schemes will provide “like for like” replacement of existing windows, doors etc, where reasonably practicable. This means that existing PVC windows will be replaced with PVC, aluminium with aluminium, and white with white. Approved contractors may be able to offer upgrades (e.g. timber effect or painted frames) as an extra cost option to the applicant. Cat flaps cannot normally be fitted to acoustic doors and windows but may be moved to doors or walls of non-habitable rooms.

3.2.6 The schemes will not be provided to properties that currently meet or exceed the benefit of the eligible package to avoid disruption without benefit, or even degradation, of existing properties.

3.2.7 Roofs are not replaced in the Noise Insulation Schemes and due to complications associated with existing roof conditions, it is not practical to replace roof windows or skylights. Generally, roof windows are replaced when a vortex protection roof is installed under the Vortex Protection Scheme. (See Section 6).

3.2.8 For practical reasons, ceiling over-boarding is usually undertaken by the home owner or their contractor with guidance provided and costs covered by the Noise Insulation Scheme.

3.3 Community Buildings Noise Insulation Scheme

3.3.1 The current community buildings scheme will be extended to cover community buildings impacted by expanded activity at Heathrow.

3.3.2 Community buildings include schools and colleges, hospitals, hospices and nursing homes, libraries and other public buildings where a large number of people will spend long periods of time or where the use is considered to be noise sensitive.

3.3.3 The scheme will identify potentially eligible community buildings within the contour whose owners will be invited to apply. Unsolicited applications will also be considered.

3.3.4 As per Airports NPS (5.245), the Action Level for schools will reduce to 60dB $L_{Aeq,16hr}$ (for a future operational scenario) compared to the current scheme based on the 2002 63dB $L_{Aeq,16hr}$.

3.3.5 A desktop or drive-by initial assessment may be used to determine if a site inspection is needed. Each eligible community building will receive an assessment to identify a suitable package of measures which will be carried out by an approved installer.

3.3.6 The scheme may include the provision of replacement acoustic double glazing or secondary glazing, external doors and ventilation. Eligible schools will also be invited to apply for grants for adobe buildings which provide outdoor noise-reducing shelter.

3.3.7 Insulation will only be offered if the building is not already insulated to an equivalent level to that of our scheme.

3.4 Impact on Existing Schemes

3.4.1 All residents entitled to claim for the existing schemes will be notified of the scheme closure with a period of at least 12 months during which claims may be lodged before closure.

3.4.2 The Quieter Homes Scheme (QHS) will be expanded to reflect any changes in Government policy before DCO is granted. If the DCO is granted and there is a decision to proceed with construction, then Scheme 1 will replace QHS. The Action Level for Scheme 1 will be lower than the existing QHS, so there will be expanded eligibility. This means homes eligible for the current QHS will be eligible for Scheme 1.

3.4.3 The Day and Night Schemes will be closed down if the DCO is granted and there is a decision to proceed with construction. Property owners in the areas of the schemes will be notified prior to the scheme closure and will also be advised if they are likely to be eligible for the new schemes. They will have the option to apply for the existing scheme before closure or apply for the new schemes when they open. Some areas of both schemes will become eligible for Scheme 1 which is a more complete treatment of the house but may not be delivered until after opening of the new runway. In some areas currently in the Night Scheme, furthest from the airport, night-time noise levels have decreased, and some homes may become eligible for Scheme 3 after the opening of the new runway.

3.4.4 The Community Buildings Noise Insulation Scheme (CBNIS) will be extended and no currently eligible building will lose eligibility.

3.4.5 The Home Relocation Assistance Scheme and the Vortex Protection Scheme will be refreshed to take the Project into account. See Section 6 of this document.

4. DEFINING ACTION LEVELS

4.1 Outline

4.1.1 Action Levels are the noise levels which can trigger the actions in the Noise Insulation Schemes. They are the threshold levels of eligibility for the Project's different schemes and noise sources. The Action Levels will be presented geographically as "contour lines" identifying the boundary of land where the Action Levels are exceeded.

4.1.2 In addition to aircraft noise, the Project will generate construction noise and noise from new or altered roads and railways that may cause potential adverse effects on communities. The Noise Insulation Schemes for each source vary and are described in more detail in Section 3.2.

4.2 Action Levels

4.2.1 The Action Levels for air, road, rail and construction noise, are provided below, based on metrics described in more detail in Appendix B and the PEIR.

Table 4.1: Action Levels for Aircraft, Road, Rail and Construction Noise

Noise Source	Action Level	Noise Insulation Scheme	Requirement Reference
Aircraft Noise	Unacceptable Adverse Effect Level (UAEL) Day time: 71dB $L_{Aeq,16hr}$ Night time: 66dB $L_{Aeq,8hr}$	Scheme 1 (with bespoke insulation package)	PEIR
	Initially, SOAEL values of 63dB $L_{Aeq,16hr}$ day, 55dB $L_{Aeq,8hr}$ night and one additional awakening per night (92-day summer averages). Then the full single mode easterly and westerly 60dB $L_{Aeq,16hr}$ noise contour of an expanded airport	Scheme 1	PEIR/ Airports NPS
	The full single mode easterly and westerly 57dB $L_{Aeq,16hr}$ or the full 55dB L_{den} noise contours of an expanded airport, whichever is the bigger	Scheme 3	Airports NPS
Road Noise	Day time: 63dB $L_{Aeq,16hr}$ Night time: 55dB $L_{Aeq,8hr}$ (and a change of at least 1dB from before expansion)	Scheme 2	PEIR
Rail Noise	Day time: 65dB $L_{Aeq,16hr}$ Night time: 55dB $L_{Aeq,8hr}$ >20 passbys per night: 80dB L_{Amax} <20 passbys per night: 85dB L_{Amax}	Scheme 2	PEIR

Noise Source	Action Level	Noise Insulation Scheme	Requirement Reference
	(and a change of at least 1dB from before expansion)		
Construction Noise	Refer to section 11 of the Draft Code of Construction Practice or Appendix B of this policy.	Scheme 2	CoCP and BS5228

4.3 Combined noise sources

4.3.1 The cumulative effect of different noise sources on health and quality of life is difficult to evaluate, especially where different noise metrics are used.

4.3.2 As a starting point, the noise level for each source (aircraft, road, rail, or construction) will be assessed separately using the relevant Action Level. Where a resident is affected by more than one noise source (for example construction noise and aircraft noise) a cumulative assessment will be undertaken that, as appropriate, will take account of when insulation may be triggered for the different sources and combined effects. Details of the assessment methodology will be defined in the Environmental Statement supporting the DCO application and this document will be updated.

4.3.3 Noise from natural sources, such as wind and rain, is not included in the NPSE definition of environmental noise. Furthermore, other noise sources that are not associated with the airport activity such as existing roads and railways are also excluded from this Noise Insulation Policy. When assessing a house site for noise insulation, any noise measurements or calculations will be undertaken or adjusted to exclude noise sources that are not caused by airport operations or expansion.

5. DELIVERY

5.1 Phasing and Transition from existing schemes

5.1.1 The new noise insulation schemes will replace the existing noise insulation schemes as described above. The stages of the Noise Insulation Policy are shown below in Table 5.1 below.

5.1.2 We will also consider options to assess the effectiveness of the new Noise Insulation Schemes, and to demonstrate our ability to deliver our schemes for subsequent stages.

5.1.3 The staged roll out of programmes may overlap and will ensure all properties likely to be significantly exposed to adverse noise effects will be offered noise insulation before the source of the noise effect is introduced. This staging will also help to avoid long waiting times between applications and fit outs.

Table 5.1 – The Staged Roll-out of Noise Insulation Schemes.

Stage	Period	Homes for Noise Insulation	Scheme
Stage 1	From late 2019 (subject to CAA approval) until DCO application is granted	Homes that are exposed to the highest noise with existing operations, in line with latest Government policy, and this includes homes that would also be exposed to the highest noise with the Project. Also homes potentially exposed to early construction noise as well as existing high aircraft noise. Homes will also be selected in this stage to develop and test our systems and suppliers. (Figure 5.1)	Scheme 1
Stage 2	Between DCO application granted and start of major construction phases	Homes identified as potentially impacted by construction noise, but outside forecast aircraft noise impacted areas. (Figure 5.2 shows the indicative construction noise study areas.)	Scheme 2
Stage 3	Between DCO application granted and new runway opening	Homes forecast to be newly exposed to high, or very high, noise levels from aircraft or the new or altered roads or rail, in stages as the Project progresses.	Scheme 1 and Scheme 2
Stage 4	New Runway opening onwards	Insulation provided in advance for homes forecast to exceed SOAEL for aircraft (i.e. 63dB $L_{Aeq,16hr}$ day and 55dB $L_{Aeq,8hr}$ night) as traffic using the expanded airport grows to a point where the airport's noise impact is forecast to be highest (the peak year as defined in the Environmental Statement). There will also be progressive roll-out of offers to homes at aircraft noise levels from SOAEL down to the 60dB Action Level as airport movements grow.	Scheme 1

Stage	Period	Homes for Noise Insulation	Scheme
		Figure 5.3 has the current estimate of the predicted noise contour for 2027, but revised noise contour forecasts will be published every 5 years. (This is referred to as the Inner Area in the PEIR. We expect this stage to be completed by 2040).	
Stage 5	New Runway opening onwards	There will be progressive roll-out of offers to homes at noise levels down to the 57dB $L_{Aeq,16hr}$ and 55dB L_{den} Action Levels as airport movements grow. Revised noise contour forecasts will be published every 5 years. (This is referred to as the Outer Area in the PEIR.)	Scheme 3

5.2 Identification of eligible buildings

5.2.1 At each stage, the relevant existing or predicted noise contour will be used to identify the properties that may be eligible for the Noise Insulation Schemes. Noise contours will be calculated based on expected air, road, rail and construction traffic movements and the modelling of construction plant noise.

5.2.2 For this consultation, preliminary noise contours are available below and in Chapter 17 of the PEIR. The aircraft noise contours have been developed based on indicative flight paths. These contours are presented to provide an indication of the scope of the Noise Insulation Schemes.

5.2.3 For the DCO application in 2020, updated noise contours will be provided in the Environmental Statement.

5.2.4 The predicted aircraft noise contours will also be updated as part of the statutory airspace flight path options consultation for an expanded Heathrow, currently planned for 2022, and further again in 2023 when the final flights paths are defined.

5.2.5 This will mean that the aircraft noise contours are expected to evolve and be updated as the Expansion scheme design and airspace change process continues to evolve and develop. This may result in some changes to the predicted future contours so that some homes indicated as being within a certain noise contour may later fall outside that contour and vice versa. The aim at each stage will be to reduce the noise impact, in line with the Airports NPS and the ICAO “balanced approach”, which would also reduce or change the homes within the contours, as far as reasonably practicable.

5.2.6 Subsequently, the current noise contours will be published every year (for the previous year), and projected noise contours will be updated every 5 years in conjunction with developments of the Noise Envelope.

5.2.7 This will mean that future eligibility for noise insulation schemes will be continually reviewed and residents will be informed if they are likely to be eligible within 5 years. Where a 5-year review identifies that a contour may reduce and properties may not be eligible in future, the scheme will remain open for at least 12 months after the property ceases to be within a relevant contour.

5.2.8 In densely developed areas such as those with terraced homes, there are likely to be adjacent properties exposed to similar noise levels with one property inside the contour whilst its neighbour outside. For this policy any residential property with any part of its curtilage within the contour will be assessed to be within the contour.

Figure 5.1 – Stage 1 – Prior to DCO Grant

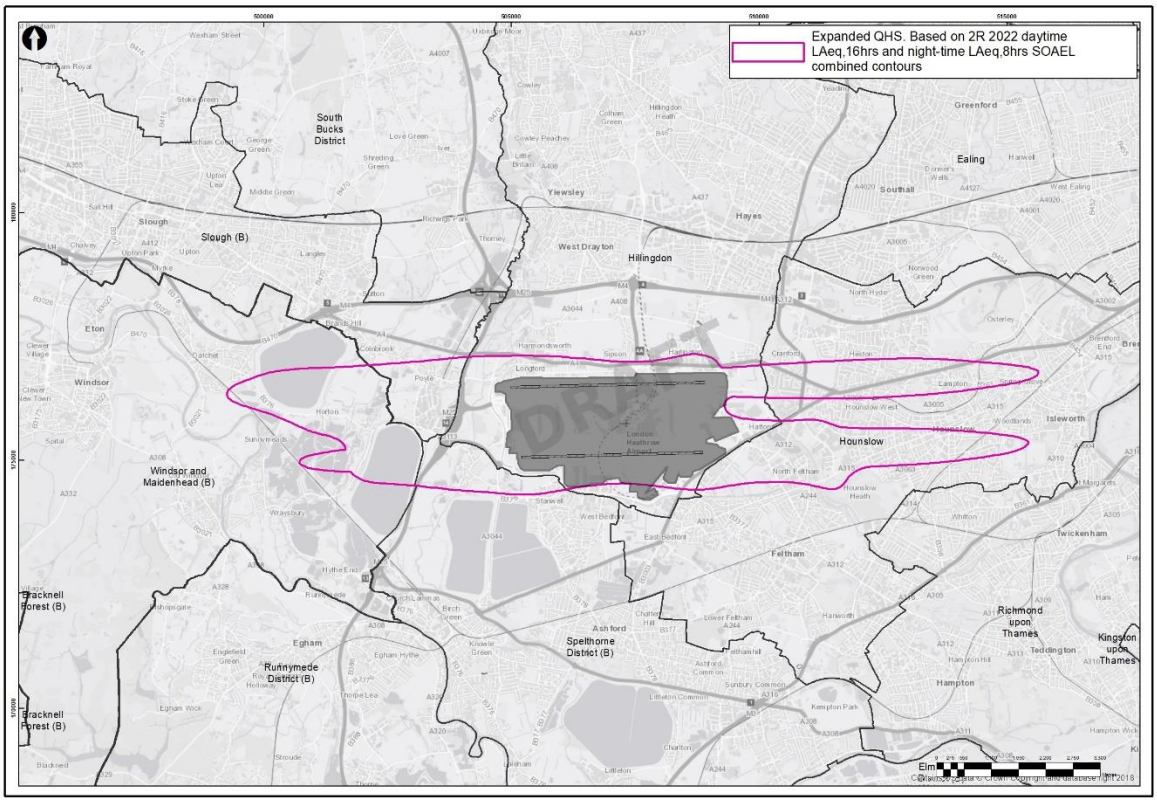


Figure 5.2 – Stage 2 – Indicative Construction Noise Study Area

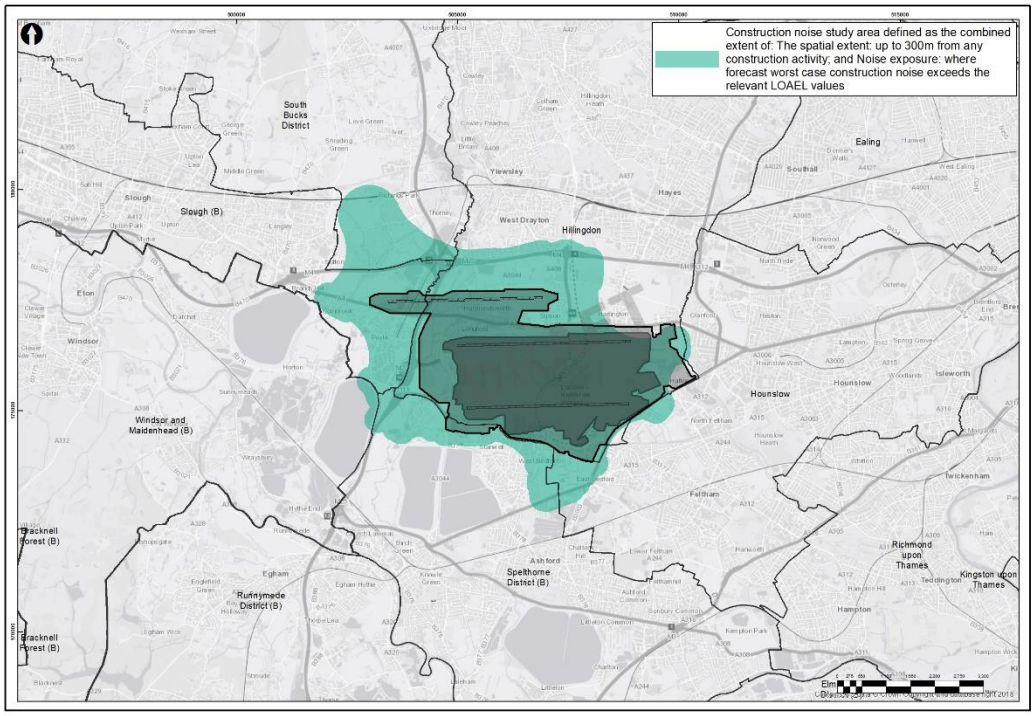
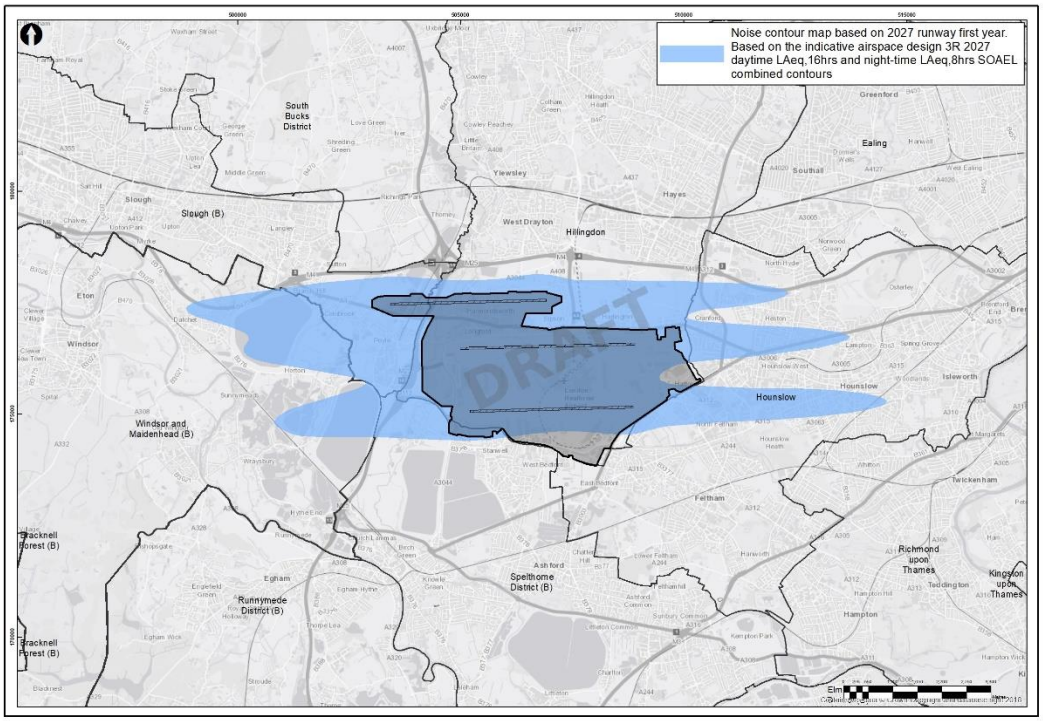


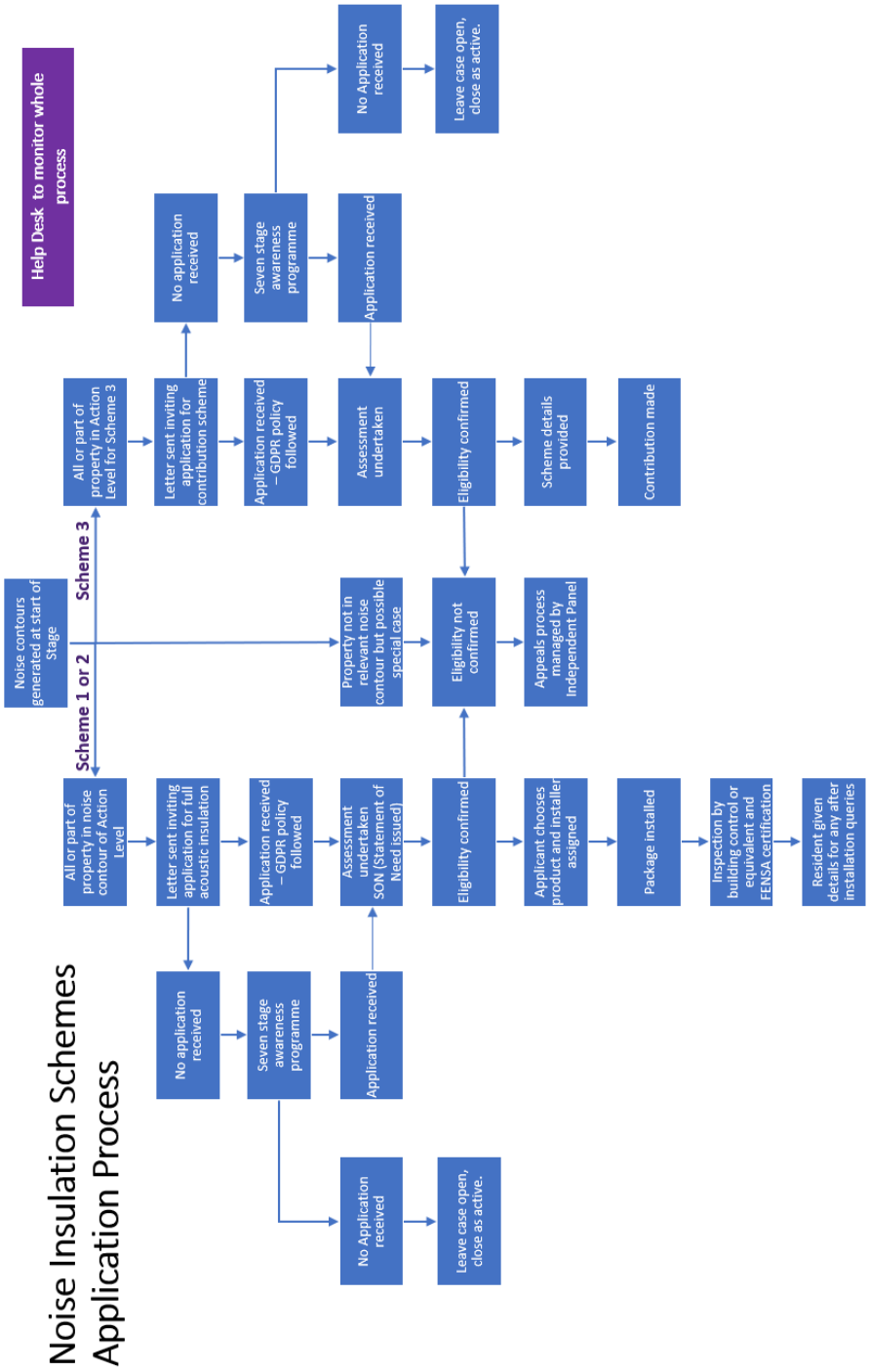
Figure 5.3 – Stage 3 – Indicative Noise contour map based on 2027 runway opening year



5.3 Application Process

5.3.1 The process for delivering the Noise Insulation Schemes is summarised in a flow chart in Figure 5.4.

Figure 5.4 – Application Process Flow Chart



5.3.2 At each stage, or at intervals within a stage, the owners of properties identified as within the relevant noise contour will be contacted by post and advised that they are eligible to apply for the scheme.

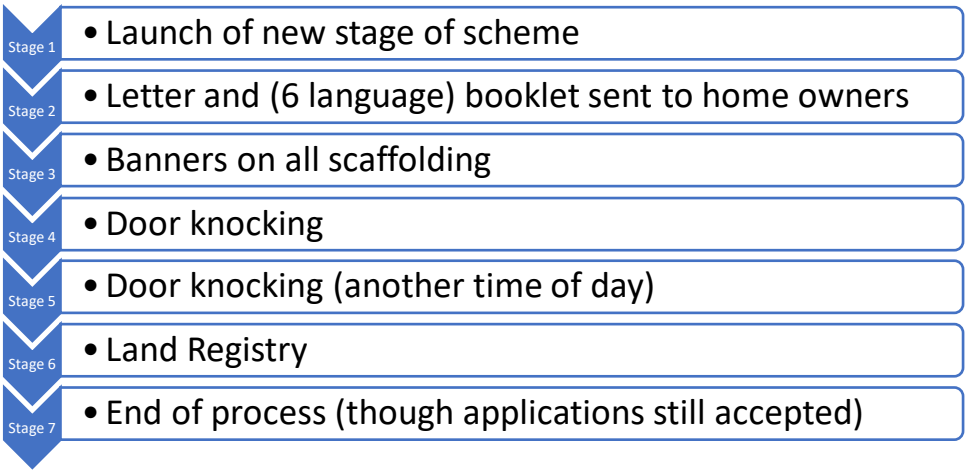
5.3.3 Where a property is rented, the tenant must obtain the permission of the property owner to apply for the scheme. This is for legal reasons.

5.3.4 Although Heathrow will seek to identify all eligible people and invite them to apply, a helpdesk will be available for people to check if they are eligible to apply.

5.3.5 The invitation to property owners will be supported by a seven-stage programme that is designed to promote awareness of the scheme and encourage applications. The seven-stages are outlined in a flow chart in Figure 5.5 and Appendix C.

5.3.6 If the homeowner does not respond during this seven-stage process, the application will be marked as dormant unless the property is within the UAEL contour. The homeowner may apply at a later date (if still eligible) but we cannot then guarantee that the insulation will be installed before the noisy activity starts.

Figure 5.5 Seven-stage awareness programme



5.3.7 Once an application has been received and a property owner has registered for the scheme, an assessment of the property will be carried out by the Assessor, a third-party organisation appointed by Heathrow. An initial desktop or drive-by assessment may be used to identify if a detailed inspection is required.

5.3.8 The initial assessment will address the following questions:

- Is the applicant entitled to apply for the property (the homeowner or appointed agent)?
- Is the property within a relevant noise contour?
- What is the relevant scheme and is there a priority for delivery?

- Has the property benefited from a previous scheme? What is the condition of the property?
- What works or options would be offered under the relevant scheme?
- Are any consents required for the works?
- Are there any special considerations?

5.3.9 Once the Assessor confirms eligibility, the property owner will be provided with scheme details and a list of approved installers or processes to enable work to take place. For Scheme 1 this will normally be summarised in a Statement of Need (SON) based on the house construction external noise levels, and priority.

5.3.10 Records will be made of all properties contacted as eligible, persons making applications under the scheme, the outcome of the assessment, and the satisfactory completion of the package, if provided.

5.3.11 Heathrow will seek to provide information to home owners, house purchasers or their agents and tenants, on request, concerning the eligibility of properties for noise insulation schemes, subject to data protection and confidentiality requirements. It is for this reason the database of information is managed by an address rather than the owner's or resident's name.

5.3.12 Properties eligible for the Scheme 3 contribution to noise insulation will be required to use a supplier approved by Heathrow to ensure suitable quality management.

5.3.13 After the completion of works, auditing will be conducted to demonstrate compliance. This will include performance inspection or tests of a sample range of properties.

5.3.14 A dedicated support team will be provided to assist applicants throughout the process, including people needing special assistance, and to investigate any complaints during and after completion. Applicants will also be able to appeal to the Independent Panel. (See Section 5.4.)

5.3.15 Reasonable time needs to be allowed for applicants to be identified, for applicants to consider and apply for the scheme, to receive applications and determine eligibility, and to carry out the works. Therefore, the Noise Insulation Schemes will open in advance of the relevant expected noise change. It is also possible that applicants may defer, perhaps hoping that they will find the noise acceptable and avoid the disruption of the works. The schemes will therefore remain open for at least a year after the relevant expected noise change occurs.

5.3.16 Where consents are required for the installations proposed by the Noise Insulation Schemes, for example, planning, listed building or conservation area consents, and building control, the appointed contractor and the Heathrow support team will

assist the applicant in obtaining the necessary consents[1]. It is normally the responsibility of the homeowner to obtain these consents, but in some circumstances support with consent applications could be provided.

5.4 Appeals and Exceptions

Applications from non-eligible properties

5.4.1 Although Heathrow will seek to identify all eligible home owners and invite them to apply, a help desk will support other people who wish to check eligibility to apply. These may be people who are not in the current stage, or who are outside the contours, or who have a special case for consideration.

Appeals

5.4.2 An independent appeal process will be available to applicants who do not accept an eligibility or Statement of Need (SON) decision. After the initial response by the Assessor, an appeal may be made to an Independent Panel who will carry out an initial review, consider if further action is appropriate and advise the complainant of their decision.

5.4.3 Heathrow will set up and fund the Independent Panel in consultation with other community and local authority stakeholders, modelled on that set up for the Thames Tideway project.

Exceptions

5.4.4 The policy and schemes described above meet or exceed the minimum requirements of the Airports NPS and NPSE, and provide sustainable and practical schemes for the majority of people and properties. However, there may be exceptional cases where a bespoke alternative performance standard to meet the requirements could be considered. Examples may be:

- a person with a specific health or disability issue associated with noise,
- a property which is not suitable for the standard schemes, such as some listed or historic buildings,
- a property exposed to very high noise levels above the UAEL of 71/66dB $L_{Aeq,16/8hr}$ for aircraft noise.

5.4.5 Bespoke assessments and schemes are inherently costly and can be disproportionate in the effort and funds required for assessment and design compared to delivery and therefore may not be considered practicable or

[1] Normally the property owner or resident will apply for the consent and retain the benefit of any permissions granted.

sustainable but can be appropriate in exceptional circumstances. The Independent Panel would review cases where bespoke assessments may be justified and recommend the most appropriate treatment options. Where substantial works are required, temporary relocation may be offered on a similar basis to that offered for construction noise.

5.4.6 For the very few properties that will be newly exposed above the UAEL, where an application is not received or an offer accepted, we may need to obtain compulsory rights to provide bespoke treatments to prevent exposure above UAEL. Such treatments may also need to include temporary rehousing to allow the work to be done to those homes. This will be addressed in the DCO application.

6. OTHER SCHEMES BEYOND THE NOISE INSULATION POLICY

In addition to the noise insulation schemes in this draft Noise Insulation Policy, Heathrow has two other existing noise and vortex related schemes that will be refreshed. These are the Home Relocation Assistance Scheme which offers financial help to eligible homeowners living in the noisiest areas around Heathrow to move away from the area if they wish; and the Vortex Protection Scheme which is designed to protect and repair homes from around the airport damaged by wind currents from aircraft wings.

Heathrow will also introduce a Temporary Rehousing Scheme for those most impacted by short term construction noise. These schemes are summarised in this section for reference.

6.1 Proposed Temporary Home Relocation Scheme

6.1.1 This section sets out a draft proposal for a Temporary Home Relocation Scheme for those most impacted by short term construction noise.

6.1.2 Where, after applying best practical means mitigation, construction noise at any residential receptor is predicted to exceed the construction noise insulation Action Levels for a temporary period, Heathrow would offer an option of temporary re-housing for the duration of the works. The Action Level will be based on the UAEL for construction noise of around 75 to 85dB $L_{Aeq,T}$, as detailed in Appendix B.

6.1.3 Heathrow will contact the owners or occupiers of properties affected before the works are due to start to allow residents to find alternative property and move before the noisy works begin. Temporary re-housing could be a similar rental property or a hotel.

6.1.4 Heathrow will provide a help desk and work with local property agents to identify suitable temporary accommodation and support applicants who choose to find their own temporary housing. Applications will be assessed for:

- Property location and eligibility
- Ownership/occupancy
- Accommodation requirements including any special needs or adaptations

6.1.5 Eligible applicants will receive a Statement of Need (SON) setting out what range of temporary accommodation will be provided within the scheme, details of local letting agents, removal and storage companies, and the Heathrow helpdesk support.

6.1.6 Subject to eligibility, Heathrow would pay the reasonable costs of:

- Equivalent temporary accommodation based on reasonable market rates,
- Packing and removal costs, and storage of personal goods if required
- Kennel/cattery or equivalent housing for pets,
- Works to secure the vacated property when empty, including disconnection and re-connection of services, and
- Additional insurance for temporary accommodation and vacated property.

6.1.7 Applicants will be able to make their own arrangements, but payments will be audited and claimants must receive approval from Heathrow of the supplier and of the costs before using suppliers not previously audited by the scheme.

6.1.8 Heathrow will usually seek to support temporary accommodation as close as practical to the vacated property, but sufficiently distant to avoid significant noise impacts. Where temporary accommodation is a significant distance from the permanent location, assistance with travel costs (e.g. workplace or school) may be provided.

6.2 Home Relocation Assistance Scheme (HRAS)

6.2.1 Since 2002, Heathrow has offered the Home Relocation Assistance Scheme to offer financial help to eligible homeowners living in the noisiest areas around Heathrow to move away from the area if they wish. It was developed in consultation with local residents, businesses, campaign groups and local authorities. People who meet the criteria can get financial assistance with the costs of moving.

6.2.2 This current HRAS scheme applies to residential properties around Heathrow that are exposed to a high level of noise defined for this scheme as lying within the 2002 69dB $L_{Aeq,16hr}$ noise contour.

6.2.3 The criteria for eligibility including the following:

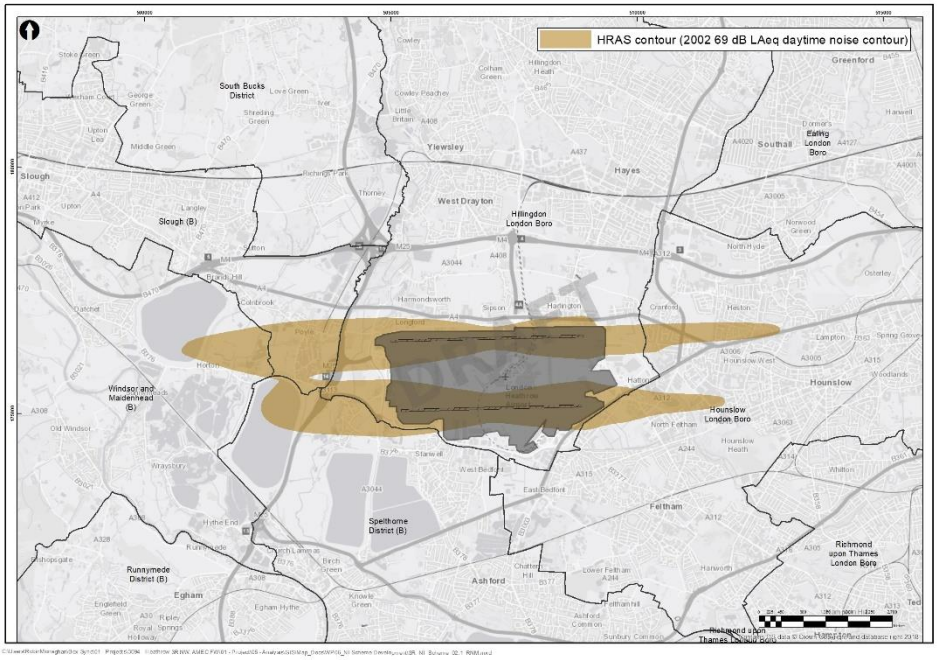
- The applicant must own the property when applying. (If the applicant lives elsewhere, it must be the only property in the UK that is owned by the applicant.)
- The applicant must be planning to move to a quieter area outside the boundaries of the scheme.
- The applicant must not retain a beneficial interest in, or right of occupation to, the property after moving.

- Residents must have owned or be living in the property prior to February 2005.
- Long-term tenants (with at least three years remaining on their lease) may also be eligible for assistance if the property they are renting is being sold. However, short-term tenants are not eligible for the scheme.

6.2.4 Homeowners receive a lump sum of £5,000, plus 1.5% of the sale price of the property (up to a maximum of £12,500). There is only one payment per property. No other assistance is provided and the property is no longer eligible for a Noise Insulation Scheme[2]. The property is sold in the open market by the owner.

6.2.5 More information on this current scheme and its eligibility criteria are provided by a Noise Helpdesk (0800 344844) or email communityschemes@heathrow.com

Figure 6.1 – Boundary for Existing HRAS



6.2.6 Heathrow is taking the opportunity to enhance the Home Relocation Assistance Scheme. The eligibility criteria will remain the same.

6.2.7 The compensation values are under review. Under the refreshed HRAS, eligible homeowners would receive the same lump sum of £5,000 and an additional 5% of the sale price of the property, up to a new higher maximum cap. There is only one payment per property.

[2] Under the "agent of change" and "caveat emptor" principles, the open market buyer of a property should consider any noise insulation requirements within their purchase price offer. For houses purchased by Heathrow, any noise insulation scheme would normally be provided before the property is returned to the market.

6.2.8 HRAS will apply to the areas to east, west and possibly south of the existing two runways based on the $L_{Aeq,16hr}$ 69dB noise contour. (See below for discussion of the year of the applicable contour.)

6.2.9 As with the Noise Insulation Schemes, HRAS eligibility will require that some part of a property lies within the relevant, calculated noise contour.

6.2.10 More information about a refreshed HRAS will be available later this year. Eligibility for HRAS will continue to be based on the 69dB $L_{Aeq,16hr}$ contour from 2002. It can be noted that since 2002, the annual noise contour at Heathrow has continually decreased is size, which means that some houses that qualified for HRAS in the past, now lie outside the current 69dB contour.

6.2.11 In 2021, if the DCO is granted and there is a decision to proceed with construction, HRAS will be based on the 69dB $L_{Aeq,16hr}$ contour for 2020 (because the 2021 contour will not be available). With expansion, however, there may be years when the noise contour could be different to the previous year. Therefore, the intention is that HRAS will be based on the noise contour for 2020 or the projected contours for 2025, whichever is larger. Subsequently, from 2026, HRAS will be based on noise contour for 2025 and the projected contours for 2030, whichever is larger.

6.2.12 In this manner, a homeowner will be able to make a decision on selling and claiming the HRAS scheme, based on the highest noise levels expected for five years.

6.2.13 If with the publication of a new HRAS contour, a property newly falls outside, previous eligibility for the scheme will be considered for 12 months.

6.3 Vortex Protection Scheme

Existing Vortex Protection Scheme

6.3.1 A vortex is a circulating current of air generated by the wings of an aircraft. It can sometimes strike and damage the roofs of houses located under a flight path. Pitched roofs with loose-laid tiles are prone to vortex damage. For many years, Heathrow has had a Vortex Protection Scheme to both repair and protect homes around the airport.

Damage Repair

6.3.2 If a home has been damaged by a vortex strike, Heathrow operates a 24-hour emergency service and will repair it. Although legal liability for vortex damage rests with the airlines, Heathrow voluntarily funds this scheme as part of its commitment to its local communities.

6.3.3 Every house, school, church or hospital affected by a vortex strike is eligible for the Vortex Protection Scheme. This includes home situated above commercial properties. However, the scheme does not cover damage to other property, such as cars, from roof tiles dislodged by a vortex.

6.3.4 An assessor will inspect a roof reported as damaged. The damage caused by vortex strikes is very specific and the assessor will quickly be able to confirm whether one has occurred. Once approved, remedial repairs to the roof are carried out at no cost to the home owner.

Vortex Protection

6.3.5 If a roof is repaired under the Vortex Protection Scheme, the property is eligible for permanent protection. This involves strengthening the roof by fixing down tiles with metal clips that have passed stringent wind tunnel tests – this has proven to be the most effective way to protect roofs from vortex damage. This work will be completed as soon as possible and free of charge.

6.3.6 Because the majority of vortex strikes are concentrated in small areas near the end of runways, Heathrow offers blanket vortex protection for homes in these high-risk areas. This currently includes streets where 50% of the homes on a given road have been struck, where all of the homes are invited to register under a blanket scheme.

6.3.7 To date, no further vortex damage has been recorded at any home that has had its roof strengthened under the Vortex Protection Scheme.

6.4 Expanded Vortex Protection Scheme

6.4.1 For the Project, a new blanket area based on the new runway layout has been defined that identifies homes where vortex damage may occur. After granting of the DCO and a decision to proceed, Heathrow will undertake vortex protection of all of the roofs in the defined area that are eligible within a blanket roll out.

6.4.2 After opening of the new runway expected in 2026, the Vortex Protection Scheme will continue as it does today. We will respond to reports of vortex damage, and areas with many confirmed reports of damage will be considered for blanket protective treatments.

APPENDIX A: GLOSSARY

Term	Definition
Airports NPS (or ANPS)	Airports Noise Policy Statement (2018)
APF	Airports Policy Framework
BS 5228	British Standard 5228 (2014): Code of practice for noise and vibration control on construction and open sites Part 1: Noise.
BS8233	British Standard 8233 (2014): Guidance on sound insulation and noise reduction for buildings
CAA	Civil Aviation Authority
CoCP	The Draft Code of Construction Practice included in the current consultation documents.
CRTN	Calculation of Road Traffic Noise – a guidance document for road noise referred to in the Noise Insulation Regulations
CRN	Calculation of Railway Noise – a guidance document for rail noise referred to in the Noise Insulation Regulations
dB (or dBA)	Decibel (usually A-weighted to approximate the response of the human ear.) is used to measure noise level on logarithmic scale (relative to a standard reference.)
DCO	Development Consent Order
DfT	Department for Transport
Double glazing	This is a window pane with two sheets of glass giving better noise insulation (and thermal insulation) performance than a pane of single glazing. The double glass units are factory sealed and installation will usually require the removal of the existing windows and frames. Acoustic double glazing, for example using laminated glass, can provide better noise reduction than standard thermal double glazing.
ENG	Environmental Noise Guidelines for the European Region (2018)
GCN	Guidelines for Community Noise (WHO 1999)
The Project	Heathrow Expansion Programme
HRAS	Home Relocation Assistance Scheme
ICCAN	Independent Commission on Civil Aviation Noise
L_{A10} or L_{10}	The noise level exceeded for 10% of a measurement period. This is traditionally used to measure road traffic noise.
$L_{Aeq,16hr}$	The noise level averaged over the 16-hour day period (07:00-23:00) and over the 92-day summer period. This day time aircraft noise metric has been used in the UK since the 1980's.
$L_{Aeq,8hr}$	The noise level averaged over the 8-hour night period (23:00-07:00) and over the 92-day summer period. This night time aircraft noise metric has been used in the UK since the 1980's.
$L_{Aeq,T}$ or $L_{eq,T}$	The energy equivalent noise level over a specified period, T, and A-weighted to approximate the response of the human ear.
L_{den}	The annual average energy equivalent noise level, A weighted to approximate the frequency response of the human ear and time weighted for day, evening and night time periods. This annual aircraft noise metric was adopted as the standard noise metric in the EU in 2002.

L_{Amax} or L_{max}	The maximum noise level occurring during a measurement period, A weighted to approximate the frequency response of the human ear.
L_{night}	The A-weighted noise level averaged over the 8-hour night period (23:00-07:00) and over the calendar year.
LOAEL	Lowest Observable Adverse Effect Level
NNG	Night Noise Guidelines (WHO 2009)
Noise Insulation Policy	The policy set out in this document to address the Airports NPS requirements for the Heathrow Expansion Programme, The Project.
Noise Insulation Regulations	Noise Insulation Regulations (1974) as amended by Noise Insulation Regulations (Amended) 1988 and The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996
Noise Insulation Schemes	The 3 schemes or levels of acoustic treatment for aircraft, road, rail and construction noise set out in this Policy.
Noise Insulation Strategy	Heathrow's wider and long-term approach to the insulation of homes and community buildings for existing activities, airspace changes and the Expansion Project.
NPPF	National Planning Policy Framework (2019)
NPSE	Noise Policy Statement for England
PPG or PPGN	Planning Practice Guidance-Noise (2014)
The Project	The Heathrow Expansion Programme
Secondary glazing	This is an upgrade of the acoustic performance of an existing window, by the installation an addition glazing pane in its own frame on the existing sill of the window.
SOAEL	Significant Observable Adverse Effect Level
SON	Statement of Need
UAEL	Unacceptable Adverse Effect Level
WHO	World Health Organisation

APPENDIX B: NOISE METRICS AND ACTION LEVELS

Aircraft Noise [92-day summer average levels unless noted otherwise]				
Level	Daytime dB $L_{Aeq,16\ hr}$	Night time dB $L_{Aeq,8\ hr}$	Event dB L_{Amax}	Policy Source
"*approximate onset of significant community annoyance*"	54			APF (2013) as amended by Consultation Response on UK Airspace Policy (2017)
LOAEL	51	45		Air Navigation Guidance (2017) and PEIR
Financial assistance toward insulating homes and schools	63			Consultation Response on UK Airspace Policy (2017)
SOAEL	63	55	One additional awakening per person, per night	PEIR
Proposed new expectation for financial assistance toward insulating homes and schools	60			Draft Aviation Strategy 2018
UAEL	71	66		PEIR
Action Level for Scheme 1	The full single mode easterly and westerly 60dB $L_{Aeq,16hr}$ noise contour of an expanded airport		One additional awakening per night	
Action Levels for Scheme 3	The full single mode easterly and westerly 57dB $L_{Aeq\ 16hr}$ or the full 55dB L_{den} noise contours of an expanded airport, whichever is the bigger		One Additional awakening per night	Airports NPS (5.245)
Proposed Govt new expectation for financial assistance toward insulating homes	An increase of 3dB compared to before expansion which leaves a household in the 54dB $L_{Aeq,16hr}$ contour			Draft Aviation Strategy 2018

Road Noise				
Level	Daytime $L_{Aeq,16\ hr}$	Night time $L_{Aeq,8\ hr}$	Event	Source
LOAEL	50	40		PEIR
SOAEL	63	55		PEIR
UAEL	71	66		PEIR
Action Levels for Scheme 2	63/55dB $L_{Aeq\ 16/8\ hr}$ (and a change of at least 1dB from before expansion)			PEIR and Noise Insulation Regulations
Rail Noise				
Level	Daytime $L_{Aeq,16\ hr}$	Night time $L_{Aeq,8\ hr}$	Event L_{Amax}	Source
LOAEL	50	40	60	PEIR
SOAEL	65	55	80 (>20 events) or 85 (<20 events)	PEIR
UAEL	71	66		PEIR
Action Levels for Scheme 2	65/55dB $L_{Aeq\ 16/8\ hr}$ (and a change of at least 1dB from before expansion)			PEIR and Noise Insulation Regulations

Construction Noise

In line with Section 11 of the draft CoCP, to be eligible the dwelling must be one in which the predicted or actual noise exceeds any of the relevant thresholds in CoCP Table 11.1 for:

- A period of 10 or more days of working in any 15 consecutive days during construction, or
- A total of 40 days or more in any 6 consecutive months during construction

The noise thresholds for both construction and noise insulation are set out in the Table below:

Day	Time (hours)	Averaging Period, T	Noise Insulation Action Level $L_{Aeq,T}$ (dB)*	Construction Temporary Rehousing Action Level $L_{Aeq,T}$ (dB) *
Monday to Friday	0700 – 0800	1 hour	70	80
	0800 – 1800	10 hours	75	85
	1800 – 1900	1 hour	70	80
	1900 – 2200	1 hour	65	75
Saturday	0700 – 0800	1 hour	70	80
	0800 – 1300	5 hours	75	85
	1300 – 1400	1 hour	70	80
	1400 – 2200	1 hour	65	75
Sunday & Public Holiday	0700 – 2200	1 hour	65	75
Any night	2200 – 0700	1 hour	55	65

* DCO Project construction noise only. Trigger levels are defined as 1m in front of the closest façade of a habitable room. Where measurements are used, they will be taken either at the façade or in free-field. A façade correction will be applied to any free-field measurements to establish the façade level.

* Where the current ambient noise level is greater than the noise insulation trigger level:

    1. the ambient noise level will be used as the noise insulation trigger level
    2. the temporary rehousing trigger level will be the ambient noise level +10dB.

APPENDIX C: SEVEN-STAGE AWARENESS PROGRAMME TO INFORM AND ENCOURAGE APPLICANTS

Stage 1: Launch of New Stage

Public awareness of the launch of a new stage of noise insulation will be driven through notices posted at the following – Community Centres, Churches, Local MP's and Schools.

Stage 2: How individual residents are made aware of Heathrow's Noise Insulation Scheme

All property owners that qualify for Heathrow's current stage are individually written to explaining the scheme in detail. A comprehensive booklet written in six languages will be sent to all homes identified within the relevant contour – English, Arabic, Hindi, Polish, Punjabi and Urdu.

Every effort is made to ensure that qualifying residents are able to understand the booklets that outline the scheme, key facts, explain proposed works and most importantly who to contact should further information be required to clarify what is in the booklet and answer any questions.

Stage 3: Banners on all scaffolding

During works on a property, scaffolding set up at a home being fitted out will include a banner displaying. Neighbouring properties will be able to that it is a Heathrow related scheme and neighbours will be encouraged to phone up, investigate their eligibility and register for the scheme.

Stage 4: Door knocking

Staff 'door knock' resident's properties that are eligible for the scheme to speak directly with them and hand over another booklet that explains the scheme in detail. This will give the residents the opportunity to ask any questions that they may have as a result of the scheme being discussed. In the event that there is nobody home at the time of the visit, another booklet will be posted to drive awareness of the Noise Insulation Scheme.

Stage 5: Door knocking

Stage 4 is repeated at a different time of day. If, for example, a property was originally visited in the morning then the second visit would be in the afternoon to make every effort to speak with the resident.

Stage 6: Land Registry

Heathrow contact the Land Registry with a view to contacting landlords whose homes qualify for NIS. A comprehensive booklet will be posted to further drive awareness of NIS to help drive registrations.

Stage 7: End of process

Make a record that all awareness processes have been completed. The residents/ landlords still have the opportunity to come forward as long as they are still within the specified noise contour. The purpose of documenting is to demonstrate that all seven stages have been processed.

There are lots of ways you can contact us or find out more

Find all the consultation information on our website aec.heathrowconsultation.com

Email any questions about the consultation to info@heathrowconsultation.com

Follow @LHRconsultation to stay up to date on event details

Call our freephone number 0800 307 7996 (open Monday to Friday, 9am-6pm)

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By Louise Smith

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BRIEFING PAPER

Number 8567, 16 May 2019

Tracing ownership of property or land

By Lorraine Conway

Contents:

Contents

Summary

Constituents often ask their Members of Parliament, "who owns that empty property or piece of land?" Although a simple question, it is not straightforward to answer.

Property in England and Wales can be either registered or unregistered and the steps involved in tracing ownership will vary accordingly. Any member of the public can search online the Land Registry (a fee is payable), information is available from the GOV.UK website. The Library **cannot** undertake Land Registry searches on behalf of constituents.

If the property or land is registered, then a Land Registry search should reveal the owner(s) name. If the property is unregistered, then matters become more difficult. Lack of registration does not mean that a piece of land is not owned but ascertaining who owns the land may involve some investigatory work. Owners of unregistered land will have a bundle of paper deeds, which form a record of previous sales, mortgages and other dealings with the land. In cases where there is no legal owner, the property may have become bona vacantia and have reverted to the Crown.

This Commons briefing paper provides information on how to trace ownership of a property or piece of land (section 3), in the process it also provides a summary of land ownership (section 1) and what is meant by registered and unregistered land (section 2). This briefing paper is concerned with England and Wales only; Scotland has its own land law. Northern Ireland and Scotland also have their own land registries.

1. Land ownership

1.1 Relevant legislation

- Land Registration Act 1925 (LRA 1925)
- Land Registration Act 2002 (LRA 2002)
- Land Registration Rules 2003 (LRR 2003)

1.2 Crown land

Land ownership in England and Wales is based on historical feudal principles. The Crown owns all land in England and Wales; people own estates in land either directly or indirectly from the Crown (for example, a freehold estate or a leasehold estate).

There are different categories of Crown land. For detailed information, see Part XI of the Law Commission's report on "Land Registration for the Twenty-First Century: A Conveyancing Revolution."

1.3 Estates in land

Major changes to property law in England and Wales were made in 1925, for example the Law of Property Act 1925, which reduced the number of estates in land capable of being created or conveyed at law to an estate in fee simple absolute in possession (the freehold estate) and a term of years absolute (the leasehold estate).

1.4 Types of legal ownership

This is a complex area of the law. The following information is at best an outline of the main types of ownership.

Land can be owned in various ways. A person might be the **legal owner** (freehold or leasehold) and/or they might have a beneficial interest (sometimes known as an owner in "equity" or an "**equitable owner**"). For example, someone who has contributed to the purchase of a property might (though it will depend enormously on the specific facts) have a beneficial interest in the property. Expert advice would usually be needed to verify the existence of a beneficial interest.

If two or more people own a property jointly they will own it either as **joint tenants** or as **tenants in common**. If they own the property as tenants in common, they may own it in equal or unequal shares. The crucial point to note is that joint tenants or tenants in common relates to the equity in the property. The **legal title** (the right to transfer or mortgage the property) can only be held as joint tenants.

Whether a property is held as joint tenants or as tenants in common makes a difference to what happens to the property on the death of a joint owner, both in terms of who is entitled to the deceased's share in any equity (the money which would be released if the property was sold

after repaying any mortgage) and what steps need to be taken to sell the property.

When a property is held as joint tenants, then the joint owners are both entitled to the whole of the equity. This means that on the death of one of the joint tenants the whole of the equity passes to the survivor, irrespective of any provision to the contrary in the deceased's will.

When a property is held as tenants in common the owners hold the equity in shares, often in specified unequal shares. Upon the death of a tenant in common, their share does not pass automatically to the survivor (as with joint tenants) but via the deceased's will or, if there is no will, via the rules of intestacy. However, only the equitable share passes, not the legal title.

2. Registered and unregistered land

2.1 Recording land ownership

There are two parallel systems for recording ownership of land in England and Wales: registered and unregistered. HM Land Registry records property ownership in the Land Registry, which is the official ownership list for property in England and Wales. Northern Ireland and Scotland have their own land registries.

Since 1990 it has been compulsory when buying unregistered property or land to apply to have the land registered within **2 months** of a sale completing. The LRA 2002 extended the range of transactions subject to compulsory first registration and encourages voluntary registration. The overriding objective of the LRA 2002 is that:

> "[…] the register should be a complete and accurate reflection of the state of the title of the land at any given time, so that it is possible to investigate title to land online, with the absolute minimum of additional inquiries and inspections".[1]

Other transactions which result in a change of ownership and therefore trigger a requirement to register, include:

- gifts of land; or
- assents by personal representatives.

HM Land Registry: compulsory registration

Land or property must also be registered for the first time if it's being mortgaged.

The LRA 2002 does **not** compel the registration of all remaining unregistered land. However, even where there is no 'trigger', a legal owner may be persuaded to register their property for the first time because of the various benefits that derive from registration, including:

HM Land Registry: voluntary registration

- proof of ownership;
- protection against land fraud; and
- making it easier to change, sell or give the property away in the future

The owner can either elect to register the property themselves or instruct a solicitor or conveyancer to do it on their behalf. Detailed information on how to register a property for the first time is provided on the gov.uk website.

According to HM Land Registry, as of April 2018, over 85% of the land mass of England and Wales is registered.[2] Much of the land owned by the Crown, the aristocracy, and the Church has not been registered

1 Law Commission report: Land Registration for the Twenty First Century: A Conveyancing Revolution, para. 1.5 and the Explanatory Notes to the LRA 2002, para. 10.

2

because it has never been sold, which is one of the main triggers for compulsory registration.

HM Land Registry is aiming to achieve comprehensive registration in England and Wales by 2030. This is a key target for the Government and is a core component of its Business Strategy 2017-2022. It would result in a more definitive record of property ownership, making property transactions simpler. However, there will always be the odd piece of land where the owners are difficult to identify, which is why the Land Registry is aiming to achieve 'comprehensive' rather than total registration.

2.2 Law Commission recommendations to update land registration

On 31 Mar 2016, the Law Commission published a consultation paper, "Updating the Land Registration Act 2002", on improving the operation of certain aspects of the Land Registration Act 2002 (LRA 2002). This included some aspects relating to first registration.

In July 2018, the Law Commission published its response to the consultation. In addition to its recommendations, the Law Commission published a draft Bill to update the LRA 2002. The changes are designed to combat fraud and inefficiencies in the land registration system.

2.3 Registered land, what does it mean?

Registration is the official recording of property ownership.

HM Land Registry maintains a register of all registered land, which is indexed on a map. Each property has its own unique number and individual register. Each individual register includes three sections, namely:

1. **Proprietor Register**, which contains ownership information.
2. **Property Register**, which contains a description of the property linked to a map.
3. **Charges Register**, which contains details of any mortgages or charges affecting the property.

The following searches and downloads can be made at the Land Registry:

- Title summary, this is a new basic search providing a short summary of the following information: who owns a property, what they paid for it, and if there is a mortgage on it.
- A title register search, where it is possible to find out who owns the property, price paid or value (if sold since April 2000) and any rights of way or restrictions on the land noted on the register.
- A title plan search, defining the property.
- A flood risk indicator, showing the probability of flood for the individual registered property.

Further information is provided on the gov.uk website.

2.4 Unregistered land, what does it mean?

A search of the Land Registry's index map will reveal whether a specific property or piece of land is registered or unregistered.

As outlined above, not all property is registered. There are various reasons for this but the main one is that there simply hasn't been a transaction (such as a sale or mortgage) on that property since registration became compulsory in its area

Lack of registration does not mean that a piece of land is not owned; owners of unregistered land will have a bundle of paper deeds, which form a record of previous sales, mortgages and other dealings with the land. It can be difficult to ascertain who owns unregistered freehold land as there are no central records of ownership to search, of course, local knowledge may help or the relevant local authority.

Importance of the deeds and root of title

A seller of unregistered land must prove their ownership. This means providing documentation (often referred to as the "deeds") proving their entitlement. This will involve establishing a chain of documentation (sometimes known as an 'abstract' or 'epitome' of title) starting with a good 'root of title', such as an original conveyance or mortgage deed, and including all dealings with the legal (and equitable) interests in the land all the way down to the current owner. The new buyer of the property/land will be required to register it for the first time, information is provided on the gov.uk website.

3. Who owns that property or piece of land?

3.1 First step: searching the Land Registry

The first step in tracing ownership of a property is to conduct a Land Registry search. This can be done online; a fee is payable.

The Land Registry has over 25 million registered titles (records of land and property ownership) in England and Wales. Assuming the enquirer has the address, postcode, or title number of a property, they can search HM Land Registry records.

A property's individual register will show the legal owner of the property and any other information which affects the property, including third party interests. Restrictive (or negative) covenants are either recorded in the Charges Register of the Official Copies or else in a separate document held by the Land Registry, in which case that document will be referenced in the Charges Register as containing covenants.

The first step is to conduct a Land Registry search.

Collectively, all this information is known as "title information". For a fee, the Land Registry will supply an official copy of the register for a specific property that is registered with them.

In cases where the legal owner of a property has died leaving a will, the deceased's executors should register their details with the Land Registry. They should appear on the register as holding the property/land on trust for the named beneficiaries. If the land is unregistered, the executors may have to prepare documents for the first registration of the land and this may take time.

Information on how to search the Land Registry is available from the GOV.UK website. The Land Registry can be checked for a small fee. The Commons Library does not carry out Land Registry searches.

3.2 Second step: local investigation

If there is no record of the property on the Land registry, then it is safe to assume that the property is unregistered. Lack of registration does not mean that a piece of land is not owned. Owners of unregistered land will have a bundle of deeds, which form a record of previous sales, mortgages and other dealings with the land.

You have searched the Land Registry and the land or property is not registered, what can you do next?

However, verifying ownership of unregistered land is a much more difficult task and will involve some detective work. For example, the enquirer could:

- Ask neighbouring or adjoining landowners if they know who the owner(s) might be.
- Ask any local resident who has lived in the area a long time if they have any ideas about who might on it, they may have local knowledge.
- Ask in in the local post office, public house or shop.

- Check adjoining registered properties with the Land Registry for possible clues (a fee would be charged for each property). For example, the registered property may refer to a deed or document which affected not only that registered title but also 'other land'. The 'other land' may have included the unregistered property and the deed/document will refer to the parties to the deed, which may give a clue as to the owner on a specific date.
- Search county or local authority records for clues.
- Check with the local authority to see if any planning applications have been submitted over the years. (Legally, applicants must sign a certificate to confirm they are the owner or a certificate to confirm they have served notice on the owner who they must name).
- Check the local electoral register.

If these suggestions do not lead to the answer, the advice and assistance of a professional adviser such as a lawyer might be needed. Internet searches reveal organisations advertising services to find the owner of unregistered land – at a cost. The Library has no knowledge about the effectiveness of these organisations and is not recommending them in any way.

3.3 Third step: bona Vacantia property & escheat

Box 1: What is Bona Vacantia property?

In a nutshell, bona vacantia property is **ownerless assets** (literally, vacant goods).

Bona vacantia may include:

- The estate of a person who dies intestate and has no relatives to inherit the estate.
- Assets that were beneficially owned by a company that has been dissolved.
- In certain circumstances, assets that were the subject of a failed trust (for example, on the dissolution of a club).

Assets that are bona vacantia pass to the Crown, except in Lancaster and Cornwall, where they vest in the **Duchy of Lancaster** and the **Duchy of Cornwall** respectively.

The **Treasury solicitor** deals with bona vacantia that pass to the Crown. Bona vacantia in the Duchies of Lancaster and Cornwall are dealt with by **Farrer & Co. solicitors**. The **Bona Vacantia division** (**BVD**) of the Government Legal Department is responsible for this function.

It is sometimes thought that unregistered land isn't owned by anyone. This is not correct. In England and Wales, all land is owned by somebody, even if the legal owner cannot be identified. For example, if a person dies without a valid will (i.e. intestate) and without known kin (i.e. entitled blood relatives), their property or land can pass to the Crown by law, referred to as "bona vacantia" (see **Box 1** above). Another common example is where a company has been dissolved and

a registered property belonging to it beneficially has not been disposed of.

If a property becomes bona vacantia it belongs to the Crown and will normally be sold for full market value. However, the Crown has a statutory power to disclaim (give up) its interest in bona vacantia. This power to disclaim is frequently used in relation to difficult or problematic land, which has limited value or where it would not be cost effective to dispose of it. For example, the type of land that is often disclaimed, includes:

- Land used in common (such as private roads, service yards, or amenity land).
- Property subject to onerous covenants or other potential liabilities.
- Property which is contaminated or has buildings, trees, or other items which are in a dangerous state and condition.
- Property in negative equity.
- Property subject to a dispute or competing claims.
- Low value property.

An escheated estate is usually onerous property of little or no value, or even of negative value, that is difficult to dispose of because, for example, the land is contaminated.

The effect of the disclaimer is that the property is deemed not to have vested in the Crown. A notice of disclaimer will be published in the "London Gazette" and a copy sent to anyone who has contacted the Treasury Solicitor to claim an interest in the property.

If the property disclaimed is freehold land, the freehold title will be extinguished, and the property will "escheat" to the Crown estate (see **Box 2** below). Some 300-500 freehold estates escheat to the Crown every year.

Box 2: Doctrine of escheat

Escheat is the process under common law by which freehold land in England and Wales, which has become ownerless, reverts to the Crown as the ultimate owner of all land. The aim of this doctrine is to ensure that property is not left in 'limbo' without recognised ownership.)

Examples of when freehold land becomes subject to escheat include, when:

- The Treasury Solicitor disclaims freehold land which had belonged to a dissolved company.
- A company liquidator disclaims freehold land which belonged to a company being wound up.
- A trustee in bankruptcy or the Official Receiver disclaims freehold land which belonged to an individual.
- A foreign company which owned freehold land in England and Wales is dissolved.

The Crown Estate deals with escheat where the land is within England and Wales but outside Cornwall and the County Palatine of Lancaster (except where the respective Duchy authorities deal with escheat.

To ascertain whether a property or piece of land has become bona vacantia property, would require contacting the Treasury Solicitor at:

Government Legal Department Bona Vacantia Division (BVD),

PO Box 70165,

London WC1A 9HG.

Further information is provided on a gov.uk website.

Unfortunately, neither the Treasury solicitor nor the Crown Estate offer a search facility against land that may be deemed subject to "escheat". The Crown Estate will only deal with an enquiry if it is clearly ascertained that a specified property or piece of land has been subject to escheat.

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Contents

Summary

What are Nationally Significant Infrastructure Projects (NSIPs)?

Nationally Significant Infrastructure Projects (NSIPs) are large scale developments (relating to energy, transport, water, or waste) which require a type of consent known as "development consent". The Planning Act 2008 introduced a new development consent process for NSIPs which was subsequently amended by the Localism Act 2011. A Development Consent Order (DCO) automatically removes the need to obtain several separate consents, including planning permission and is designed to be a much quicker process than applying for these separately. An extension of the regime in 2013 now allows certain business and commercial projects to opt into this process.

Development Consent Orders (DCOs)

The DCO process starts when an application is formally accepted by the National Infrastructure Planning Unit and lasts approximately 12-15 months. The process however, is front-loaded with a number of pre-application consultation requirements, which, depending on the complexity of the project, can take a number of years to carry out. The final decision on granting a DCO rests with the Secretary of State for that field. The National Infrastructure Planning website provides a number of guidance on the processes.

National Policy Statements (NPSs)

Applications for DCOs are decided in accordance with National Policy Statements (NPSs), which after a process of public consultation and Parliamentary scrutiny are formally "designated" by Government. There are currently 12 designated or proposed NPSs, which fall under the categories of hazardous waste, water supply, energy, transport networks, aviation and ports. An *emerging* NPS can carry some weight for decision takers in the development consent process. The amount of weight given will depend on how far along the process the NPS is at and how much consultation has taken place.

Draft airports NPS

On 2 February 2017 the previous Conservative Government published its draft Airports National Policy Statement. This was accompanied by a formal consultation which closed on 25 May 2017. The draft NPS explained the Government's general policy and reasons for supporting a third runway at Heathrow. It also set out particular considerations relevant to any DCO airport expansion application.

Recent changes to the NSIP regime

- The Infrastructure Act 2015 amended the process for changing and revoking DCOs.
- A National Infrastructure Commission was set up in 2015 to examine the country's long-term infrastructure needs.
- Onshore wind farms of over 50MW were removed from the NSIP regime in 2016.
- From April 2017 DCOs can include an element of housing when associated with an NSIP.

Extent and further information

This note applies to England and, where specified, to Wales. See the joint Library briefing paper Comparison of the planning systems in the four UK countries: 2016 update for information about consenting regimes in the other UK countries. The Library briefing paper, Infrastructure Policy examines the current state of infrastructure in the UK, current levels of investment and recent Government policy.

1. The legal framework

The Planning Act 2008, (the 2008 Act), introduced a new development consent process for Nationally Significant Infrastructure Projects (NSIPs). NSIPs are usually large scale developments (relating to energy, transport, water, waste water or waste) which require a type of consent known as "development consent".

A Development Consent Order (DCO) automatically removes the need to obtain several consents that would otherwise be required for development, including planning permission and compulsory purchase orders. The idea of this regime is that it is a quicker process for large scale development projects to get the necessary planning permission and other related consents that they would require, rather than having to apply separately for each consent.

Before this, the final decision on whether development consent should be granted rested with the Infrastructure Planning Commission (IPC), a non-departmental public body which would take decisions in line with National Policy Statements designated by Government. The 2008 Act was subsequently amended by the Localism Act 2011, which abolished the IPC.

Responsibility for decisions on these projects now rests with the relevant Secretary of State. In practice the planning inspectors, (known as the "examining authority" in the legislation), from the National Infrastructure Directorate of the Planning Inspectorate will make recommendations to help inform the Secretary of State's decision. Further information about the process for making a DCO is set out in section 3 below.

1.1 Categories of NSIPs

Section 14 of the 2008 Act sets out the projects which may be considered to be a NSIP:

> (1) In this Act "nationally significant infrastructure project" means a project which consists of any of the following—
>
> (a) the construction or extension of a generating station;
>
> (b) the installation of an electric line above ground;
>
> (c) development relating to underground gas storage facilities;
>
> (d) the construction or alteration of an LNG facility;
>
> (e) the construction or alteration of a gas reception facility;
>
> (f) the construction of a pipe-line by a gas transporter;
>
> (g) the construction of a pipe-line other than by a gas transporter;
>
> (h) highway-related development;
>
> (i) airport-related development;
>
> (j) the construction or alteration of harbour facilities;
>
> (k) the construction or alteration of a railway;

(l) the construction or alteration of a rail freight interchange;

(m) the construction or alteration of a dam or reservoir;

(n) development relating to the transfer of water resources;

(o) the construction or alteration of a waste water treatment plant [or of infrastructure for the transfer or storage of waste water];

(p) the construction or alteration of a hazardous waste facility[;

(q) development relating to a radioactive waste geological disposal facility].

Part 3 of the 2008 Act sets out the thresholds which these projects have to meet in order to be considered as nationally significant and require development consent.

The Infrastructure Planning (Onshore Wind Generating Stations) Order 2016 removed onshore wind farms of over 50MW in size from the NSIP regime from 5 March 2016.

From April 2017 section 160 of the Housing and Planning Act 2016 allowed for a DCO to include an element of housing when it is related to a nationally significant infrastructure project under the 2008 Act. For further information see the Government guidance, Planning Act 2008: guidance on nationally significant infrastructure projects and housing, March 2017.

Information about all past and current projects decided under the NSIP regime are available on the National Infrastructure Planning Unit's Register of Applications webpage.

1.2 Procedural rules

The examination procedure for NSIPs is set out in the:

- Infrastructure Planning (Examination Procedure) Rules 2010, (SI 103); and
- Infrastructure Planning (Interested Parties) Regulations 2010, (SI 102).
- The application fees for Development Consent Orders are set out by the Infrastructure Planning (Fees) Regulations 2010, (SI 106), as amended.

The Infrastructure Act 2015 made provision for changes to the NSIP regime in respect of timing of the appointment of the examining authority, providing for two-person Panels, and amending the process for changes to, and revocation of, development consent orders.

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 revoked and replaced the previous *Infrastructure Planning (Environmental Impact Assessment) Regulations 2009*, to transpose changes made to EU Directive 2011/92/EU ("the EIA Directive") by EU Directive 2014/52/EU about Environmental Impact Assessment requirements and procedures into the infrastructure planning regime. For further information about the EIA Directive and the changes to it, see the Government's Explanatory Memorandum to the 2017 Regulations.

1.3 Business and commercial projects

The Growth and Infrastructure Act 2013 introduced an extension of the regime to include certain business and commercial projects. This was to enable developers of certain projects to opt-in to the NSIP planning regime at the developer's discretion, where the projects are judged as being of national significance.

The Infrastructure Planning (Business or Commercial Projects) Regulations 2013 (SI 3221) allow the Secretary of State to direct that certain types of projects can be decided under the development consent regime. In summary, the categories include major office, warehousing, manufacturing, research and development facilities as well as significant tourism and leisure schemes including sports stadia. Some extractive industry schemes are included (i.e. deep-mined coal) but the extraction of peat, oil, and gas are excluded, as are housing developments. Retail is not listed in the regulations as a permissible project type. This means that while retail-led schemes are not permitted under these rules, mixed use schemes that contain an element of retail may be allowed. The Secretary of State will therefore consider requests for a direction where retail is not the primary element but is associated development.[1]

Further information about the types of business and commercial projects which may opt in to the process are set out in:

- Policy Statement by the Department for Communities and Local Government: Extension of the nationally significant infrastructure planning regime to business and commercial projects, November 2013;
- Nationally significant infrastructure planning: extending the regime to business and commercial projects – consultation, November 2012; and
- Major infrastructure planning: extending the regime to business and commercial projects: Summary of responses and government response, 21 June 2013.

Any developer who wants their business or commercial project to be dealt with under the DCO procedure will need first to ask the Secretary of State for a direction. The Secretary of State must be satisfied that the project both falls within one of the prescribed types of project and is nationally significant. Typically this will mean the project must have a significant economic impact, is important for driving growth in the economy, or has an impact across an area wider than a single local authority area.[2]

1.4 Wales

The Planning Act 2008 regime for NSIPs is more limited in its extent in Wales. In Wales, development consent is only required for certain

1 HM Government, Major infrastructure planning: extending the regime to business and commercial projects: Summary of responses and government response, June 2013, p13

2 Planning Portal, 'Nationally significant' regime set to be extended, 7 November 2013

energy generating projects, pipelines, overhead electricity line and harbour facility projects.[3]

Developments of National Significance

The Planning (Wales) Act 2015 established a new category of development called Developments of National Significance ("DNS"). This enables the planning applications for certain types of development above specified thresholds to be made directly to the Welsh Ministers.

The provisions in the 2015 Act are supplemented by the *Developments of National Significance (Specified Criteria and Prescribed Secondary Consents) (Wales) Regulations 2016* ("the Regulations").[4] Regulation 3 specifies the types of development which can be of national significance: generating stations; underground gas storage facilities; facilities for liquid natural gas; gas reception facilities; airports; railways; rail freight interchanges; dams and reservoirs; transfer of water resources; waste water treatment plants and hazardous waste facilities. Further amendments to the Regulations have now captured those onshore wind projects above 50MW as a DNS. The current DNS threshold for energy generating stations in Wales is therefore between 10 and 50MW, except for onshore wind where there is now no upper limit. The thresholds for where other types of development will qualify as a DNS is specified in Part 2 of the Regulations.

Further information about the DNS consenting process is available from the Welsh Government's website on Developments of National Significance and its Guidance on Developments of National Significance.

The Wales Act 2017 devolves further responsibility for all energy generating development consents for projects up to 350MW onshore (other than wind) and offshore in Welsh territorial waters and for associated overhead lines to the Welsh Ministers. Energy generating projects from 50MW-350MW have not yet been brought into the definition of a DNS. Energy generation development above 350MW continues to be determined by the UK Secretary of State under the Planning Act 2008 development consent regime.

For further information about the different regimes that different sized energy generating developments go through in Wales see the National Assembly for Wales Research Service briefings: Developments of National Significance, 21 January 2016; and The Planning Series: 14 - Developments of National Significance, November 2016.

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3 National Infrastructure Planning website, Frequently Asked Questions [on 6 May 2014

4 Welsh Government, Developments of National Significance Explanatory Memorandum, 2 February 2016

2. National Policy Statements

Applications for development consent orders (DCOs) are decided in accordance with National Policy Statements (NPSs), which set out the national policy in relation to the different categories of NSIPs. NPSs undergo a process of public consultation and parliamentary scrutiny, before being officially designated by Government. The consultation and Parliamentary requirements are set out in part 2 of the Planning Act 2008, as amended by the Localism Act 2011.

A DCO application is normally determined in accordance with an NPS, subject to the exceptions listed in section 104 of the *Planning Act 2008*. Under section 104, the Secretary of State must decide any DCO application in accordance with any relevant NPS unless he or she is satisfied that to do so would:

- Lead to the UK being in breach of its international obligations;
- Be unlawful;
- Lead to the Secretary of State being in breach of any duty imposed by or under any legislation;
- Result in adverse impacts of the development outweighing its benefits; or;
- Be contrary to legislation about how the decisions are to be taken.[5]

An *emerging* NPS can carry some weight for decision takers in the development consent process. The amount of weight given will depend on how far along the process the NPS is at and how much consultation has taken place.[6]

Section 105 of the 2008 Act gives the Secretary of State the power to take the decision on a DCO in the *absence of an NPS*. In the absence of a NPS for a particular project decisions will be taken in accordance with the National Planning Policy Framework and any relevant local plan for the area where there development would be located.[7]

There are currently 12 designated or proposed National Policy Statements, which fall under the following categories:

Hazardous waste

- The National Policy Statement for Hazardous Waste: A framework document for planning decisions on nationally significant hazardous waste infrastructure, officially designated by the Secretary of State as an NPS on 18 July 2013.

Water supply

- A water supply NPS has not yet been published in draft for consultation.

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5 HM Government, *Draft Airports National Policy Statement*, para 1.16
6 Planning Inspectorate National Infrastructure Planning website [accessed 13 April 2017]
7 National Infrastructure Planning, National Policy Statements [on 25 May 2016]

- The National Policy Statement for Waste Water, officially designated as a NPS on 26 March 2012.

Transport networks

- The National Policy Statement for National Networks which was officially designated on 14 January 2015.

  This followed a Consultation on a Draft National Policy Statement for the National Road and Rail Networks, December 2013. In December 2014 the Government published its response to this consultation. At the same time the Government published its final version of the National Policy Statement for National Networks to lay before Parliament. On 13 January 2015 the House of Commons resolved to approve the national policy statement. A debate on a motion to take note of the NPS was held in the House of Lords on 20 January 2015.

Aviation

- On 2 February 2017 the previous Conservative Government published its draft Airports National Policy Statement.[8] This was accompanied by a number of technical reports[9] and a formal consultation, which closed on 25 May 2017. [10] The draft NPS states:

  > The Airports NPS provides the primary basis for decision making on development consent applications for a Northwest Runway at Heathrow Airport, and will be an important and relevant consideration in respect of applications for new runway capacity and other airport infrastructure in London and the South East of England.[11]

  It explains the Government's general policy and reasons for supporting the third runway at Heathrow. It also sets out particular considerations relevant to a DCO application to which the Airports NPS relates.[12]

  Before the dissolution of Parliament for the 2017 general election, the Transport Select Committee began an inquiry into the the Government's draft Airports National Policy Statement. No report was published before dissolution. The committee's website notes that all Select Committees cease to exist until after the general election. If an inquiry on this subject is held in the future, the Committee may refer to the evidence already gathered as part of this inquiry. Select committees have not yet been reestablished following the election.

  In a written statement to Parliament on 2 February 2017, the Government proposed initially to lay an airports NPS before the

8 HM Government, Draft Airports National Policy Statement, 2 February 2017
9 HM Government, Heathrow Airport expansion [updated 22 February 2017]
10 HM Government, Consultation on Draft Airports National Policy Statement: new runway capacity and infrastructure at airports in the south-east of England, 2 February 2017
11 HM Government, Draft Airports National Policy Statement, para 1.10
12 HM Government, Draft Airports National Policy Statement para 1.11

House in winter 2017-18. [13] This timetable has now been amended, through a further written statement, as follows:

> The consultation closed on 25th May and the work to analyse the over 70,000 responses is progressing well. I would like to thank all of those who contributed their views.
>
> This government is fully committed to realising the benefits that a new Northwest runway at Heathrow would bring, in terms of economic growth, boosting jobs and skills, strengthening domestic links and – critically – increasing and developing our international connectivity as we prepare to leave the European Union.
>
> The timing of the election, in particular the need to re-start a Select Committee inquiry into the draft Airports NPS means we now expect to lay any final NPS in parliament in the first half of 2018, for a vote in the House of Commons.
>
> I will provide a further update to the House after the summer recess on our next steps following analysis of the consultation responses. [14]

For further information about Heathrow expansion, see Library briefing paper, Heathrow Expansion, 24 April 2017.

Ports

- The National Policy Statement for Ports was designated on 26 January 2012.

Energy

Six Energy NPSs were designated on 19 July 2011 as follows:

- EN-1 Overarching Energy NPS
- EN-2 Fossil Fuel Electricity Generating Infrastructure NPS
- EN-3 Renewable Energy Infrastructure NPS
- EN-4 Gas Supply Infrastructure & Gas and Oil Pipelines NPS
- EN-5 Electricity Networks Infrastructure NPS
- EN-6 Nuclear Power Generation NPS - Volume I and Volume II

- The Department of Energy and Climate Change has also consulted on producing a National Policy Statement on the **geological disposal of higher activity radioactive waste**. [15] A Government Response was published in July 2014. In the response, the then coalition Government said that:

> We intend to consult on the proposed National Policy Statement before the beginning of any formal discussions between communities and the developer. We are committed to making the National Policy Statement available as early as practicable, to ensure that communities have access to as much information as possible. [16]

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13 HC Deb 2 February 2017, c30WS
14 Aviation update: Written statement - HCWS41, 13 July 2017
15 DECC, Consultation: Review of the Siting Process for a Geological Disposal Facility, September 2013
16 HM Government, Government Response: Review of the Siting Process for a Geological Disposal Facility, July 2014, para 77

In response to a PQ in February 2017 the previous Conservative Government indicated that consultation on a draft NPS may begin "in the coming months":

> In the 2014 *Implementing Geological Disposal* White Paper Government set out three initial actions which will provide greater clarity on issues such as geology, development impacts and community representation. Good progress is being made on these initial actions and Government expects to consult on the draft National Policy Statement and Working with Communities policy in the coming months, ahead of the launch of the official siting process.[17]

Business and commercial projects

When extending the DCO regime to business and commercial projects, the then coalition Government consulted on whether to produce NPSs for them.[18] It decided that new NPSs would not be necessary as the majority of these projects would not use this process and the decisions would be taken by local planning authorities, who would be able to include relevant policies on these sorts of projects in their local plans. The response to this consultation highlighted disagreement by respondents:

> 42% of respondents disagreed with the proposal not to have a National Policy Statement or Statements for this new category of development. Those who disagreed with the Government proposal highlighted a number of concerns, including the lack of a clear policy framework for decision-making; the importance of Parliamentary scrutiny of National Policy Statements; and concern about the Government's commitment to National Policy Statements more generally. One respondent suggested that a "light touch" version of a National Policy Statement should be prepared.[19]

2.1 Parliamentary procedure

Under the provisions of the *Planning Act 2008* a draft NPS (called a "statement" in the legislation), may be designated as an NPS only if the consultation and publicity requirements set out in section 7, and the Parliamentary requirements set out in section 9, have been complied with in relation to it.

Under section 9 if either House of Parliament makes a resolution with regard to a proposed NPS, or a committee of either House of Parliament makes recommendations with regard to the a proposed NPS, the Secretary of State must lay before Parliament a statement setting out his response to the resolution or to the recommendations.

House of Commons standing order 152H (11 October 2016 addendum), shows that an NPS can be considered by either a

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17 Radioactive Waste: Written question – 62478, holding answer 3 February 2017

18 Department for Communities and Local Government, Nationally significant infrastructure planning: extending the regime to business and commercial projects: Consultation, November 2012

19 Department for Communities and Local Government, Major infrastructure planning: extending the regime to business and commercial projects: Summary of responses and government response, June 2013, p13

designated select committee, or a dedicated National Policy Statement Committee established for that purpose.

NPSs should be approved by Parliament before they are designated. Under section 5(4) and 5(4A) of the Planning Act 2008 (as amended by the Localism Act 2011), approval of an NPS can occur either by "deemed consent", after a "consideration period" of 21 sitting days passing without a vote, or if the House of Commons votes to approve the NPS within the 21 day period.

Neither Standing Order No 152H nor section 9 of the *Planning Act 2008* specify that a debate has to take place before the end of the relevant period (in which a committee makes recommendations or a resolution of either House with regard to the proposal).

Commitments made about NPS scrutiny in Parliament

In a debate on Planning: National Policy Statements in May 2009, Phyllis Starkey MP highlighted that "there is no statutory requirement for a vote to take place before a statement can be designated as an NPS".[20]

John McDonnell MP moved an amendment to provide that recommendations from committees should be debated by the House before Ministers could proceed to designate national policy statements. He explained:

> The amendment suggests that when the Select Committee process has ended, a report is provided to the House. If it is uncontentious and the Select Committee recommends approval, we have a debate for a maximum of one and a half hours, the Question is put and the statement is agreed or not. If it is contentious, and there are recommendations from the Select Committee not to approve the national policy statement, a debate of up to three hours is held, and then we vote on the matter.[21]

His amendment was rejected.[22]

During the debate, Alan Whitehead asked for a reinstatement of the Government's commitment hold a debate on an NPS in Parliament:

> Notwithstanding all that, the amendment tabled by my hon. Friend the Member for Hayes and Harlington (John McDonnell) underlines an important point about what happens at the end of a Select Committee's scrutiny. When the Planning Bill was introduced, the Secretary of State for Communities and Local Government stated:
>
> > "In addition, if the Committee has recommended that a national policy statement raises issues which should be debated by Parliament as a whole, we will make available time in each House for a debate before we designate it."—[*Official Report*, 27 November 2007; Vol. 468, c. 14WS.]
>
> That was a clear commitment, and I should be grateful for, at the very least, a reinstatement of it today. However, I am not sure

[20] HC Deb 20 May 2009 c1545
[21] HC Deb 20 May 2009 c1552
[22] HC Deb 20 May 2009 c1565

> whether it is sufficient to guarantee debate on the Floor of the House.[23]

In responding to the debate, the then Minister stated that:

> The relevant period needs to be long enough to incorporate three important underlying elements: the period of public consultation, which is normally three months; the overhang period of four to six weeks after the close of public consultation during which the relevant Select Committee scrutinising the matter will conclude its report; and the crucial further period of six weeks or 40 days in which the Government would—not might—make time for debate if the Committee recommended that that was warranted. In reality, the relevant period would be about six months, but we did not want the motion to impose a rigid time scale because we think it is important for the Select Committee to have flexibility. That third element that I mentioned is crucial: whether there should be a debate and a vote is decided not by the Government, but by the Select Committee.[24]

An example of an NPS's route through Parliament

Looking at what has happened previously with other NPSs is perhaps the best way to understand how the Parliamentary process works and the reasons for it.

The draft National Policy Statements for energy infrastructure were laid before Parliament on 9 November 2009 by the then Labour Government. This suite of NPSs set out the then Government's policy for delivery of major energy infrastructure. The draft NPSs were subject to a consultation exercise in 2009 under the Labour Government to which the Government response was published under the coalition Government in October 2010. The coalition Government's response launched a "re-consultation" on certain aspects of the draft NPSs and revised versions of the draft NPSs were published.

As well as a public consultation exercise, draft NPSs were also subject to parliamentary scrutiny. The 2008 Act requires the Government to lay each draft NPS before Parliament, and to respond to the recommendations of a Committee of either House or a resolution of either House made within a specified period. The House of Commons Energy and Climate Change select committee took evidence on, and published a report, The proposals for national policy statements on energy, 23 March 2010. It recommended that House be given the opportunity to debate the NPSs:

> 5. This Report makes a number of recommendations, which we expect the Government to take account of before designating the energy NPSs. Given the importance of the Statements in delivering our energy and climate change objectives, we recommend that they be subject to a debate in the main Chamber on an amendable motion, offering the possibility of a vote. If there is not time to schedule a debate before the dissolution, it is imperative that this take place at the earliest opportunity in the next Parliament.[25]

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23 HC Deb 20 May 2009 cc1562-1563
24 HC Deb 20 may 2009 c1564
25 Energy and Climate Change Committee, *The proposals for national policy statements on energy*, 23 March 2010, HC 231-I 2009-10, para 5

A debate on the NPSs were held in the House of Commons on 1 December 2010. The Energy and Climate Change Committee then examined *The revised draft National Policy Statements on energy* (January 2011).[26] The Committee noted how the debate in the House had informed its deliberations:

> 10. During our inquiry, in response to our predecessor's recommendation,[10] the Government scheduled a debate on the draft energy NPSs on 1 December 2010.[11] This helped inform our deliberations. We are grateful to all those who gave evidence to us or took part in the House of Commons debate.[27]

The House of Lords scrutinised the original draft energy NPSs in a series of 3 Grand Committee meetings on 23 February, 9 and 11 March 2010. Five motions were then laid for a debate in the full House of Lords. The debate was held on 29 March 2010. In the debate, Lord Jenkin of Roding set out the procedure and how the motions came to be debated in the Lords though an "invented" process:

> The Motions today deal with national policy statements. The Act requires both public consultation and parliamentary scrutiny by both Houses-I emphasise both Houses. Some of the volumes have been amended, while others have not. It was originally said that this would be done by the House of Commons, for which the noble Lord, Lord Hunt, apologised generously and profusely.
>
> The two Houses have adopted different processes. In another place there are departmental Select Committees, so the six energy national policy statements have been the subject of detailed scrutiny by the Select Committee on Energy and Climate Change. It heard evidence over many weeks; indeed, I sat in on many days to listen to what was going on. Its report-an interesting document-was published last week.
>
> In this House we do not have departmental Select Committees, so an entirely different procedure had to be-well, "invented" is not too strong a word. It was to be based on debates in Grand Committee. We had three debates, which took place in the Moses Room on 23 February, 9 March and 11 March. The procedure also envisaged that there could be resolutions to amend the national policy statements, which could be debated on the Floor of the House. We had undertakings from the Leader of the House that time would be provided. As noble Lords will have seen, and as I have mentioned, there are five Motions tabled: the first three are in my name, while my noble friend and the noble Lord, Lord Teverson, have the other two.
>
> I should perhaps mention one matter. The Government are obliged to consider all the issues raised, both in public consultation and parliamentary scrutiny, before finally designating the national policy statements in their final form.[28] (HC deb 29 march 2010 cc1191)

As part of the scrutiny of the revised draft energy NPSs published in October 2010, the House of Lords Grand Committee also held debates on:

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26 Energy and Climate Change Committee, The revised draft National Policy Statements on energy, 26 January 2011, HC 648 2010-12

27 Energy and Climate Change Committee, The revised draft National Policy Statements on energy, 26 January 2011, HC 648 2010-12, para 10

28 HC deb 29 March 2010 cc1191

- the Overarching Energy NPS (EN-1) and the non-nuclear technology specific NPSs (EN-2 to EN-5) on 11 January 2011; and
- the Nuclear Energy NPS (EN-6) on 13 January 2011.

The Government's response to the Parliamentary scrutiny and to the "re-consultation" was published in June 2011. On 23 June 2011 the Government the final versions of the National Policy Statements (NPS) for energy infrastructure to lay before Parliament.

On 18 July 2011 there was a debate in the House of Commons on motions to approve the national policy statements on energy. Following the debate the question was put to the House that each energy NPS should be approved. The question was resolved without division (vote) and approval was given for each of the energy NPSs, with the exception of the Nuclear NPS. There was a division called for the Nuclear NPS, where it was approved by 267 votes to 14.

The final versions of the National Policy Statements for energy infrastructure were then officially "designated" by the then Secretary of State for Energy and Climate Change on 19 July 2011.

On 19 July 2011 in the House of Lords, Labour peer Lord Berkeley expressed regret that the Lords did not have a debate on the approval on the NPSs:

> It is interesting that, yesterday, the House of Commons debated and approved the six national policy statements for energy. They have been around for a long time in draft form and been subject to consultation, and it is good that the House of Commons debated them, but I suggest that there is an equal need for this House to debate such national policy statements, because there is a great deal of expertise among your Lordships about issues that are likely to come within the national policy statement framework. It seems equitable that we should debate them too. I am sure that noble Lords will have good contributions to make, and I hope that the noble Lord or the noble Baroness-I do not know which of them will reply-will take that seriously. It should have happened under the 2008 Act, but it did not, so here we are today.[29]

Responding for the Government, Earl Attlee set out why the House of Lords did not have a role in approving NPSs:

> National policy statements are policy documents, not legislation. This House has never had a role in approving policy documents and it does not automatically follow that because the Localism Bill provides for the other place to have such a role, this House should also. If both Houses had the authority to approve a national policy statement, but one were to reject it and the other approve it, this would call into question the legal standing of the document and any planning decisions that were to rely upon it. This could lead to extensive delay to both the national policy statements and the provision of vital infrastructure.
>
> The discretion to approve a national policy statement using the negative procedure and the introduction of a timetable of 21 sitting days are intended to ensure that the approval process is both efficient and flexible. Their removal could ultimately result in

[29] HL Deb 19 July 2011 c1314

> further delay. It is important to note that the DPRRC [Delegated Powers and Regulatory Reform Committee] raised no concerns about these provisions. Given this, and the explanations I have given, I hope that noble Lords will not press their amendments.[30]

2.2 Amendment of an NPS

Section 6 of the Planning Act 2008, as amended, sets out the process for review and amendment of an NPS. Under section 6(7) the Secretary of State may amend a national policy statement only if the consultation and publicity requirements set out in section 7, and the parliamentary requirements set out in section 9, have been complied with in relation to the proposed amendment, and:

> (a) the consideration period for the amendment has expired without the House of Commons resolving during that period that the amendment should not be proceeded with, or
>
> (b) the amendment has been approved by resolution of the House of Commons—
>
> (i) after being laid before Parliament under section 9(8), and
>
> (ii) before the end of the consideration period.
>
> (7A) In subsection (7) "the consideration period", in relation to an amendment, means the period of 21 sitting days beginning with the first sitting day after the day on which the amendment is laid before Parliament under section 9(8), and here "sitting day" means a day on which the House of Commons sits.[31]

Section 6(8) provides that the publicity and Parliamentary scrutiny requirements do not apply if the amendment to the NPS is not considered, (by the Secretary of State), to "materially affect the policy":

> (8) Subsections (6) [to (7A)] do not apply if the Secretary of State thinks that the proposed amendment (taken with any other proposed amendments) does not materially affect the policy as set out in the national policy statement.

2.3 National Infrastructure Delivery Plan 2016-2021

On 23 March 2016 the previous Government published a National Infrastructure Delivery Plan 2016-2021. This plan sets out key projects and programmes in each infrastructure sector, as well as details of the then Government's ongoing work.

30 HL Deb 19 July 2011 c1319
31 Section 6(7)(a) and (b) and 6(7A) of the Planning Act 2008

3. The Development Consent process

The development consent process starts officially when an application is formally accepted by the National Infrastructure Planning Unit at the Planning Inspectorate. This is when a formal timetable begins which lasts approximately 12-15 months until development consent is granted or refused. Before this starts however, the developer must carry out extensive consultation on the proposed development which can take several years. For full information about this process see the National Infrastructure Planning website.

The National Infrastructure Planning website also has a dedicated page for each project on its website for projects which have been accepted or are close to being accepted. This page provides links to all the documents associated with the project, the timetable and the latest developments.

Pre-application

Prior to formally submitting an application for development consent the developer is required to carry out extensive consultation on their proposals. The length of time taken to prepare and consult on the project will vary depending upon its scale and complexity. Applicants for a proposed NSIP must, amongst other documents, submit a draft of the Development Consent Order (DCO) with their application, together with an explanatory memorandum. The DCO should be written in the form of a statutory instrument. For further information see Planning Act 2008: Guidance on the pre-application process.

Acceptance

When the developer submits a formal application for development consent the Planning Inspectorate (on behalf of the Secretary of State) then has a 28 day period in which to determine whether the application meets the requirements for formal examination.

Once a DCO application is submitted and accepted there is a process for members of the public (including MPs) to register as an "interested party" to be able to take part in the examination process, provide written evidence and speak at meetings.[32]

Pre-examination

Before the formal examination stage begins the public can register with the Planning Inspectorate and submit a summary of their views about the application in writing. A preliminary meeting for these people will be run and chaired by an Inspector. This stage of publicising the application and gathering representations takes approximately three months, but the timeframe is not set out in legislation.

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[32] For further information see, *Nationally Significant Infrastructure: how to get involved in the planning process: Advice note 8.3*

Examination

The Planning Inspectorate will invite interested parties to submit their views, hold hearings and will carefully consider all the evidence submitted. It is focused on written representations rather than a public inquiry, with hearings on issues only being held where necessary. The examination is done by the "examining authority". The Secretary of State decides whether the examining authority should be either a single inspector or a panel of inspectors. In making this decision the Secretary of State will consider the complexity of the case and the likely public interest. Examination takes approximately six months. For further information see Planning Act 2008: examination of applications for development consent.

Decision

The Planning Inspectorate will prepare a report on the application to the Secretary of State, including a recommendation on whether development consent should be granted, within three months of the end of the examination period. The Secretary of State then has a further three months to make the decision on whether to grant or refuse development consent.

Section 107 of the 2008 Act and section 23 of the *Infrastructure Planning (Examination Procedure) Rules 2010* (SI 2010/103) (the 'procedure rules') allows for further time to be taken in the decision making process. Under section 107 any extension to the statutory timetable would require the Secretary of State to make a statement to Parliament and would *not* be a decision which "would be taken lightly".[33]

The Secretary of State may reach a different decision on the DCO to that recommended by the Examining Authority. Government guidance states that the Secretary of State:

> … is required under the Procedure Rules to notify all interested parties if he is inclined to disagree with the Examining Authority's recommendation because he differs from the Examining Authority on any matter of fact mentioned in, or appearing to be material to, a conclusion reached by the Examining Authority, or because the Secretary of State proposes to take into consideration any new evidence or any new matter of fact.
>
> The Secretary of State will set out the reasons for disagreement with the Examining Authority and will give interested parties the opportunity to make representations in writing, in respect of any new evidence or new matter of fact, by an appropriate deadline.[34]

Post decision legal challenge

Once a decision has been issued by the Secretary of State, there is a six week period in which the decision may be challenged in the High Court by way of Judicial Review.

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33 HM Government, *Planning Act 2008: Guidance for the examination of applications for development consent*, March 2015, para 108

34 ibid., paras 117-118

4. National Infrastructure Commission

A National Infrastructure Commission (NIC) was initially set up by the previous Conservative Government as an independent body on 5 October 2015. Its purpose is to provide expert, impartial analysis of the country's long-term infrastructure needs. It also reports on high-priority issues and produces an in-depth, independent assessment of the UK's major infrastructure needs on a 30-year time horizon. These needs will then be articulated into National Infrastructure Assessments (NIAs).

It was originally announced, in the Government's background briefing paper to the Queen's Speech 2016, that the NIC would be established on a statutory footing. The Government later informed the House that the NIC would, instead, be established on a permanent basis as an Executive Agency of HM Treasury in January 2017.[35] The Government said it considered that the NIC could achieve the same objectives without legislation.[36] The NIC was then formally established as an executive agency of the Treasury on 24 January 2017.[37] A Framework Document was published to set out the broad framework within which the NIC will operate, and outlines its roles and responsibilities.

The Framework Document sets out how the Government will respond to the NIC's reports and about how recommendations from the NIC endorsed by the Government may become planning policy:

> 1.7 The government will lay the NIC's reports before Parliament, and will respond to the NIC's national infrastructure assessment and specific studies. The government will respond as soon as practicable; it will endeavour to respond within 6 months, and not longer than a year. The response will set out clearly any further work required to take forward the recommendations. Recommendations the government agrees should be taken forward will become known as 'endorsed recommendations'. Where the government does not agree with a Commission recommendation, it may put forward an alternative proposal.
>
> 1.8 Where the government is responsible for delivering endorsed recommendations, the government's endorsement will be a statement of government policy. Where recommendations have wider implications for the planning regimes, the government will highlight any further steps needed to confirm the endorsed recommendation as planning policy. The government will use the levers at its disposal to deliver endorsed recommendations – whether through spending, regulation, deregulation, market stimulation, or by setting strategic priorities for regulators as appropriate. In some cases, endorsed recommendations will not be directly taken forward by the government, but may be relevant for decisions made by other bodies such as economic regulators. The NIC will monitor progress in delivering endorsed

35 National Infrastructure Commission: Written statement - HCWS181, 12 October 2016
36 National Infrastructure Commission: Written statement - HCWS181, 12 October 2016
37 National Infrastructure Commission: Written statement - HCWS431, 24 January 2017

recommendations, and will comment on this in its annual monitoring report.[38]

The Framework document follows from earlier consultation on how the NIC should operate. See:

- HM Treasury, National Infrastructure Commission: consultation, January 2016; and
- HM Treasury, National Infrastructure Commission: response to the consultation May 2016.

[38] HM Treasury, National Infrastructure Commission framework document, January 2017

5. Potential future change

The Conservative Party manifesto for the 2017 General Election contained a commitment to bring major shale gas applications into the "national planning regime". It stated:

> We will legislate to change planning law for shale applications. Non-fracking drilling will be treated as permitted development, expert planning functions will be established to support local councils, and, when necessary, major shale planning decisions will be made the responsibility of the National Planning Regime.
>
> We will set up a new Shale Environmental Regulator, which will assume the relevant functions of the Health and Safety Executive, the Environment Agency and the Department for Business, Energy and Industrial Strategy. This will provide clear governance and accountability, become a source of expertise, and allow decisions to be made fairly but swiftly.[39]

Following the election the new Government has not yet confirmed whether it will go ahead with this proposal.

[39] The Conservative and Unionist Party 2017 General Election Manifesto, May 2017, p23

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BRIEFING PAPER
Number 06881, 17 July 2017

Department for Tansport: Making Best Use of Airport Capacity; Airport Level Data

Air Transport Movements (000s)*, central demand scenario

Airport	2016	2030	2040	2050
Aberdeen	73	77	83	91
Belfast Cit	43	47	51	58
Belfast Inte	42	46	52	60
Birminghai	104	116	144	188
Bournemo	3	1	5	15
Bristol	58	61	75	77
Cardiff	17	14	15	20
Doncaster	9	4	3	5
East Midla	58	79	90	98
Edinburgh	109	123	145	164
Exeter	12	11	15	30
Gatwick	277	277	296	299
Glasgow	76	90	86	91
Heathrow	476	743	749	750
Humbersic	9	9	9	9
Inverness	11	13	14	16
Leeds/Bra	28	51	54	60
Liverpool	40	37	37	60
London Ci	74	76	97	120
Luton	101	129	163	201
Mancheste	196	201	239	265
Newcastle	41	42	42	47
Newquay	8	8	8	8
Norwich	24	24	25	26
Prestwick	5	1	1	1
Southamp	42	35	38	66
Southend	7	6	7	8
Stansted	173	139	155	205
Teesside	3	1	1	5
Total	2119	2460	2700	3043

*Includes arriving and departing ATMs

Passengers (million passengers per annum), central demand scenario**

Airport	2016	2030	2040	2050
Aberdeen	2.6	3.0	3.4	4.0
Belfast Cit	2.7	3.3	3.9	5.0
Belfast Inte	5.1	6.3	7.7	8.9
Birminghai	12.3	15.0	20.1	27.5
Bournemo	0.6	0.1	0.3	1.5
Bristol	7.6	8.8	10.9	10.7
Cardiff	1.4	0.8	1.0	1.5
Doncaster	1.2	0.2	0.2	0.5
East Midla	4.8	6.5	7.5	8.4
Edinburgh	11.8	13.1	16.3	19.3
Exeter	0.8	0.7	1.0	3.1
Gatwick	43.4	44.6	50.1	51.6
Glasgow	8.2	11.4	12.1	13.8
Heathrow	76.0	130.8	134.3	137.3
Humbersic	0.2	0.2	0.2	0.2
Inverness	0.7	0.9	1.0	1.2
Leeds/Bra	3.4	7.8	9.2	10.1
Liverpool	4.8	4.6	5.1	9.4
London Ci	4.0	4.6	6.2	7.8
Luton	14.5	19.9	26.3	32.5
Mancheste	26.8	29.4	36.8	41.9
Newcastle	4.7	5.1	5.1	5.6
Newquay	0.4	0.5	0.5	0.5
Norwich	0.5	0.4	0.5	0.6
Prestwick	0.8	0.0	0.0	0.0
Southamp	2.0	1.8	2.0	3.8
Southend	0.7	0.7	0.7	0.9
Stansted	24.5	21.3	26.4	36.1
Teesside	0.1	0.0	0.0	0.6
Total	266.6	341.9	388.8	444.2

**Passengers are defined as 'terminal passengers' - a terminal passenger is counted each time they land or take off on a plane at a UK airport

Departing flight CO_2 (million tonnes)*, central**

Airport	2016	2030	2040	2050
Gatwick	4.52	2.96	2.88	2.79
Heathrow	19.48	27.16	24.28	20.79
London Ci	0.16	0.15	0.24	0.31
Luton	0.97	1.17	1.41	1.62
Stansted	1.33	1.06	1.08	1.43
London	26.46	32.49	29.88	26.94
Outside Lo	8.04	7.95	9.67	11.01
Ground (A	0.46	0.55	0.59	0.64
Freighters	1.04	1.06	0.95	0.85
Residual	1.34	1.34	1.34	1.34
Total UK	37.34	43.38	42.43	40.79

***Departing commercial passenger flights only
Ground APUs, freighters and the residual correction to baseline bunker fuel outturn cannot robustly be allocated around the airports
All figures are modelled

The Future of UK Aviation: Making Best Use of Existing Runways

Freedom of Information Data Release: Explanatory note

1. In June 2018, the Government published *The Future of UK Aviation: Making Best Use of Existing Runways*[1]. This provided policy support for airports beyond Heathrow making best use of their existing runways, subject to related economic and environmental considerations.

2. In developing this policy, the Government recognised that airports making the best use of their existing runways could lead to increased air traffic which could increase carbon emissions. Therefore, to ensure that our policy was compatible with the UK's climate change commitments, we used the DfT aviation model to look at the impact on carbon emissions of allowing all airports to make best use of their existing runway capacity.

3. This FOI data release presents the passenger, Air Transport Movement (ATM) and CO_2 forecasts produced for the *Making Best Use* work. The forecasts are for United Kingdom (UK) airports, and cover a central demand scenario that includes the proposed Northwest Runway at Heathrow (LHR NWR) and the possible impact of the *Making Best Use* policy.

Aviation Forecasts and how they work

4. The Department publishes aviation forecasts looking at the longer-term strategic picture for UK aviation. The forecasts are designed to inform longer-term policy making rather than detailed shorter-term forecasts for specific airports.

5. The Department's model forecasts overall demand at the national level, based on underlying economic drivers. This demand is then distributed geographically at the district level. The model then allocates passengers at airport level. This allocation is based on estimated drivers of passenger preference, for example accessibility, along with developments in the industry that are captured in the baseline data, in this case up to 2016. More detail on the methodology and guidance on interpretation is given in UK Aviation Forecasts 2017 upon which this data release is based[2].

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1 https://www.gov.uk/government/publications/aviation-strategy-making-best-use-of-existing-runways

2 https://www.gov.uk/government/publications/uk-aviation-forecasts-2017

Forecast Limitations

6. There is inherent uncertainty in any forecast. Of relevance to this data release is that, where airports compete closely for passengers in overlapping catchment areas, there will be greater uncertainty around forecasts for individual airports. Here local short-term, often commercial, drivers can have significant impact. Forecasts for smaller airports also have greater uncertainty and volatility, with the addition or removal of routes having a larger proportional impact on overall passenger numbers.
7. For forecasts relating to specific airports, particularly those subject to high levels of competition, reference to alternative forecasts or sensitivity tests, such as alternative local forecasting is recommended to supplement the Department's forecast.

8. It should also be recognised that modelling an increasing level of demand and shortage of supply leads to a certain degree of model 'noise'. Where there are small fluctuations year to year, or small differences between different model runs, these changes may well be attributed to such model noise and do not necessarily indicate significant differences in the forecasts.

OUR APPROACH TO DEVELOPING A SURFACE ACCESS STRATEGY

JANUARY 2018

AIRPORT EXPANSION CONSULTATION

Heathrow

The Planning Inspectorate

The Water Framework Directive

Advice note eighteen: The Water Framework Directive

Status of this Advice Note

This Advice Note has no statutory status and forms part of a suite of advice provided by the Planning Inspectorate.

This is a new Advice Note. It will be kept under review and updated when necessary.

This Advice Note makes reference to other Advice Notes, these can be found at: **http://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/**

Summary of this Advice Note

The Water Framework Directive (WFD)[1] was adopted and came into force in 2000 and represents a culmination in European Union (EU) water resource protection. It establishes a legislative framework for the protection of surface waters (including rivers, lakes, transitional waters[2] and coastal waters) and groundwater throughout the EU. The WFD is transposed into law in England and Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 2017 Regulations)[3].

The 2017 Regulations place a general duty on the Secretary of State (SoS), the Welsh Ministers, the Environment Agency (EA), and Natural Resources Wales (NRW) to exercise their 'relevant functions' so as to secure compliance with the WFD (Regulation 3). Functions under the Planning Act 2008 (as amended) (PA2008) are not 'relevant functions' for this purpose.

However, the SoS, the Welsh Ministers, EA, NRW, and each public body have a specific duty to have regard to the relevant River Basin Management Plan (RBMP)[4], and any supplementary plans made under it, in exercising their functions (Regulation 33)[5]; this would include functions under the PA2008.

Contents

1. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (the 'Water Framework Directive').
2. Article 2 of 2000/60/EC defines 'Transitional waters' which for the purposes of this Advice Note are referred to as estuarine waters
3. SI 2017/407 which revoke and replace The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (subject to transitional provisions in article 38 of the 2017 Regulations).
4. Article 13.1 of the WFD requires EU Member States to produce river basin management plans for each river basin district within their territory.
5. 'Having regard to' river basin management plans includes taking account of and considering the environmental objectives and summary of measures contained within the plan when exercising any functions and the effects of those functions on the objectives and measures within the plan.

The SoS will need to consider the implications of the Proposed Development, firstly in relation to the specific duty to have regard to the RMBP and supplementary plans, and secondly, in more general terms in relation to the UK's ability to comply with the WFD, including (if applicable) the derogation provisions of Article 4.7 (see section 4 of this Advice Note).

The Examining Authority (ExA) for a Nationally Significant Infrastructure Project (NSIP) will therefore need, by the close of the Examination, to be in a position to report to the SoS on the effects of the Proposed Development on the relevant RBMP (and the water bodies therein) as well as any supplementary plans. The ExA will also need to ensure that the SoS has sufficient information to determine whether or not the Proposed Development has implications for the UK's obligations under the WFD (including necessary information in support of any derogation that may be sought under the provisions of Article 4.7 of the WFD).

In this Advice Note, the Inspectorate supports the preparation and submission of separate WFD assessment reports by Applicants, which clearly explain how the requirements of WFD have been met. These reports should be prepared in consultation with the EA and / or NRW and it is acknowledged that they are likely to inform any Environmental Statement (ES) and vice versa.

A number of National Policy Statements (NPS)[6], for example EN-1 (overarching NPS for energy), expressly stipulate that the ES for an NSIP must contain information on impacts arising from the Proposed Development on water bodies or protected areas under the WFD (and daughter directives).

The purpose of this Advice Note is to alert Applicants to the requirements of the WFD and 2017 Regulations, as applicable to NSIPs under the PA2008. This Advice Note explains the information that the Inspectorate considers an Applicant must provide with their NSIP application in order to clearly demonstrate that the WFD and the 2017 Regulations have been appropriately considered.

This Advice Note seeks to provide:

- an introduction to the legal context and obligations placed on both the decision maker and the Applicant by the WFD and the 2017 Regulations;
- an explanation of the relationship between the WFD assessment, the Environmental Impact Assessment (EIA) and Habitats Regulations Assessment (HRA);
- advice regarding the relevant bodies that should be consulted by the Applicant during the process of preparing a Development Consent Order (DCO) application in respect of the WFD, and the suggested timing and level of that engagement;
- a clarification of the process and information to be provided with a DCO application with respect to WFD; and
- advice on the presentation of the information using optional screening and assessment matrices.

6. EN-1 Energy NPS; EN-6 Nuclear; National Networks NPS; Ports NPS; Waste Water NPS; and Hazardous Waste NPS.

1. Introduction to the legal context

1.1 The WFD established a legislative framework for the protection of surface waters (including rivers, lakes, transitional (estuarine[2]) waters and coastal waters) and groundwater throughout the EU.

1.2 The overall aims and objectives of the WFD are to:

- enhance the status and prevent further deterioration of surface water bodies, groundwater bodies and their ecosystems;
- ensure progressive reduction of groundwater pollution;
- reduce pollution of water, especially by Priority Substances and Certain Other Pollutants[7];
- contribute to mitigating the effects of floods and droughts;
- achieve at least good surface water status for all surface water bodies and good chemical status in groundwater bodies by 2015[8] (or good ecological potential in the case of artificial or heavily modified water bodies); and
- promote sustainable water use.

1.3 The WFD is transposed into English and Welsh law by the 2017 Regulations.

1.4 Many NSIPs have the potential to affect and also potentially contribute toward the achievement of the aims and objectives established by the WFD.

1.5 The WFD requires EU Member States to consider a single system of water resource management through characterisation, protection and enhancement of water resources considered within the context of a river basin district (RBD). Within England and Wales 11 RBDs have been identified, including three cross-border RBDs, one of which crosses the borders of England and Scotland. The 2017 Regulations require 'the appropriate agency' (the EA in England, and NRW in Wales) to prepare RBMPs for each RBD, for the approval of 'the appropriate authority' (the SoS in England, and the Welsh Ministers in Wales).

1.6 The RBMPs describe the current state of the water environment for each RBD, the pressures affecting the water environment, the objectives for protecting and improving it, and the programme of measures needed to achieve the statutory environmental objectives of the WFD. RBMPs are subject to a six year planning cycle and are to be routinely reviewed and updated to ensure compliance with the overall WFD objectives. RBMPs were first published in 2009, and were subsequently updated in 2015.

1.7 The 2017 Regulations also place a general duty on the SoS, the Welsh Ministers, the EA, and NRW to exercise their 'relevant functions' so as to secure compliance with the WFD (Regulation 3). Functions under the PA2008 are not 'relevant functions' for this purpose. However, the SoS, the Welsh Ministers, EA, NRW, and each public body have a specific duty to have regard to the relevant RBMP, and any supplementary plans made under it, in exercising their functions (Regulation 33); these functions include the determination of applications under the PA2008.

1.8 The SoS will need to consider the implications of the Proposed Development, firstly in relation to the specific duty to have regard to the RBMP and supplementary plans, and secondly, in more general terms in relation to the UK's ability to comply with the WFD, including (if applicable) the derogation provisions of Article 4.7 (see section 4 of this Note).

7. Annex II, Environmental Quality Standards (EQS) Directive (2008/105/EC) as amended
8. Article 4, Water Framework Directive (WFD) (2000/60/EC)

1.9 Some NPS', such as EN-1 (overarching NPS for energy), expressly stipulate that the ES for an NSIP must contain information on impacts arising from the Proposed Development on water bodies or protected areas under the WFD (and daughter directives).

1.10 Regulation 5(2) (l) (iii) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended) (the APFP Regulations) requires each NSIP Applicant (where applicable) to provide with their application *'a plan with accompanying information identifying … water bodies in a river basin management plan, together with an assessment of any effects on such … bodies likely to be caused by the proposed development.'* It is essential that any WFD assessment (see Section 4 below) is conducted thoroughly and is easily identified amongst the application documents, together with any relevant plans.

2. Relationship with Environmental Impact Assessment (EIA) and Habitat Regulations Assessment (HRA)

2.1 Most DCO applications are likely to require assessments in accordance with the WFD, the Habitats Directive[9] and the EIA Directive[10]. With regard to EIA and HRA, Applicants should refer to advice contained in the Inspectorate's Advice Notes 7[11] and 10[12], respectively. Although the WFD assessment, the HRA, and EIA are separate assessments, all are integral to the application and there is a direct relationship between them.

2.2 WFD, HRA and EIA influence decision-making in different ways:

- the WFD assessment – informs the SoS in relation to the duty to have regard to the RBMP and any supplementary plans (Regulation 33 of the 2017 Regulations);
- the EIA - informs the SoS as decision maker of likely significant effects (its findings must be taken 'into consideration') (Regulation 4(2) of the EIA Regulations[13]); whereas
- the HRA – the decision maker has to follow the stages prescribed by the Habitats Regulations[14] (Regulation 61 of the Habitats Regulations) and can only make a DCO if authorisation is permissible in accordance with the Habitats Regulations.

2.3 Consideration of a Proposed Development's implications on WFD is often included within the ES supporting the DCO application. This approach is not incorrect; however, it is important that Applicants recognise that WFD impacts are assessed in a different way from the EIA approach.

9. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (as codified) (the 'Habitats Directive'), transposed into UK law by the Conservation of Habitats and Species Regulations 2010 (as amended) (the 'Habitats Regulations'), SI 2010/490.
10. Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance (the 'EIA Directive'). Directive 2014/52/EU (amending Directive 2011/92/EU) was made in April 2014, the terms which required Member States to bring into force the laws, regulations and administrative provisions necessary to comply with directive 2014/52/EU by 16 May 2017 (transitional provisions apply to the new regulations).
11. Advice Note seven: Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping.
12. Advice Note ten: Habitat Regulations Assessment relevant to nationally significant infrastructure projects.
13. The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations'), SI 2017/572.
14. The Conservation of Habitats and Species Regulations 2010 (as amended), SI 2010/490. (The Offshore Marine Conservation (Natural Habitats, &c) Regulations 2007 (as amended), SI 2007/1842 (Offshore Marine Regulations) will apply beyond UK territorial waters (12 nautical miles)).

2.4 Applicants will need to clearly identify in their documentation (either within the ES or as a standalone document(s)) the implications of the Proposed Development for the objectives of the WFD and relevant RBMPs. While it is most likely that the WFD assessments will utilise information gathered as part of the wider EIA, this must be transposed into an assessment in the context of WFD and ultimately it must be determined if the Proposed Development has the potential to impact upon WFD water bodies.

2.5 It may not be sufficient to use the conclusions of the EIA to determine if there would be a potential impact to WFD, a WFD assessment in its own right must be carried out if required (in consultation with the EA and / or NRW). To that end, it will be more appropriate to present the information in a separate WFD assessment report, particularly for more complex cases (see Section 4).

2.6 Although EIA is a separate process, Applicants are invited to use the formal EIA scoping procedures to submit information identifying the water bodies within relevant RBMPs likely to be impacted by the Proposed Development. EIA scoping often occurs early in the pre-application process and this will help alert the Inspectorate, the SoS, and relevant consultees (in particular the EA and/or NRW) to any potential implications the NSIP may have in respect of the WFD.

2.7 It is recommended that Applicants provide information on the methodology proposed to be used in their WFD assessment within their EIA Scoping Report.

2.8 Further advice on the WFD process and the information required is provided in section 4 of this Advice Note.

3. Relevant bodies to be consulted

Consultation with the Environment Agency and Natural Resources Wales

3.1 The EA and NRW have a duty to secure compliance with the WFD and are statutory consultation bodies for the purpose of the PA2008. Therefore, Applicants are advised to seek the views of the EA and/or NRW (as appropriate) early in the pre-application process and to continue this engagement through to (and during) the Examination stage. Matters to be discussed with the EA and/or NRW may include, but are not limited to, the following:

- the need or otherwise for a specific WFD assessment;
- the scope and methodology of any WFD assessment;
- the potential impact of the Proposed Development on water bodies within the relevant RBMP and compliance with the objectives of the WFD;
- any mitigation measures required to ensure compliance; and
- the information to be submitted as part of the DCO application to inform the tests of Article 4.7, if the WFD impact assessment concludes a derogation is necessary (see section 4 of this Advice Note). Applicants should be aware that if a derogation is likely to be required, the supporting information should be gathered from an early stage in the process, including the design options appraisal stage.

3.2 Applicants should ensure that sufficient information concerning compliance with the requirements of the WFD is submitted with an application. Applicants are therefore strongly advised to use the pre-application consultation process to obtain advice from the EA and/or NRW (as appropriate) to verify that all relevant water bodies have been considered, together with all potential effects on these water bodies, and whether the requirements of the WFD have been met, before an application is submitted. Evidence of the outcome of this consultation should be

recorded as part of the WFD assessment for completeness or appended to the relevant chapter of the ES if there is no separate WFD screening or assessment document. Further information on working and consulting with the EA and NRW during the NSIP process is provided in the Inspectorate's Advice Note eleven (and its annexes)[15].

3.3 In cases where it has been agreed with the EA/NRW that a specific WFD assessment is not required, this should also be clearly reported and evidenced with the relevant consultation response being provided.

4. The WFD process and the information required

WFD Screening and the WFD Assessment

4.1 There is no specific or prescribed format or process to follow for WFD assessments (the EA have produced guidance in relation to estuarine and coastal waters in England which is discussed in the following paragraphs). The absence of a prescribed approach presents flexibility to Applicants and enables them to undertake a proportionate and flexible approach; however, it also adds a level of uncertainty and variation in the perceived levels of robustness between assessments. The Inspectorate has therefore produced this Advice Note to help clarify the information that should be provided with a DCO application with respect to WFD assessments.

4.2 Having regard to the EA's *"Water Framework Directive assessment: estuarine and coastal waters"* guidance[16], Applicants may find it helpful to consider WFD impacts in a three-stage approach described below):

- **Stage 1 – WFD screening** –to determine if there are any activities associated with the Proposed Development that don't require further consideration, for example activities which have been ongoing since before the current RBMP plan cycle and which have thus formed part of the baseline
- **Stage 2 – WFD scoping** – to identify risks of the Proposed Development's activities to receptors based on the relevant water bodies and their water quality elements (including information on status, objectives, and the parameters for each water body)
- **Stage 3 – WFD impact assessment** – a detailed assessment of water bodies and their quality elements that are considered likely to be affected by the Proposed Development, identification of any areas of non-compliance; consideration of mitigation measures, enhancements, and contributions to the RBMP objectives. Where the potential for deterioration of water bodies is identified, and it is not possible to mitigate the impacts to a level where deterioration can be avoided[17], the project would need to be assessed in the context of Article 4.7 of the Directive (see Section 4 of this Advice Note for further advice on derogation). Where a derogation is necessary, Applicants will need to provide the necessary information to justify their case, bearing in mind that Applicants must always seek to avoid deterioration of the water environment. It is a matter for the SoS to consider whether derogation under Article 4.7 is justified in relation to a Proposed Development.

4.3 It should be noted that an assessment of a project's compliance with the WFD could be made at any of the outlined stages above and Applicants may not need to proceed to all stages depending on the specific circumstances of a project.

15. Advice Note eleven: Working with public bodies in the infrastructure planning process (including Annex A – Cyfoeth Naturiol Cymru/Natural Resources Wales, and Annex D – Environment Agency)
16. https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters.
17. Applicants should note that consideration of measures to avoid, mitigate and compensate impacts identified need not be limited to stage 3 and may also be considered at stages 1 and 2 as appropriate.

4.4 Mitigation relied upon to demonstrate compliance at any of the stages referred to above must be appropriately defined and sufficiently secured. Mitigation could be secured through DCO requirements/deemed marine licence conditions, or other legally binding methods.

4.5 The Inspectorate acknowledges that the EA's *"Water Framework Directive assessment: estuarine and coastal waters"* guidance is specifically directed at projects affecting estuarine and coastal waters in England. However, the Inspectorate considers that the principles established in the guidance, particularly the staged approach to assessment, is equally applicable to other water bodies such as rivers, lakes and groundwater and projects in England and Wales. The application of these principles should be specifically discussed with EA/NRW (as appropriate) on a project specific basis (see section 3 of this Advice Note in relation to consultation with EA and NRW). Further information as to consultation with relevant bodies is provided in the following paragraphs.

4.6 The WFD screening stage and any subsequent WFD assessment should commence early in the pre-application process and should be conducted in consultation with the EA and/or NRW. In particular, Applicants should consider early discussions to inform their evidence gathering process (including any survey/monitoring and assessment work which may be required) in characterise the baseline conditions. In some instances, there may be a long lead-in time for the level of survey work that may be considered necessary prior to the submission of any DCO application.

4.7 A flow chart has been included as Figure 1 below to provide an overview of the recommended process to address the WFD during the pre-application process.

Stage 1

Does the proposed development have impact pathways to WFD water bodies?

No → Consult with EA/NRW – do they agree that there are not impact pathways to WFD water bodies?

Yes → No WFD screening or assessment required. Submit evidence of consultation agreement with DCO application

No → Undertake WFD Screening and establish the Proposed Development's zone of influence

Yes → Undertake WFD Screening and establish the Proposed Development's zone of influence

Stage 2

Undertake WFD Screening and establish the Proposed Development's zone of influence → Consult with EA/NRW as appropriate – can effects on all WFD water bodies be screened out?

Yes → Submit WFD Screening report and plan identifying WFD water bodies within the zone of influence (plus evidence of consultation agreement) with the DCO application

No → WFD Scoping – agree the scope of the assessment with EA/NRW in respect of WFD water bodies screened in

WFD Scoping – agree the scope of the assessment with EA/NRW in respect of WFD water bodies screened in → Identify risks from Proposed Development to relevant WFD water bodies. Consider mitigation. Consultation with EA/NRW

Stage 3

Identify risks from Proposed Development to relevant WFD water bodies. Consider mitigation. Consultation with EA/NRW → Undertake WFD Impact assessment – does the project comply with WFD? Do EA/NRW agree?

Yes → Prepare and submit WFD Impact assessment (reflective of the screening assessment), a plan identifying WFD water bodies and evidence of the consultation agreement with the DCO application

No → Consult with EA/NRW. Consider mitigation or changes to the proposed development. Compile case for Article 4.7 derogation. Can a case be made for the 4.7 derogation?

Yes → Prepare and submit WFD Impact assessment (reflective of the screening assessment) and Article 4.7 derogation case with DCO application, including plan identifying the WFD water bodies, and evidence of consultation agreement with the DCO application

No → Further work needed to comply with WFD (risk of DCO refusal)

Further work needed to comply with WFD (risk of DCO refusal) → Identify risks from Proposed Development to relevant WFD water bodies. Consider mitigation. Consultation with EA/NRW

Stage 1 – WFD Screening

4.8 The WFD water bodies should be clearly shown and labelled on a map / plan. The WFD screening stage should identify the extent to which the Proposed Development is likely to affect the water bodies (ie defining the Proposed Development's zone of influence). The decision to exclude aspects[18] from further consideration (screening out) at this stage should be clearly stated alongside reasoning for their exclusion. WFD screening should address and identify:

- the relevant RBMPs and water bodies;
- the zone(s) of influence based on aspects of the proposed development that could affect the identified water bodies; and
- any aspects of the Proposed Development that have been screened out and why.

4.9 Applicants should share the findings of their WFD screening with the EA and/or NRW and provide with the DCO application, written confirmation of their views (and identify the extent to which the conclusions are agreed). If written confirmation is not provided, it is likely to be requested during Examination.

4.10 WFD screening may determine that no further consideration of WFD matters is required, for example due to the absence of an impact pathway to the WFD water bodies, (i.e. where they do not fall within the project's Zone of Influence). It is for the Applicant to provide sufficient evidence to demonstrate this. In such instances, evidence of the agreement with EA/NRW should be provided with the DCO application.

4.11 Decisions taken at the WFD screening stage should be considered and reviewed periodically. This will be particularly important as and when more detailed information regarding the Proposed Development becomes available.

Stage 2 – WFD Scoping

4.12 Once the screening stage has been completed, the Applicant should seek to define and agree, with EA/NRW, the scope of further assessment work that may be required as part of stage 3. This will include identifying risks from the Proposed Development's activities to receptors based on the relevant water bodies and their water quality elements. Evidence of agreement as to the scope of works taken forward should be recorded through the reporting process and should be included as part of the DCO application documents.

4.13 WFD scoping should involve:

- undertaking an initial assessment to identify the risks from the Proposed Development to receptors (within the zone of influence) based on the relevant water bodies and their water quality elements; and
- identification of those water bodies where a more detailed impact assessment is required.

4.14 As per the outcomes of the screening stage, Applicants should share the findings of their WFD scoping with the EA and/or NRW and provide with the DCO application, written confirmation of their views (and identify the extent to which the conclusions are agreed). If written confirmation is not provided, it is likely to be requested during Examination.

18. 'Aspects' are referred to interchangeably in this text and relate to the specific characteristics of the Proposed Development (including related activities during construction and operation) and the environmental topic areas relevant to the assessment of effects.

Stage 3 – WFD Impact Assessment

4.15 The WFD impact assessment is a detailed assessment of the water bodies and activities carried forward from the WFD screening stage. It should be set within the context of the appropriate RBMPs and should include:

- **Identification of water bodies** that are potentially affected (directly or indirectly) or could be at risk as a result of the Proposed Development;
- The **baseline characteristics** of the water bodies concerned;
- A **description of the Proposed Development** and the aspects of the development considered within the scope of the WFD assessment;
- The **methods used** to determine and quantify the scale of WFD impacts;
- An assessment of the **risk of deterioration**, as Article 4.7 may apply where is a there is a risk the Proposed Development will prevent the achievement of good status or result in deterioration in status;
- An explanation of any **mitigation required** and how its delivery is secured; and
- An explanation of any **enhancements and/or positive contributions to the RBMP objectives** proposed and how their delivery would be secured.

Identification of Water Bodies

4.16 The Applicant's WFD impact assessment submitted with their DCO application should clearly identify each water body that is likely to be affected by the proposed NSIP, as carried forward from the WFD screening exercise. This information should also be presented on a plan, in accordance with the APFP Regulations. Applicants should identify the water bodies that have been considered in a table, including the relevant baseline information relating to the water bodies stating whether the water body concerned is a river, lake, reservoir, stream, canal, transitional, coastal or groundwater body. Any designated artificial water bodies (AWB) or Heavily Modified Water Bodies (HMWB)[19] should also be included in the table.

The baseline characteristics of the water bodies concerned

4.17 The WFD assessment should establish the baseline characteristics for each water body likely to be impacted by the Proposed Development. The assessment should clearly describe the current classification status for all elements (including hydromorphological status) for each affected water body.

4.18 The assessment should clearly explain the pressures already affecting the water body and its sensitivity to any change, as described in the RBMP.

Surface water bodies

4.19 The status of surface water bodies will be determined having regard to their Ecological and Chemical status. These are established having regard to the following elements:

- Ecological status
  - Biological quality;
  - General chemical and physicochemical quality;
  - Hydromorphological quality; and
  - Specific pollutants with UK Environmental Quality Standards (EQS).

19. AWB and HMWB are defined at Article 2.8 and 2.9 of the WFD respectively. Conditions under which EU Member States may designate AWB or HMWB are provided in Article 4.3 of the WFD

- Chemical Status
  - Priority substances and other EU level substances with EU EQS.

4.20 As EA guidance[20] explains, the lowest classification of these is used to determine overall status of the water body. There are sub-elements to each of the ecological status criteria, for example biological quality is determined by consideration of phytoplankton, macroalgae, fish and invertebrates. The lowest classification principle applies equally in this context.

4.21 In addition, hydromorphological quality is only a 'supporting element' in determination of ecological status and is not taken into account in the overall status classification (unless it is required in differentiating between 'high' and 'good' overall status).

4.22 The lowest classification of the ecological status (including sub-elements) and chemical status is used to determine overall status of the water body. This is sometimes referred to as a "One out all out" principle.

4.23 For AWBs and HMWBs, a separate classification process applies because these water bodies cannot reach good ecological status given their socio-economic use for a particular purpose[21]. The classification of AWBs and HMWBs 'ecological potential' is determined by:

- Identifying the impacts affecting the AWB / HMWB;
- Identifying the mitigation measures necessary to ensure the hydromorphological characteristics of a water body are consistent with 'good' or 'maximum' ecological potential; and
- Assessing whether those measures have been implemented in overall determination of 'ecological potential.

Groundwater bodies

4.24 Groundwater status is established by having regard to both quantitative status and chemical status.

A description of the Proposed Development and the aspects of the development considered within the scope of the WFD assessment

4.25 A description of the Proposed Development, consistent with the draft DCO, should be included within the assessment or cross-referenced to the relevant description in the ES or other application documents. Certain aspects of the Proposed Development may not affect water bodies – these should be set out in the description and clearly identified as screened out of the assessment.

The methods used to determine and quantify the scale of WFD impacts

4.26 The WFD assessment should clearly set out the methodology used to identify WFD impacts arising from the Proposed Development.

4.27 The WFD assessment should quantify the scale of any impacts likely to occur both in terms of the geographical extent (ie which water bodies fall within the zone of influence) as well as the magnitude of change (ie any deterioration of an element within a status class and / or between status classes). The methods used to determine this should be clearly explained and justified. If the assessment has involved particular assumptions or professional judgement this should be clearly explained and reasoned as well as being supported by an appropriate evidence base. Ideally the information provided as part of any EIA scoping request will give an early indication of the likely methods to be used and will be helpful to inform the WFD methodology.

20. http://evidence.environment-agency.gov.uk/FCERM/en/SC060065/About.aspx
21. WFD Article 4.3

An assessment of the risk of deterioration

4.28 The WFD assessment should assess the risk of impact to the water bodies, having regard to its specific elements and objectives. The assessment should identify if there is a risk of deterioration of any WFD element as a result of the Proposed Development and any conclusion reached should be supported by a robust evidence base. A 2015 judgment in the EU Court of Justice[22] found that the WFD precludes the authorisation of individual projects which may cause the deterioration of the status of a body of water, unless a derogation under Article 4.7 of the WFD is justified. Further, the judgement also ruled that activities which jeopardise the attainment of 'good' overall status are similarly precluded from authorisation. The Court advised that 'deterioration of status' is established as soon as the status of at least one of the quality elements falls by one class, even if the change does not result in a fall in classification of the water body as a whole[23]. Therefore, Applicants should clearly identify any predicted deterioration in status in any of the quality elements within water bodies.

An explanation of the mitigation required and how its delivery is secured

4.29 If specific mitigation is required in order to ensure no risk of deterioration of water bodies as a result of the project, this should be clearly identified in the WFD assessment. Any necessary mitigation should be explained in detail alongside a prediction of its likely efficacy and an assessment of any residual effect. It will also be necessary for the assessment to clearly explain the type of mechanisms to be put in place in order to secure the delivery of such mitigation, including reference to any DCO requirements/deemed marine licence conditions, or other legally binding methods and timescales for delivery.

An explanation of any enhancements and/or positive contributions to the RBMP objectives proposed and how their delivery would be secured

4.30 Applicants should also describe any enhancement measures or positive contributions that the project can provide in respect of the objectives in the relevant RBMP. These should be clearly distinguished from any necessary mitigation measures. Their method and timescales of delivery, as well as how they would be secured, should also be clearly explained.

Article 4.7 Derogations

4.31 Article 4.7 of the WFD allows derogation from the Directive; where its requirements are met, Member States can fail to achieve the objectives or cause a deterioration in status[24]. It is only available subject to stringent conditions[25] and any reliance on Article 4.7 should be very much a last resort.

4.32 In addition, the development must not permanently exclude or compromise achievement of the WFD objectives in other bodies of water within the same RBD and must be consistent with the implementation of other EU environmental legislation (Article 4.8). In applying Article 4.7, steps must also be taken to ensure the new provisions guarantee at least the same level of protection as the existing EU legislation (Article 4.9).

4.33 The Article 4.7 tests require significant and often complex evidence to be made available and assessed. It is therefore critical that the potential requirement for Article 4.7 derogation is considered as early as possible

22. Bund fur Umwelt und Natursh utz Deutschland eV v Bundesrepublik Deutschland [2015] EUECJ C-461/13.
23. This applies unless the water body is already in the lowest status class in which case any deterioration is considered to be deterioration in status under the WFD.
24. Article 4.7 of the WFD is only applicable to new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, or for deterioration from high to good status for surface water bodies related to new sustainable human development activities.
25. Set out in Article 4.7 of the WFD

in the pre-application stage of the PA2008 process. Applicants should engage early with the EA/NRW as the "appropriate agencies" for WFD in England and Wales respectively[26]. The appropriate agencies will be able to provide advice to Applicants on the information that is required to inform the Article 4.7 tests. The Inspectorate also strongly encourages Applicants to seek the comments of the appropriate agencies on draft documents where Article 4.7 tests are to be engaged during the pre-application process.

4.34 Further advice on the tests in Article 4.7 is provided below (the headings simplify the precise requirements of the Article). Applicants should be aware that all of the four tests must be satisfied. Where a derogation may be sought in relation to an NSIP, Applicants will need to provide the necessary information for the SoS (in exercising functions in Regulation 33 of the 2017 Regulations) to determine if an Application meets the tests and therefore whether a derogation may be justified under Article 4.7.

Test (a): All practicable steps are to be taken to mitigate the adverse impacts on the water body concerned

4.35 A case made in support of a derogation under Article 4.7, should explain all of the practicable steps taken to mitigate the adverse impacts arising from the Proposed Development on the status of the affected WFD water bodies. This will need to consider the whole lifecycle of the Proposed Development including construction, operation and decommissioning. The means of securing the proposed mitigation measures in the DCO should be clearly identified. Applicants are advised to consult with the EA / NRW as to whether the proposed mitigation measures can be effectively implemented.

Test (b): the reasons for modifications or alterations are specifically set out and explained in the RBMP

4.36 The SoS (as the competent authority in respect of a DCO application) must be satisfied, under WFD Article 4.7(b), that any alterations or modification to water bodies that necessitate derogation would be capable of being reported in the relevant RBMP (whose objectives are required to be reviewed every 6 years under WFD Article 13.7).

Test (c)(1): There is an overriding public interest in the Proposed Development and/or Test (c)(2): its benefits outweigh the benefits of the WFD objectives

4.37 Applicants will need to provide evidence as to why they consider that the Proposed Development is justified by:

- Overriding public interest and/or
- That the benefits of the project to human health, human safety or sustainable development outweigh the benefits of achieving the WFD objectives.

4.38 It may be that a Proposed Development satisfies both (c)(1) and (c)(2) tests, in which case, Applicants should consider providing information to support both cases, however, only one part of the test would need to be satisfied.

26. Regulation 2 of the WFD Regulations.

Test (d): The benefits of the project cannot be achieved by a significantly better environmental option

4.39 To satisfy this condition, Applicants have to demonstrate that the beneficial objectives of the modifications or alterations to the water body made by the Proposed Development cannot be achieved by other means which are a significantly better environmental option, are technically feasible, and do not lead to disproportionate cost. This could include consideration of alternative locations, different scales, designs of development, or alternative processes for example.

4.40 The Scottish Environment Protection Agency (SEPA) has provided guidance (SEPA, 2013[27]) stating that an option may be a significantly better environmental option if:

- the benefit it delivers is at least equivalent to the benefit that would be delivered by the proposal;
- its environmental cost is significantly less than the environmental cost of the proposal (SEPA would assess the environmental cost of a proposal by identifying the significance of its adverse impacts using the method set out in WAT-SG-67: Assessing the Significance of Impacts - Social, Economic, Environmental[28]); and
- it is economically viable and hence a realistic option.

4.41 Applicants for NSIPs should contact the EA and/or NRW to obtain any other available guidance or advice it may be able to provide in this context for projects in England and Wales respectively.

5. Presentation of Information

5.1 Regulation 5[29] of the APFP Regulations requires Applicants (where applicable) to provide an assessment of the effects on water bodies likely to be affected/impacted by the Proposed Development. As described above, typically this will result in the WFD screening and impact assessment (as necessary) being provided as separate assessments, or appended to the ES. Applicants are also required to provide a plan showing the relevant water bodies within a RBMP to which their development proposal relates.

5.2 To support the process the Inspectorate has prepared WFD overview matrices [see Appendix 1] which are intended to assist Applicants in providing information that is likely to be required in the examination of their applications. The WFD Matrices are available for download in Microsoft Word format.

5.3 Completed draft Matrices can be provided along with other relevant information as part of a request for an EIA scoping opinion in order to address the requirements identified above.

5.4 The matrices are only intended to provide an 'at a glance' overview and could be useful to Applicants and the Inspectorate, particularly during the acceptance process under the PA2008. They are not intended to replace or negate the need for the full information contained in the Applicant's WFD screening/assessment report, but should contain appropriate cross-referencing to relevant parts of that report.

5.5 The matrices allow Applicants to document their approach to WFD on the basis of the screening stage and the WFD compliance assessment conclusion stage as follows:

- Identify each RBMP that could be affected by the Proposed Development and each water body within the relevant RBMP likely to be affected. The screening matrices should also indicate for each water body if it has

27. SEPA (2013) Supporting Guidance (WAT-SG-68) Assessing Significantly Better Environmental Options.
28. SEPA Water Use Supporting Guidance (WAT-SG-67), https://www.sepa.org.uk/media/149801/wat_sg_67.pdf
29. Regulations 5(2)(l)(iii) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

been carried forward to a detailed WFD assessment; and

- In respect of each water body assessed by the Applicant, the matrices will provide a summary position of the assessment and a useful point of reference during the acceptance review stage and during the examination. It should also provide an 'at a glance' summary of water bodies. In particular, where deterioration in the status/ class of an element is predicted or where achievement of WFD objectives for the identified water bodies may be impeded by the Proposed Development. WFD water bodies and elements carried forward to consideration of Article 4.7 derogation should be clearly identified in the matrices.

6. Other Resources

6.1 The European Commission has produced a series of guidance documents and technical reports under the Common Implementation Strategy (CIS) to assist stakeholders to implement the WFD[30].

6.2 These guidance documents are intended to provide an overall methodological approach, and although they need to be tailored to the specific circumstances of each EU Member State, Applicants are advised to take into account such guidance when undertaking their assessment of WFD.

6.3 The UK WFD Technical Advisory Group (UKTAG)[31] is a partnership of UK government agencies set up by the UK WFD policy group, created to provide coordinated advice on scientific and technical aspects of the WFD.

6.4 UKTAG considers available scientific and technical information (as well as commissioning research into specific areas) in developing recommendations for WFD practice in the UK, and these are made available as part of their online resources, to which Applicants are encouraged to refer for specific technical guidance. The different UK government administrations then consider whether to adopt the UKTAG's recommendations (which can vary by administration).

30. http://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm
31. http://www.wfduk.org/

Further information

The Planning Inspectorate, Major Applications and Plans Directorate, Temple Quay House, Temple Quay, Bristol, BS1 6PN

Email: environmentalservices@pins.gsi.gov.uk
Telephone: 0303 444 5000
Web: http://infrastructure.planninginspectorate.gov.uk

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1.1 Why surface access matters

1.1.1 Surface access to Heathrow matters because a successful strategy means passengers, colleagues and other people can get to and from the airport with a choice of safe, reliable, comfortable, value for money, efficient and sustainable options. That will be better for passengers, build up our workforce, better for air quality and local quality of life and improve Heathrow's economics and value for the UK.

1.1.2 Today, around 250,000 passengers and colleagues use the airport each day. With expansion, this is expected to grow to around 340,000 by 2030[1]. The challenge for the future is to serve more people, from more of the UK, in a sustainable way. A clear and deliverable surface access strategy is necessary to ensure that the needs of all the people who travel to the airport in the future can be met in the most efficient and sustainable way.

Definition: Surface access

Surface access refers to all the ways in which passengers, visitors, employees and commercial traffic travel to and from Heathrow when they are not in an aircraft.

This includes traveling to or from Heathrow by public transport (e.g. rail, London Underground, bus, coach), taxis, cars, lorries, walking and cycling.

1.1.3 Heathrow is already well connected to the strategic road network. There is direct access to the M25 and M4 with the M1, M3 and M40 close by. Important local access is provided by the A4 and A30. This excellent location in relation to the motorway network means that coach and freight operators use Heathrow as a hub for their activities. There is a good choice of public transport options with express rail services into London as well as the Piccadilly line and Heathrow Connect. Full Elizabeth line services will begin to serve the airport from December 2019, with an initial service to Paddington starting in May 2018. A wide range of bus and coach services serve Heathrow today and connect the airport to many parts of the UK as well as the local area.

1.1.4 This document sets out our proposed approach to the development of a Surface Access Strategy (SAS) for an expanded Heathrow Airport. It identifies a package of possible measures that work together to meet the requirements of the National Policy Statement (NPS) whilst delivering commitments made by Heathrow Airport Ltd (HAL) that seek to improve surface access for airport users and local communities and support the development of more sustainable forms of transport. Further engagement will take place during 2018 as the Surface Access Strategy develops into a set of specific proposals that will form part of the Development Consent Order (DCO) application for Heathrow Expansion.

Surface access matters to passengers

1.1.5 Surface access is an important part of a passenger's overall experience. Research shows there is a strong link between a passenger's surface access experience and their overall satisfaction with Heathrow[2]. Passengers value reliable, convenient, direct and frequent services. Offering a range of choices to passengers makes it easier to meet the different needs of different types of passengers.

1.1.6 The convenience of travel to and from the airport is an important factor in the passengers' decisions on which airport to use. With population growth, congestion is expected to increase and therefore minimising the impacts of congestion on the passenger journey is essential for a successful airport.

1 A colleague is defined as a person working within the Airport boundary or travelling to the Airport for employment within the aviation industry whether they are directly employed by Heathrow Airport Limited or not.

2 Heathrow - http://www.londontravelwatch.org.uk/documents/get_lob?id=4198&age=&field=file

1.1.7 Our current surface access provision is highly rated by our passengers. This is measured through our own Quality of Service Monitor (QSM) survey. These surveys indicate that 93% of passengers rated Heathrow surface access as either 'very good' or 'excellent' in 2016[3]. The independent airport service quality (ASQ) programme shows that satisfaction has improved over time with Heathrow achieving its highest ever quality score for the last quarter of 2016[4]. We want to make passengers' experience even better as we expand the airport.

Surface access matters to sustainable growth

1.1.8 Heathrow 2.0 is our airport wide sustainability strategy and it sets out a framework for the future. Heathrow's plan is to expand to meet passenger demand in a way that creates a positive impact on our community, environment and economy. This will be achieved by making Heathrow a great place to work and live, creating a thriving sustainable economy and a world worth travelling.

1.1.9 Surface access has a key role to play in meeting our aspirations set out in all four areas. It has an important role in tackling local air quality and targets for reducing carbon emissions. Surface access also has a key role in connecting all of the UK to growth and ensuring a sustainable economy. Our operation relies on getting colleagues to work on time to serve passengers and allow the airport to function. Affordable and convenient choices for colleagues are critical to the ongoing success of the airport. Poor air quality is an issue affecting London and many parts of the UK. We recognise that we need to play our part in improving local air quality and ensuring that proposals for expansion support HAL's wider air quality strategy. The key contributor to local air quality issues around Heathrow is road traffic. Our plans for expansion seek to tackle this by reducing the reliance on the use of cars to access the airport by improving public transport as well as supporting ways to reduce the emissions of vehicles that will still access the airport.

1.1.10 More widely, we want to play our part in addressing climate change and carbon emissions by making surface access by sustainable transport more convenient and attractive for all users.

Surface access matters to the economy

1.1.11 Congestion and delays on the transport network are bad for the economy. Road traffic congestion is estimated to cost the UK economy about £31 billion in 2016 through lost time and unreliable journeys[5]. Reliable surface access journeys are critical to ensuring goods and people arrive on time.

1.1.12 Heathrow is a strategic national asset and key transport hub that is vital to the UK economy. Heathrow is Britain's biggest port by value for global markets outside the EU and Switzerland, handling over 30% of these UK exports [6]. Fast and reliable journeys to Heathrow matters to passengers and business who need to get their products and services to market.

1.1.13 Through a robust and innovative surface access strategy, we can deliver additional capacity and put the UK's hub airport at the heart of the transport network, ensuring all of the UK benefits. This will help support London in its continuing role as a leading world city, as well as the Government's aspirations to support growth across the whole of the UK through its industrial strategy.

3 Source: Heathrow. Note: Average score across the four quarters of 2016

4 Source: Airports Council International - http://your.heathrow.com/heathrow-breaks-passenger-satisfaction-record-2016-q4/

5 Source: Inrix - http://inrix.com/press-releases/traffic-congestion-cost-uk-motorists-more-than-30-billion-in-2016/2015 data.

6 Source: Seabury Trade Database/HAL - http://your.heathrow.com/what-are-the-top-5-ukusa-imports-and-exports-via-AAAheathrow/

1.2 Purpose and structure of this document

1.2.1 The purpose of this document is to explain the proposed surface access priorities and initiatives that would enable Heathrow to expand in accordance with the requirements of the draft NPS. The document explains how the proposed priorities and initiatives would manage the surface access effects of increased passengers, colleagues and cargo that could arise because of the Heathrow Expansion Project (the project). It forms part of a suite of materials produced as part of our Stage 1 pre-application consultation and should be read in conjunction with the other documentation produced in support of the consultation.

1.2.2 This remainder of this document is structured as follows:

Section 2 – describes Heathrow's existing surface access arrangements;

Section 3 – outlines the policy context for expansion;

Section 4 – details our priorities and targets for surface access for an expanded Heathrow;

Sections 5-13 – outline a range of possible schemes and initiatives to enhance surface access at an expanded Heathrow;

Section 14 – considers the possible packaging of strategy options and potential impacts; and

Section 15 – articulates our proposed approach to delivery and development of the surface access strategy.

1.3 Have your say

We would like to know your views on our proposed approach to the development of a Surface Access Strategy for an expanded Heathrow Airport. We are seeking views on any aspects of our proposals but there are prompts throughout the document on areas which may be helpful to provide views on. In particular:

- **Please tell us what you think about the priorities and initiatives we propose to use to develop our surface access strategy.**
- **Please tell us what you think about the options to use road-user charging to reduce emissions and to manage vehicular access to the airport.**

Your comments will help us develop our detailed Surface Access Strategy for an expanded Heathrow Airport during 2018.

2 Surface access at Heathrow today

2.1 Overall travel to and from Heathrow

2.1.1 There are currently around 221,000 surface access journeys made by a quarter of a million people travelling to and from Heathrow each day. Around 60% of these are passengers and 40% are colleagues who work at Heathrow.

Users	Number of people at Heathrow on an average day	Number of person trips generated to/from the airport on an average day
Passengers starting or ending their plane journey at Heathrow[7]	133,000	133,000
Passengers transferring between two planes at Heathrow	75,000	n/a[8]
People working at Heathrow	44,000[9]	88,000[10]
Total	**252,000**	**221,000**

Table 2.1: People and journeys to/from Heathrow (estimate for an average day in 2016)[10]

2.2 Passenger travel

Passenger travel choices today

The CAA and Heathrow survey passengers annually to determine how they travel to and from the airport Around 39% of passengers currently use public transport to access the airport (Figure 2.1)[11]. We want more passengers to use public transport and have both short-term and long-term plans to increase this.

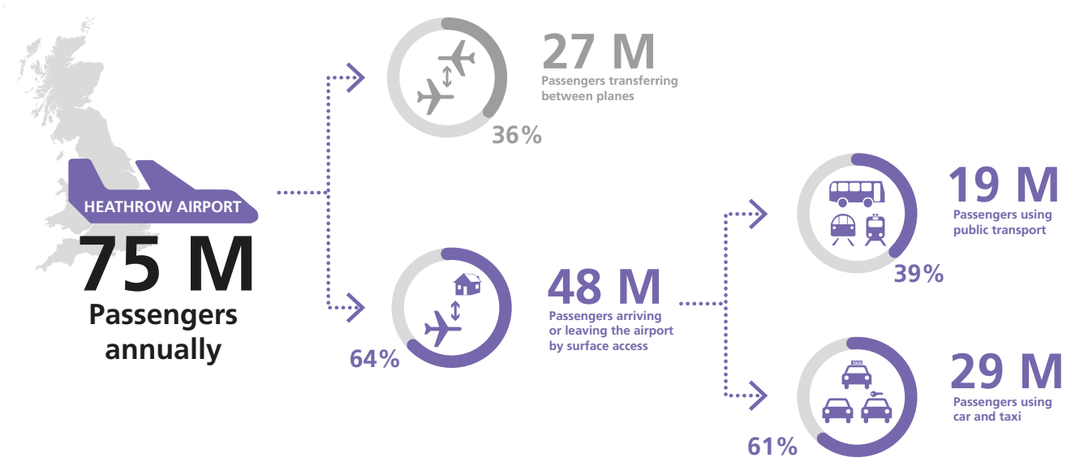


Figure 2.1: How passengers arrive today[12]

7 Ground transportation is all forms of transport that are not planes

8 Transferring passengers do not need surface access, they are just transferring from one plane to another.

9 Over 76,000 people work at Heathrow but on an average day it is estimated that around 44,000 colleagues are on site. Source: Heathrow Employment Survey 2013.

10 Approximately two trips per person, one trip to work and one trip home.

11 Source: CAA 2016. May not sum due to rounding.

12 Source: CAA 2016. May not sum due to rounding.

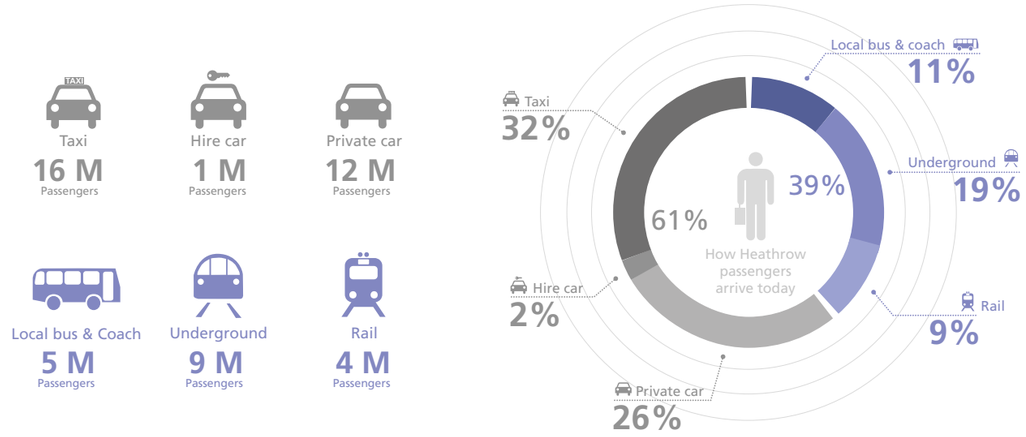


Figure 2.2: Breakdown of transport mode Heathrow passengers used[13]

2.2.1 Demand and method of travel varies depending on where people are travelling to and from. Of those passengers travelling to or from the airport, around half come from London and the East. Due to better public transport options from London and the East, almost half of these people use public transport compared to 30% or less from the other directions.

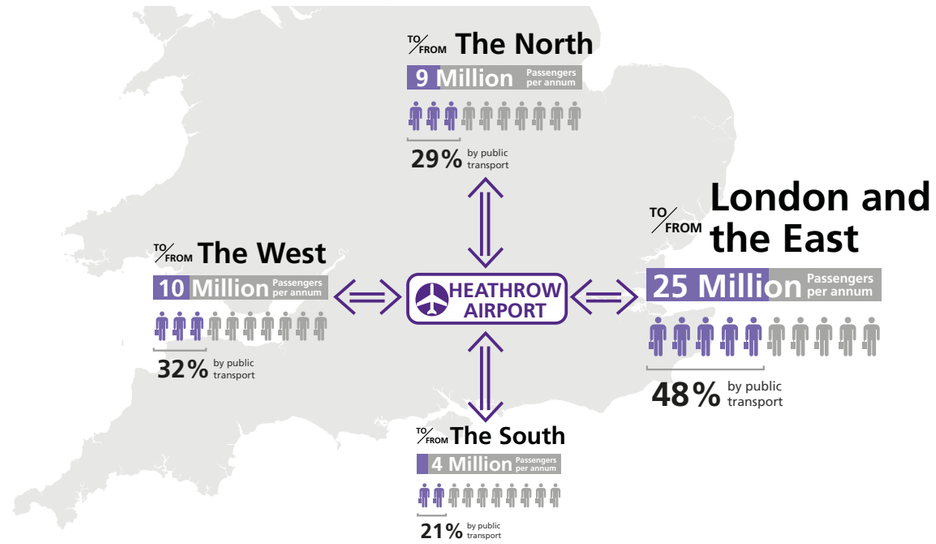


Figure 2.3: Direction from which passengers come from today[14]

13 Source: CAA 2016. Note: May not sum due to rounding. Additional 1% for other modes such as walking and cycling.

14 Source: CAA 2015. Note: May not sum due to rounding. This is an approximation and each compass point does not represent an official region; it represents a general area in relation to the airport, for example 'The North' means the area broadly north of the airport.

15 Mode share is the percentage of people who take that mode of transport to/from Heathrow

16 Includes private car and hire cars

17 Source: CAA 1990 – 2016. May not sum due to rounding.

CASE STUDY – Where there is good public transport provision, passengers want to use it

In locations where a viable public transport alternative exists, there is generally a much higher level of public transport use. In central London, this can be over 60% of passengers

Location	Approximate public transport journey time	Approximate car journey time	Public transport mode share for passengers
Tower Hamlets	57	68	63%
Westminster	48	45	56%
Hammersmith	40	25	49%
Guildford	103	44	9%
Camden	46	49	69%
Reading	70	49	29%
Wandsworth	62	42	40%
Bristol	162	118	50%

Source: CAA and Google Maps. Passenger mode share is based on 2016 data from CAA. Journey times are approximated from Google Maps

Passenger transport choices over time

2.2.2 It is helpful to look back to understand how passengers travel to Heathrow and how this has changed over time. Figure 2.4 shows changes in demand and mode of travel over time. Public transport mode share has risen steadily from 33% to 39% between 1991 and 2016[15]. The introduction of new services like the Heathrow Express have had the biggest impact but changes like the introduction of Oyster have made public transport easier to use.

2.2.3 The proportion of passengers travelling to/from Heathrow by private car or hire car has fallen from 42% in 1991 to 28% in 2016, in spite of surface access passenger demand rising from 30 million in 1991 to 49 million in 2016[16]. Alongside this, there has been an increase in the proportion of passengers travelling to the airport by taxi.

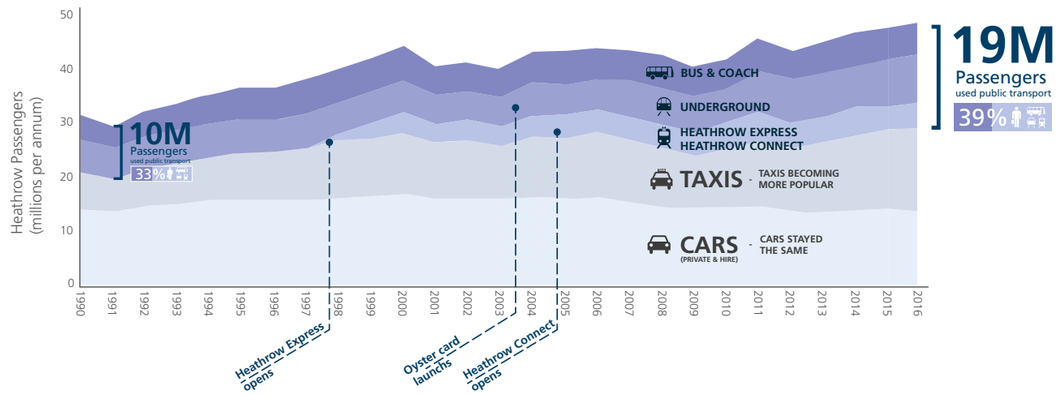


Figure 2.4: Number of passengers arriving or departing from Heathrow by mode[17]

2.3 Colleague travel

Definition: Colleague

A colleague is defined as a person working within the Airport boundary or travelling to the Airport for employment within the aviation industry whether they are directly employed by Heathrow Airport Limited or not.

Colleague travel choices today

2.3.1 Heathrow is the largest single employment site in the UK. The airport is home to over 400 companies, employing over 76,000 people making it a major employer in the local area[18]. Many have unusual working hours, travelling outside the hours when regular public transport normally operates. Just over half of colleagues travel to work by car with the remainder travelling by public transport or other modes.

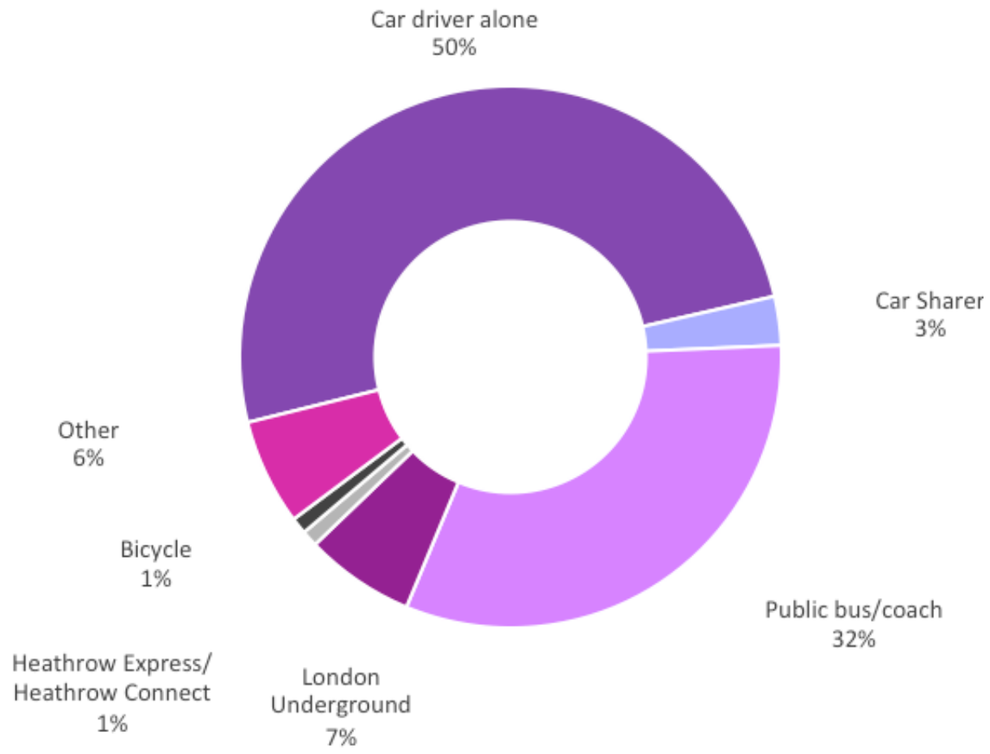


Figure 2.5: Main mode of travel to work at Heathrow (2013)[19]

2.3.2 Many Heathrow colleagues live in boroughs adjacent to the airport, with more than half living in Hounslow and Hillingdon. These are also the areas with the highest proportion of people travelling to work by public transport. Where there are good alternatives people are using public transport or other sustainable modes such as car sharing to get to work. We want fewer of our colleagues to drive to work by making more sustainable modes more attractive.

District	Colleagues living in district	Direct public transport services per hour	Direct public transport journey time (mins)	Percentage of colleagues who drive to work
Hounslow	10,400	27	16	35%
Hillingdon	9,200	11	19	40%
Ealing	6,600	13	44	42%
Slough	3,800	8	54	55%
Spelthorne	3,200	3	36	70%
Windsor & Maidenhead	1,900	3	63	71%
Richmond upon Thames	1,600	11	64	71%

Table 2.2: Colleague car demand and mode share by selected locations[20]

Colleague transport choices over time

2.3.3 Heathrow has been working with colleagues at the airport to reduce the number of people driving private cars to work. We have invested in a dedicated commuter team as well as local transport to make it easier and more affordable for people to use. As a result, the proportion of Heathrow colleagues travelling to work in a car has fallen from 82% in 1991 to 53% in 2013.[21]

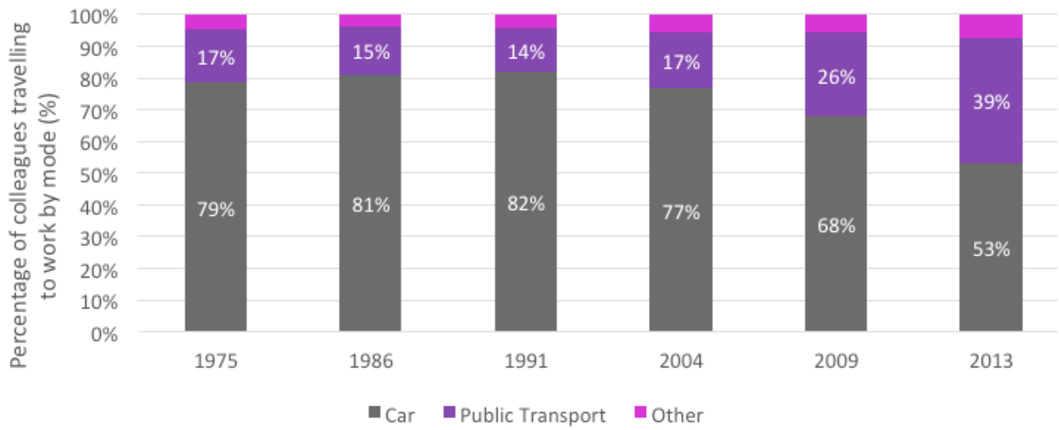


Figure 2.6: Colleague travel to work trend 1975-2013[22]

18 Source: Heathrow Employment Survey 2013 (IPSOS MORI/Heathrow)

19 Source: Heathrow Employment Survey 2013. Note: Data is unweighted. Approximately every five years we carry out a full employment survey which includes a section on travel to work. The latest survey was completed in 2013 and we are currently conducting a new survey which will be available before we submit the application for a Development Consent Order (DCO).

20 Data on colleague locations and mode of transport is from Heathrow Employment Survey 2013 (IPSOS MORI/Heathrow). Journey times and services per hour are approximates based on Google Maps. The journey time is an estimate of shortest journey time.

21 Heathrow Employment Surveys 1975 to 2013

22 Heathrow Employment Surveys 1975 to 2013

2.4 Freight and logistics

Definition: Freight and logistics

Freight or cargo is goods travelling through Heathrow for onward shipment. It can comprise many things such as high value pharmaceuticals such as medicines or short life food stuffs such as smoked salmon.

The vast majority of cargo travels in the belly hold of passenger aircraft with only a handful of dedicated freighter flights operating each week.

Logistics are goods that need to be transported to the airport for use on the airport such as food and drinks for the onsite catering materials to service aircraft such as parts and equipment.

Freight transport at Heathrow today

2.4.1 The airport is a major employment site and a key port for the import and export of goods. Maintaining this economic activity requires regular freight and logistics deliveries. Today, the vast majority of airport-related goods are transported by road, with some use of rail freight particularly in construction and for aircraft fuel. The type of freight and logistic services required at Heathrow are outlined below. Together we estimate they generate around 13,000 daily vehicle movements:

- Handling air cargo and mail: 9000 vehicles per day (69%)
- Servicing the airport: 1500 vehicles per day (12%)
- Servicing the aircraft: 2500 vehicles per day (19%)

2.4.2 Identifying freight vehicles related solely to the airport can be challenging. This is due to the wider freight and logistics activities that surround Heathrow but are not necessarily directly related to the airport. Many freight and logistics companies are attracted to the area because of the excellent access to the strategic road network and central London along with the availability of affordable light industrial land at locations such as Poyle, and the Park Royal Industrial estate.

2.4.3 Freight movements can cause problems for local people including vehicles using inappropriate routes, parking in residential areas and associated anti-social behaviour and nuisance such as rubbish. This is in part due to a lack of strategic land use planning and also a lack of facilities in the area for HGV drivers. We continue to work with the local communities and the freight industry to tackle some of the short-term issues. Longer-term solutions to improve facilities and more integrated transport and land use planning will be needed to tackle some of the existing issues.

2.5 Accessing Heathrow by rail

2.5.1 Fast and frequent rail services connect Heathrow to London (Figure 2.7). These include the Heathrow Express, the Heathrow Connect and the London Underground Piccadilly line.

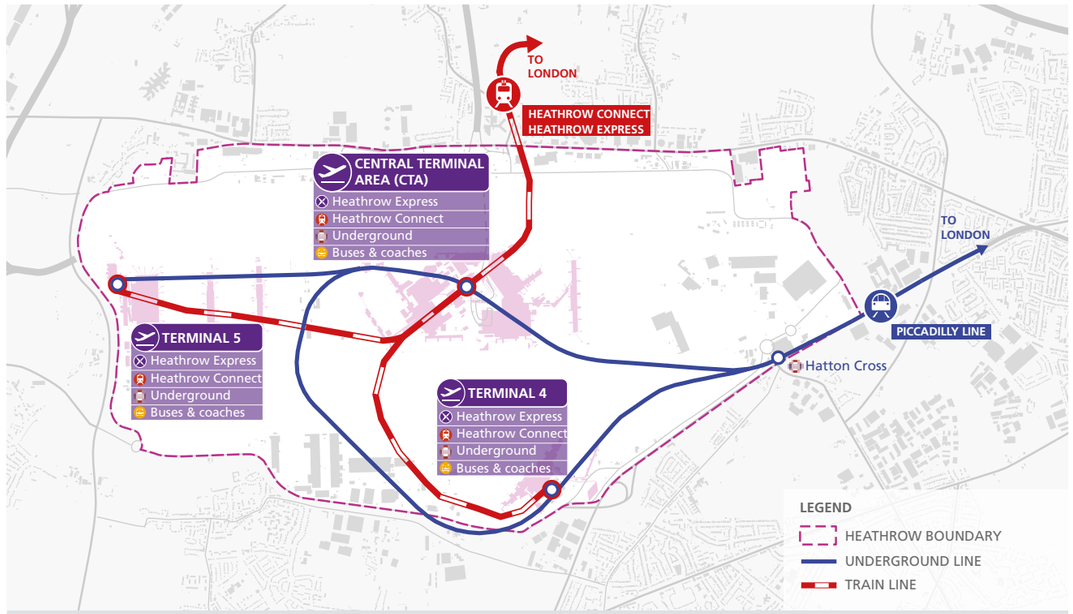


Figure 2.7: Direct rail routes to Heathrow[23]

2.5.2 The Heathrow Express rail service is important to passengers, offering a non-stop, 15-minute service to central London, four times an hour. It is designed to meet the needs of airport passengers and is industry-leading in terms of passenger experience and performance. The Heathrow Express is complemented by Heathrow Connect, a stopping service operating every 30 minutes that serves colleague and passenger catchments in West London.

23 Source: Heathrow

2.5.3 The Piccadilly line offers a lower cost public transport alternative for both passengers and airport colleagues. Trains depart from the airport every five minutes towards Central London and beyond to North London. Trains run through the night on Friday and Saturday on the Piccadilly line, providing 24-hour weekend services.

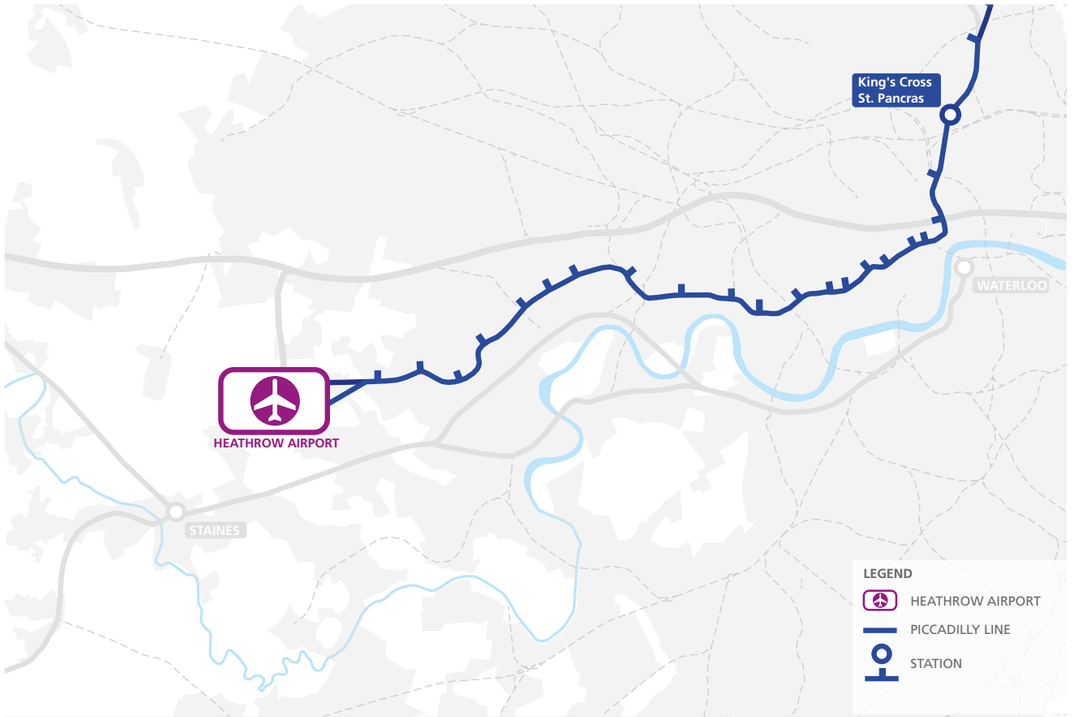


Figure 2.8: The Piccadilly line route

Rail services and usage

2.5.4 The combination of these rail services mean that at peak times 18 trains per hour leave from Heathrow to central London (Table 2.3). While frequencies to London are higher than most other airports we want to provide more rail services to a wider variety of destinations in the future.

Service	Number of services per peak hour	Total capacity per hour (sitting)	Total capacity per hour (sitting and standing)
Heathrow Express	4	1,800	1,800
Heathrow Connect	2	700	1,200
Piccadilly line	12	3,300	8,200
Total	**18**	**5,800**	**11,200**

Table 2.3: Estimated rail capacity provision today (per direction)[24]

24 Source: Heathrow, PDFH and TfL

2.6 Accessing Heathrow by road

2.6.1 Heathrow has excellent connections to the strategic road network which is operated by Highways England. The airport has direct access to the M25 and M4 and is close to the M1, M3 and M40 motorways which provide easy access to the UK. Important local road access is provided by the A4 and A30 routes which are operated by Transport for London (TfL). Heathrow owns and manages the roads within the airport boundary, which includes a full perimeter road providing access around the airport (Figure 2.9).

Figure 2.9: Detailed view of existing road infrastructure[25]

Traffic levels around Heathrow

2.6.2 Many of the roads around Heathrow are congested. These roads carry both airport and non-airport related traffic. In most cases the proportion of Heathrow related traffic is small. On the airport's main approach roads highlighted in Figure 2.10 below, only about two-thirds of the traffic is related to Heathrow.

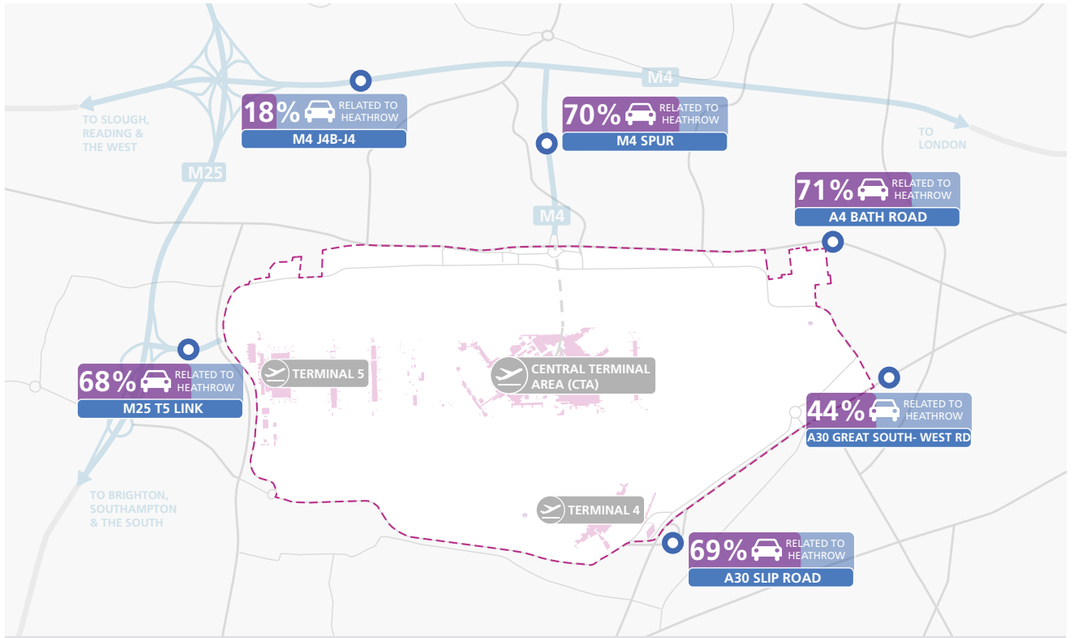


Figure 2.10: Approximate percentage of traffic on the road that is related to Heathrow airport

2.6.3 The total number of vehicles travelling to or from Heathrow is estimated at 143,000 vehicles per day, which includes cars, taxis, buses, coaches and lorries.

Vehicle type	Heathrow related vehicles	Percentage
Cars[28]	81,000	56%
Taxis	44,000	31%
Buses	4,000	3%
Coaches	1,000	1%
Commercial goods vehicles	13,000	9%
Total	143,000	100%

Table 2.4: Heathrow related traffic (preliminary estimate for an average day in 2016) (rounded)[29]

2.6.4 Local bus services play an important role at Heathrow by providing a dense network of local transport links (Figure 2.11). This connectivity often allows access to and from areas not served by rail or London Underground. There are 31 bus routes that currently serve Heathrow at a combined frequency of around 80 buses per hour. This includes 13 routes that provide early morning or 24-hour services, allowing employees who work shift hours access to public transport options.

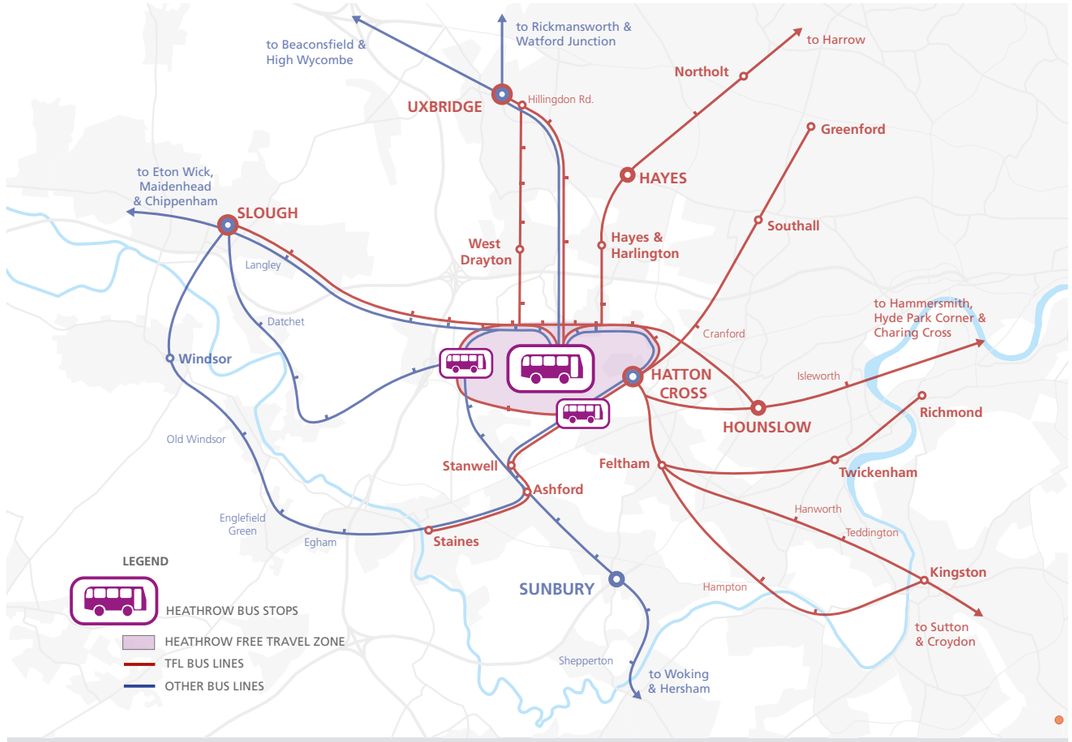


Figure 2.11: Core Heathrow related bus routes today[30]

28 Car includes all private vehicles and hire cars, but not taxis
29 Source: Heathrow and CAA. Note: These figures exclude empty returns.
30 Source: Heathrow. Note: Illustrative only

2.6.5 Heathrow's Free Travel Zone promotes the use of bus travel in and around the airport, helping to encourage the use of this sustainable mode of transport[31]. TfL and a number of other operators manage bus routes around Heathrow, and these are planned in co-ordination with Heathrow.

2.6.6 Frequent coach services also connect Heathrow with rest of the UK 24-hours a day. The airport already operates as an important hub for National Express linking over 75 major towns and cities with Heathrow. The coach network is used by more than just airport passengers; around 25% of those using the Central Bus Station at Heathrow are coach passengers changing between services not related to the airport.

Parking, drop off and pick up

2.6.7 Heathrow Airport Ltd controls around 39,000 on-airport car parking spaces, with approximately 23,500 spaces for passengers and 15,500 for colleagues. There are a further 12,500 spaces that are under the control of other tenants around the airport including British Airways.

2.6.8 Parking numbers are monitored on an annual basis which is a requirement of the Terminal 5 planning permission. This specifies a maximum of 42,000 Heathrow-controlled parking spaces at the airport. For passengers being dropped off at the airport there are free set-down lanes outside the terminals. There is no free pick up area adjacent to the terminals, most passengers being collected from a flight use the paid short stay car park or one of the longer stay car parks for free (if less than 2 hours).

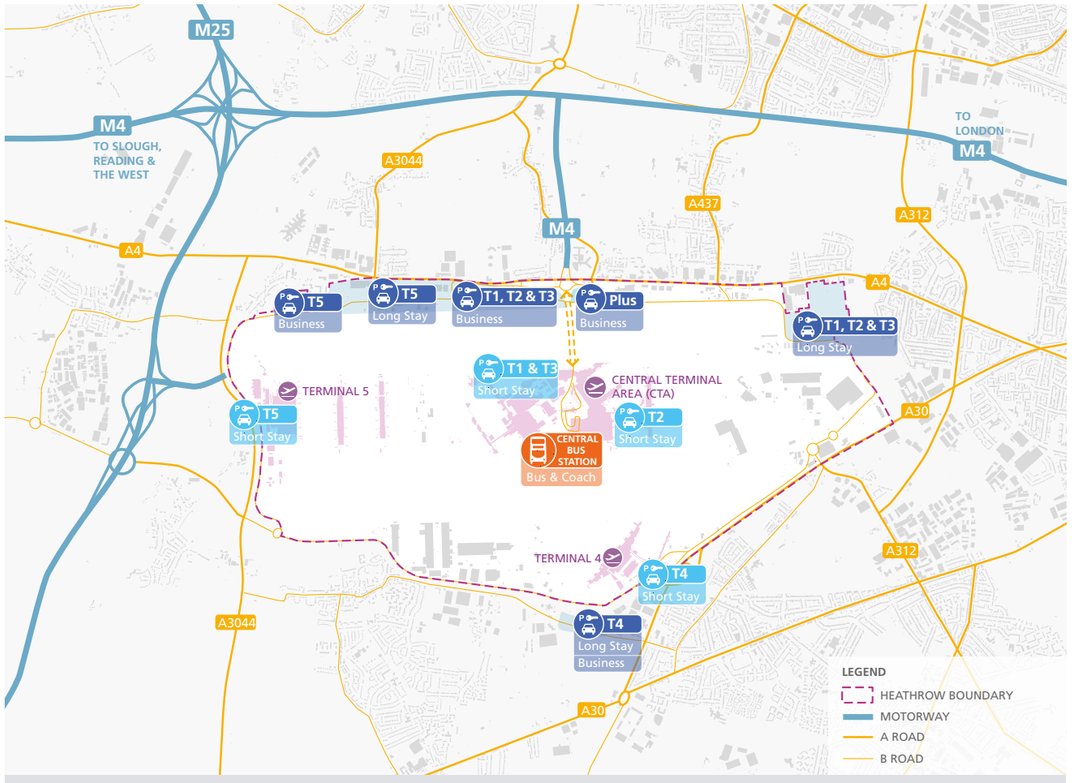


Figure 2.12: Parking options at Heathrow today

31 The Free Travel Zone is an area at Heathrow in which trips can be made free of charge on rail, underground and bus.

2.7 Current sustainable transport initiatives

Definition: Airport Transport Forum

An Airport Transport Forum (ATF) is a DfT specified engagement group that brings together a major airport and local stakeholders.

Heathrow's ATF is called the Heathrow Area Transport Forum (HATF) and is a partnership between various organisations in the private and public sectors seeking to improving accessibility and increase public transport use to, from and in the area around Heathrow.

2.7.1 The Heathrow Area Transport Forum (a forum of key stakeholders with an interest in surface access around Heathrow) has developed and delivered initiatives to encourage more sustainable patterns of travel. The forum sets the targets for our sustainable transport plan and helps to develop and deliver initiatives to achieve those targets. The current plan runs from 2014 to 2019 and seeks to increase public transport mode share of passengers to 45% and reduce colleague car use by a further 5%.

2.7.2 Working with the Forum, we have implemented innovative solutions that have helped increase public transport mode share and reduce the number of employees driving to work. These include the world's largest single site car share scheme, the Heathrow Cycle Hub and the UK's only airport free travel zone for public transport. Our award-winning Heathrow commuter initiatives support airport workers from over 400 companies across the airport with discounted travel products and travel advice.

2.7.3 Our current activities are paid for by our sustainable transport levy that is created using a surcharge placed on public and colleague car parks. This fund provides around £4million per year towards projects that help reduce emissions and reduce car use. More recently we have opened access to funding for local authorities to help deliver their local sustainable transport priorities. This has resulted in both Surrey County Council and the London Borough of Hounslow making successful bids to bring forward local projects that would not otherwise be funded.

3 Policy context

3.0.1 The scale of the proposed expansion at Heathrow means that the project is a Nationally Significant Infrastructure Project (NSIP) under the 2008 Planning Act and will therefore require an application for development consent to be submitted to the Secretary of State. The application will need to demonstrate how expansion of Heathrow complies with the specific requirements of the Airports National Policy Statement. In addition to these specific requirements, there are a range of wider planning policies at a local, regional and national level that expansion will support.

3.1 Airports National Policy Statement (October 2017)

The revised draft Airports National Policy Statement

3.1.1 As a requirement of the Planning Act 2008, the Government is required to produce, consult upon and publish a National Policy Statement for Airports. Following the three-year Airports Commission process, Government published a draft Airports National Policy Statement (ANPS) in February 2017 for consultation. A second draft was then published in October 2017 for further consultation following the incorporation of an updated National Air Quality Strategy and updated passenger demand forecasts. Government intends to lay the final ANPS before Parliament in the first half of 2018.

3.1.2 Heathrow's application for development consent will need to demonstrate how Heathrow will comply with the policy requirements set out in the ANPS. The application will be examined by the Planning Inspectorate before the Secretary of State takes the decision on whether expansion can proceed. Our plans for expansion will also impact on the M25 motorway and the rail network. Where our proposals in relation to surface access qualify as NSIPs in their own right, the Secretary of State will consider those aspects by reference to both the ANPS and the National Networks NPS which contains policies in respect of major road and rail schemes.

3.1.3 The revised draft ANPS contains specific requirements in relation to surface access. It requires Heathrow to prepare a surface access strategy which must:

- reflect the needs of the Project over its development, implementation and operational phases;
- reference the role of surface transport in relation to air quality and carbon; and
- contain specific targets for maximising the proportion of journeys made to the airport by public transport , cycling or walking and actions, policies and defined performance indicators for delivering against those targets.

3.1.4 In particular, the revised draft ANPS states that any application for development consent and accompanying surface access strategy must include details of how Heathrow will increase the proportion of journeys made to the airport by public transport, cycling and walking to at least 50% by 2030 and at least 55% by 2040 for passengers. Heathrow must also demonstrate how it will achieve a 25% reduction of all colleague car trips by 2030, and a reduction of 50% by 2040 from a 2013 baseline level.

3.1.5 The draft ANPS also specifies the assessments that Heathrow must carry out to demonstrate that Heathrow can minimise and mitigate the effect of expansion on existing surface access arrangements. There will be a range of impacts on local and national transport networks during both the construction and operational phases. The construction phase will be assessed as part of the overall Transport Assessment and also as part of the Environmental Impact Assessment. The construction approach is discussed in more detail in our Emerging Plans consultation document.

Definition: Transport Assessment

A Transport Assessment is a comprehensive and systematic process that sets out transport issues relating to a proposed development. It identifies what measures will be taken to deal with the anticipated transport impacts of the scheme and to improve accessibility and safety for all modes of travel, particularly for alternatives to the car such as walking, cycling and public transport.

3.1.6 The draft ANPS requires Heathrow to consult with Highways England, Network Rail and relevant highway and transport authorities, and transport operators, to understand the target completion dates of any third party or external schemes and investment plans. We will assess the effects of the airport expansion as influenced by such schemes and plans. Such consultation will allow us to understand the implications of the timings for our surface access proposals and enable us to demonstrate that third parties have been consulted and that we are content with the deliverability of any new transport schemes that we propose.

3.2 Wider policy

3.2.1 In addition to the specific surface access requirements of the draft ANPS, there are a number of national, regional and local policies which are relevant to Heathrow expansion and surface access. Below we outline some of the key policy areas that the expansion of the airport will support.

Industrial Strategy: Building a Britain fit for the future

3.2.2 The Government published its White Paper for an Industrial Strategy building a Britain fit for the future (November 2017) to promote economic growth across the UK. This strategy sets out several pillars to develop the UK's economy, including: upgrading infrastructure; delivering clean (low-carbon) growth; cultivating world-leading sectors; and driving growth across the whole country and specifically refers to the expansion of Heathrow as the Government's preferred scheme for increasing runway capacity[32].

3.2.3 To support the delivery of the Industrial Strategy, the Government set out its Transport Investment Strategy, in July 2017 stating that any investment can and should:

- Create a more reliable, less congested and better-connected transport network that works for users;
- Build a stronger, more balanced economy by enhancing productivity and responding to local growth priorities;
- Enhance global competitiveness by making the UK a more attractive place to trade and invest;
- Support creation of new housing.

3.2.4 In developing the surface access strategy for Heathrow, we will seek to identify proposals which help meet these wider Government policy objectives.

Air quality strategy

3.2.5 DEFRA's Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007) provides the framework for ensuring compliance with the air quality limit values based on a combination of international, national and local measures to reduce emissions and improve air quality.

3.2.6 Its more recent UK plan for tackling roadside nitrogen dioxide concentrations' (2017) details how the Government plans to reduce nitrogen dioxide (NO2) concentrations in those areas where air pollution is above the limit value in the shortest time possible[33].

32 Industrial Strategy: Building a Britain fit for the future, White Paper, November 2017, page 139

33 Defra (2017) UK plan for tackling roadside nitrogen dioxide concentrations Detailed plan July 2017

3.2.7 These documents are key drivers behind the requirements for air quality improvements through surface access outlined in the ANPS, which sets specific requirements to reference the role of surface transport in relation to air quality and carbon and to achieve mode share targets to mitigate air quality impacts.

3.2.8 Heathrow has a role in helping Government to meet its air quality objectives, working closely with the Mayor of London and local authorities. As part of our surface access strategy, we will support air quality objectives by seeking to increase the use of public transport, improving the efficient operation of vehicles using the airport and supporting the transition to low emission vehicles.

Draft Mayor's Transport Strategy and the London Plan

3.2.9 The Mayor of London published a draft Transport Strategy in June 2017 with three core themes:

- Healthy streets and healthy people;
- A good public transport experience;
- New homes and jobs.

3.2.10 The draft strategy sets out the Mayor's position on Heathrow which is to oppose expansion unless it can be demonstrated that no new noise or air quality harm will result and that surface access impacts can be accommodated. Policy 20 of the draft strategy requires Heathrow expansion to demonstrate how surface access networks will be changed to accommodate additional demand alongside background growth and refers to specific proposals which TfL believes will be required to accommodate surface access demand.

3.2.11 We are working with Transport for London to test the impact of expansion on London's transport networks to ensure there is sufficient capacity to accommodate Heathrow generated growth. Furthermore, through the development of the master plan for an expanded Heathrow, there is an opportunity to support the delivery of the Mayor's wider objectives for transport in London.

3.2.12 The current and draft London Plans identify Heathrow as an Opportunity Area for growth. The development of the surface access strategy for Heathrow could help unlock this growth by providing new transport connections and capacity that not only benefits Heathrow users but also the wider area. In order to ensure the benefits of expansion are fully integrated with the plans of the surrounding area, the Heathrow Strategic Planning Group has been created to help co-ordinate the development plans for the surrounding area. The final Mayor's Transport Strategy is expected to be published in early 2018.

Regional transport priorities

3.2.13 The Thames Valley Berkshire Local Enterprise Partnership (LEP) emphasises the importance of connectivity in its Strategic Economic Plan. Access to Heathrow is key to attracting inward investment to the region. Expansion at Heathrow and better rail connectivity to the west of the airport are considered priorities for the region.

3.2.14 The M3 LEP has also outlined the importance of Heathrow to the success of its region. Its strategic economic plan sets out the importance of improved surface access to Heathrow; in particular, a new rail connection from the south.

3.2.15 An economic assessment commissioned by the Western Wedge partners (Thames Valley Berkshire LEP, Enterprise M3 LEP, Buckinghamshire LEP, Oxfordshire LEP and West London Business) highlighted that the expansion of Heathrow would bring a boast to jobs and economic growth to the South-East economy[34].

34 Source: Regeneris - https://www.buckstvlep.co.uk/uploads/downloads/Heathrow%20Economic%20Impact%20Assessment%20%20-%20Regeneris%20-%20Final%20Report%2024%20Sep.pdf

3.2.16 Local transport policy

3.2.17 The National Planning Policy Framework (NPPF) sets out the Government's overarching planning policy that local authorities must comply with in taking decisions and setting local planning policies[35]. Of relevance to surface access to airports, the NPPF states that neighbouring authorities and transport providers should work together to develop strategies for the provision of viable infrastructure necessary to support sustainable development, including strategies for the growth of airports.

3.2.18 Heathrow contributes to the economic success of many local authorities. Growth at Heathrow will generate new jobs across the UK and in particular within the five boroughs adjoining the airport.

3.2.19 Each council produces its own local plan policy documents which set out specific priorities and proposals for their area. Whilst specific policies may vary, they share several key themes and are required to reflect the NPPF. At a local level, transport policy focuses on improving public transport accessibility, walking and cycling as well as managing traffic congestion and associated emissions.

3.2.20 Key themes, common among local authorities and a focus for Heathrow surface access strategy include:

- Supporting economic growth and housing;
- Air quality management;
- Public transport;
- Improving connectivity;
- Modal shift;
- Congestion;
- Freight management; and
- Active travel.

35 Source: DCLG

4 Our surface access priorities

4.1 Our priorities

4.1.1 Recognising the specific policy requirements of the ANPS and wider policy context that our surface access proposals support, we have developed a set of priorities to guide the development of the surface access strategy. These seek to ensure that the impacts of expansion on the transport network and local communities are adequately mitigated whilst delivering wider benefits to the local area and the UK as a whole. Our proposed surface access priorities are:

4.1.2 Mitigate the impacts of expansion by:

- Making public transport the preferred choice for more passengers
- Offering sustainable and affordable alternatives for colleagues
- Facilitating more efficient and responsible use of the road network

4.1.3 Deliver wider benefits to the national economy and local communities by:

- Connecting all of the UK to growth through better surface access
- Ensure local communities benefit from our surface access strategy

4.1.4 Table 4.1 and Table 4.2 outline what we think the outcomes and targets should be for our surface access strategy. Table 5 contains the targets set out by Government in the revised draft ANPS (2017). Table 4.2 contains a set of additional targets which we will seek to achieve by working with others to deliver wider benefits.

Priority	Outcome	Targets
Make public transport the preferred choice for more passengers	Increase the proportion of passengers using public transport Improve passenger experience on public transport modes	At least 50% of surface access passengers arriving or departing from Heathrow by public transport in 2030 At least 55% of surface access passengers arriving or departing from Heathrow by public transport in 2040
Offer sustainable and affordable alternatives for colleagues	Reduce the number of car trips generated by colleagues Provide better and more sustainable commuting options (public transport, cycling and walking)	25% reduction of all colleague car trips by 2030 compared with 2013 levels 50% reduction of all colleague car trips by 2040 compared with 2013 levels

Table 4.1: Surface access targets required by the Airports National Policy Statement

Priority	Outcome	Targets
Facilitate more efficient and responsible use of the road network	Minimise congestion and support local air quality initiatives	Expand the airport without increasing the overall volume of Heathrow traffic when compared with 2017 traffic levels
Connect all of the UK to growth through better surface access	Put Heathrow at the heart of the transport network Support economic development by ensuring there is capacity and new connections to deliver growth	Connect the largest 100 towns and cities in the U.K. to Heathrow by 2030 by public transport or air. Enable new connections with sufficient capacity on road and rail networks around Heathrow to support wider development.
Ensure local communities benefit from expansion	Connect all of the surrounding communities to Heathrow by sustainable transport.	Ensure demand from expansion can be accommodated on the road and rail networks

Table 4.2: Surface access targets to support wider benefits

4.2 Monitoring of targets

4.2.1 Reflecting the requirements set out in the revised draft ANPS and our own commitments towards delivering a sustainable expansion, our surface access strategy will contain specific and measurable targets that can be monitored over time. Heathrow is currently in the process of fully defining its targets and monitoring process. In order to provide independence there will be a mechanism whereby the Heathrow Area Transport Forum can oversee implementation of the strategy and monitor progress[36]. We will also monitor the proposed timeframes for delivery of the targets set out in Tables 4.1 and 4.2 to ensure that the right measures are in place sufficiently early as passenger numbers grow.

4.2.2 When defining targets over a long period of time, it is important to recognise that the nature of transport will change. Technology such as autonomous vehicles will become more common and will enable different models of public transport. This could include on demand services which will start to reduce the clear distinction between public and private transport. As such we would expect the definition of public transport to change over time to include these sustainable forms of transport that will be shared by different users, most likely using low or zero emission vehicles.

4.2.3 As part of the our approach to surface access we have committed to seek to expand the airport without additional Heathrow related traffic compared to today. 'Heathrow related traffic' is defined as movements by motorised vehicles into and out of the airport and using the public highway whether carrying air passengers or colleagues or for the purposes of airport related freight and servicing. This includes all cars, taxis, vans, goods vehicles, buses and coaches. Airport related freight and servicing traffic relates to those trips whose origin or destination is within the Heathrow campus or a related warehouse supporting Heathrow airport.

36 The Heathrow Area Transport Forum (HATF) is a partnership between various organisations in the private and public sectors seeking to improving accessibility and increase public transport use to, from and in the area around Heathrow.

5 Our eight key initiatives

5.1.1 We have identified eight key initiatives that will drive the development of our surface access strategy and deliver our five surface access priorities.

5.1.2 These initiatives are grouped into two areas:

1 initiatives that improve the physical infrastructure and the level of service provided to passengers, colleagues and local residents; and

2 initiatives that make public transport easier to use and change travel behaviour more widely. The proposed initiatives deliberately overlap and together form the beginning of a surface access strategy for the airport.

5.1.3 Through this consultation we would like to know your views about our five surface access priorities and the proposals and initiatives identified in the following sections to achieve these priorities. Comments are invited on any aspect of our proposals, but we have included some specific questions in the following sections which you may wish to consider when responding.

5.1.4 Your comments will help us develop our detailed Surface Access Strategy for an expanded Heathrow Airport during 2018.

6 Putting Heathrow at the heart of the rail network

6.0.1 Rail is the most commonly used means of public transport access for passengers travelling to and from Heathrow. Over a quarter of all passenger journeys to and from the airport are undertaken on the Heathrow Express, Heathrow Connect and Piccadilly line. This section outlines a number of committed improvements to the rail network followed by a number other schemes and initiatives to further expand the network.

6.1 Committed changes to the rail network

6.1.1 Heathrow has always been committed to expanding the rail network to serve Heathrow Airport and works closely with the UK Government, Network Rail, Transport for London and rail operators to ensure its own plans for rail are fully integrated with those of the rest of the UK and London. A number of rail schemes are already being delivered or will be delivered in the next few years.

The Elizabeth line

6.1.2 The Elizabeth line (Crossrail) will replace Heathrow Connect services in 2018 with increased frequencies to Paddington. When the full service commences in December 2019, the Elizabeth line will provide a direct rail connection from Heathrow to the West End, the City of London and Canary Wharf for the first time (Figure 6.1) with six services per hour serving the airport in each direction. The Elizabeth line will reduce journey times and expand catchment for the airport, as well as providing new direct connections to parts of London where there is significant airport demand. It will offer a more reliable, quicker and cost effective option for many passengers.

6.1.3 By creating the new interchange opportunities, such as a link with HS2 at Old Oak Common and Thameslink at Farringdon, the Elizabeth line will significantly extend the number of people within easy reach of Heathrow both within the South East and to all regions of the United Kingdom.

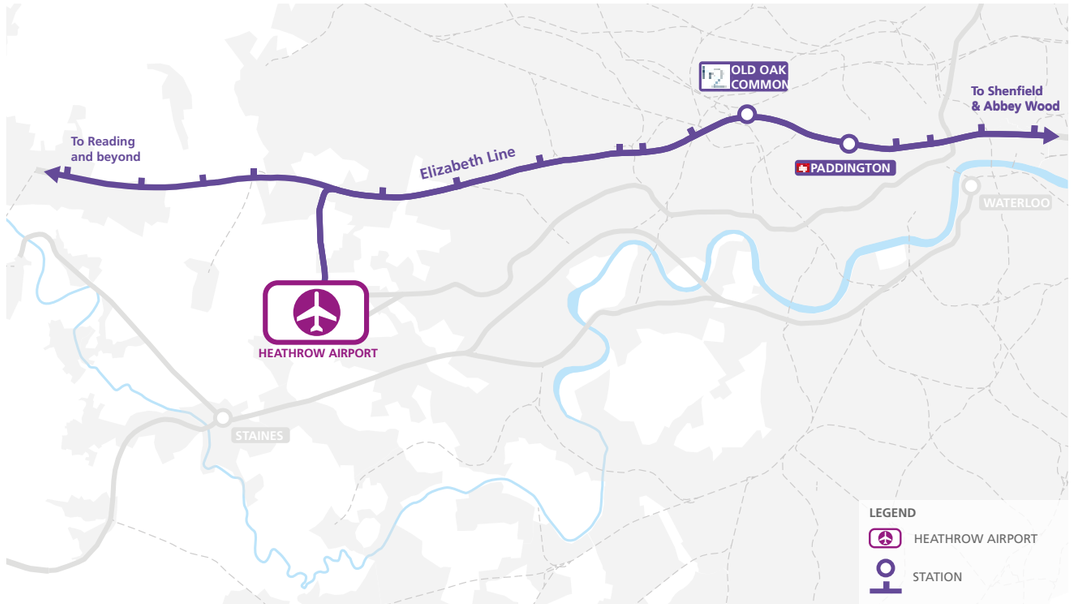


Figure 6.1: Link between HS2 and Heathrow via Old Oak Common[37, 38]

37 Alignment shown on map is illustrative only

38 Source: Heathrow

HS2 and Old Oak Common

6.1.4 HS2 will provide a high-speed rail connection between London and Birmingham (Phase 1) by 2026; to Crewe (Phase 2a) by 2027 and beyond to Manchester and Leeds by 2033. Although Heathrow is not directly served by HS2 there will be an opportunity for passengers to interchange at the new station at Old Oak Common (OOC) via the Elizabeth line which will give significantly reduced rail journey times between Heathrow, Birmingham and the major cities of the North of England and Scotland. We are working with HS2 Ltd, Old Oak and Park Royal Development Corporation, TfL and Network Rail to ensure the design of the station at Old Oak Common meets the needs of airport passengers.

The Piccadilly line upgrade

TfL plans to upgrade the Piccadilly line with work commencing in 2023[39]. The existing trains will be replaced with new trains with more capacity and a modern fit-out. The signalling system will be upgraded to allow a higher frequency of trains and faster journey times. The upgraded Piccadilly line will provide 50% more capacity with up to 18 trains per hour in each direction serving Heathrow.

6.2 Further potential rail improvements

6.2.1 In addition to the introduction of the Elizabeth line and Piccadilly line upgrades, we want to make further improvements to rail access, in particular expanding rail access to Heathrow beyond London. This includes making the most of existing and future rail infrastructure and exploring a range of new connectivity options.

A1 Optimising the Elizabeth line

6.2.2 In order to maximise rail usage within key catchments across London, there are opportunities to provide a more frequent service, extend operational hours into the early mornings/late evenings, promote the link to HS2 and provide supporting measures to encourage maximum usage.

6.2.3 Increased frequency - Heathrow is currently working with TfL to increase from six to eight trains per hour in the future. This is partly dependent on future Terminal 4 and 5 infrastructure improvements.

6.2.4 Increased operational hours – The current Elizabeth line planned operating timetable will run between 05:10 and 23:25. Heathrow would like to see extended operating hours on the Elizabeth line to accommodate the shift working and early starts required by some Heathrow colleagues. Extended operating hours on the Elizabeth line will give more colleagues the opportunity to commute to work via public transport.

39 The Piccadilly line upgrade is committed in TfL's 2016 Business Plan and 2017/18 Budget with a phased implementation of the new trains. Signalling upgrades are expected to be completed by 2026.

A2 Support delivery of a new Western Rail Link to Heathrow

6.2.5 Network Rail is promoting a new rail connection between Heathrow Terminal 5 and the Great Western Main Line close to Langley station. A new 7km section of railway would be constructed in a tunnel and would allow direct rail services from Heathrow to places such as Reading (in 26 minutes) and Slough (in 7 minutes). This new Western Rail Link would provide direct rail links to key passenger and colleague catchments in the Thames Valley, reducing traffic on the M4.

6.2.6 The proposed rail link is currently being developed by Network Rail and a statutory public consultation is expected to be held in 2018 in advance of their DCO application[40] for Western Rail Link. This would be separate from Heathrow's DCO application for the expansion of the airport. If granted consent, the new rail link could become operational by 2025. The project is funded for the development to the DCO application stage – with additional funding required for construction as part of Network Rail's Control Period 6 (2019-2024) to deliver the project.

6.2.7 There will be benefits to the airport from the scheme and we are currently working closely with the DfT and Network Rail on the planning and design of the scheme as well as how the project can be funded and delivered.

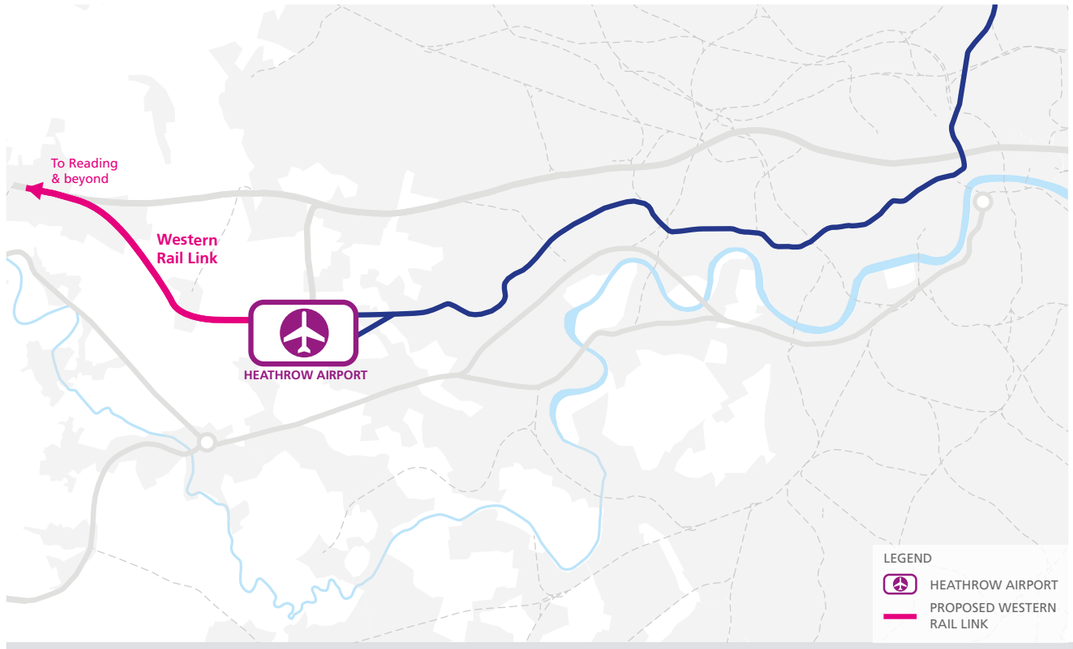


Figure 6.2: Proposed Western Rail Link[40]

40 https://www.networkrail.co.uk/our-railway-upgrade-plan/key-projects/heathrow-rail-link/

41 Source: Heathrow. Note: Alignment shown on map is illustrative only

A3 Support development of a new Southern Rail Link to Heathrow

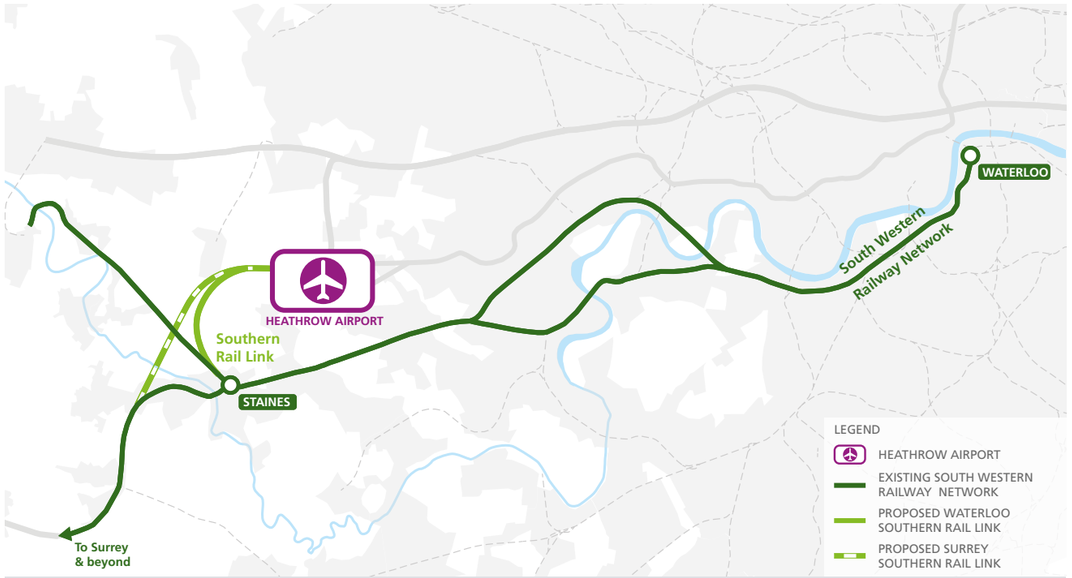


Figure 6.3: Proposed Southern Rail Link[42]

6.2.8 There are currently a number of different proposals that could connect the existing South Western railway network to Heathrow via a new Southern Rail Link. These proposals form part of a wider network improvement being considered by Network Rail. There is currently no railway connection between Heathrow and the south so this link would fill a key gap in the rail network.

6.2.9 Any plans for new rail services would need to fit into the existing timetable, a new direct service could be introduced to London Waterloo and destinations in Surrey and Hampshire from Heathrow (Figure 6.3). This would benefit passengers who currently do not have direct rail connections to Heathrow, such as those from Hampshire, Surrey and south west London. Many of these passengers currently drive or take a taxi/ private hire vehicle in order to avoid a difficult journey on public transport with luggage.

6.2.10 A service to London Waterloo, providing a new connection to Central London for Heathrow, would add resilience and additional capacity for passengers and colleagues in London. This is likely to require changes to existing service patterns and this would need to be developed in partnership with the train operators, the Department for Transport, Network Rail, Transport for London, passenger groups and local authorities along the route.

6.2.11 A feasibility study undertaken by Network Rail showed that there is a strong business case for the proposals and that there are credible infrastructure solutions that should be explored further. Heathrow's analysis to date indicates that our proposed surface access strategy is not reliant on a Southern Rail Link to deliver the mode share targets in the revised draft ANPS and commitment to no increase in Heathrow-related traffic

6.2.12 The scheme also offers potential for wider benefits by offering the opportunity to travel through Heathrow. This would create new connections into London as well as Old Oak Common. This could help to relieve Waterloo, which is currently the busiest London terminus as well as the wider London rail network by giving an alternative route to HS2 services via Old Oak Common.

42 Source: Heathrow. Note: Alignment shown on map is illustrative only

A4 Making the most of Hatton Cross

6.2.13 Hatton Cross station, on the Piccadilly line, provides a valuable gateway and interchange hub for airport colleagues as it is close to many employment sites at the airport and connects with many bus routes to the rest of the airport campus through the Heathrow Free Travel Zone. There is an opportunity to expand the role of Hatton Cross as a southern gateway to Heathrow, through the introduction of more services, better interchange and enhanced passenger facilities. Heathrow will work with TfL to investigate ways in which the role of the station as a gateway to Heathrow can be enhanced.

7 Creating a public transport focused airport

7.1.1 Heathrow has grown incrementally over time which means that some linkages between different terminals and employment areas and public transport, could be better integrated. This would have the benefit of making public transport easier and more accessible to use. The expansion of Heathrow will enable the airport to be developed in a more integrated way that makes access to public transport a priority.

7.1.2 Heathrow's expansion will lead to a significant improvement in surface access facilities at the airport, this could potentially include upgraded coach and rail stations. Overall changes to the airport as part of expansion are outlined in Our Emerging Plans published as part of this consultation. The section below outlines the key physical changes to the airport under consideration from a surface access perspective.

B1 Upgrading rail, bus and coach facilities at the airport

7.1.3 The current central bus station will be upgraded into a new public transport interchange over the life of the expansion programme. This will have more capacity for buses and be better integrated with Terminal 2 and with easier access to London Underground and Rail stations.

7.1.4 As part of the development of the western campus, the Terminal 5 rail station will be upgraded to allow access to any new terminal facilities, allowing for additional trains, higher passenger flows and a better passenger experience.

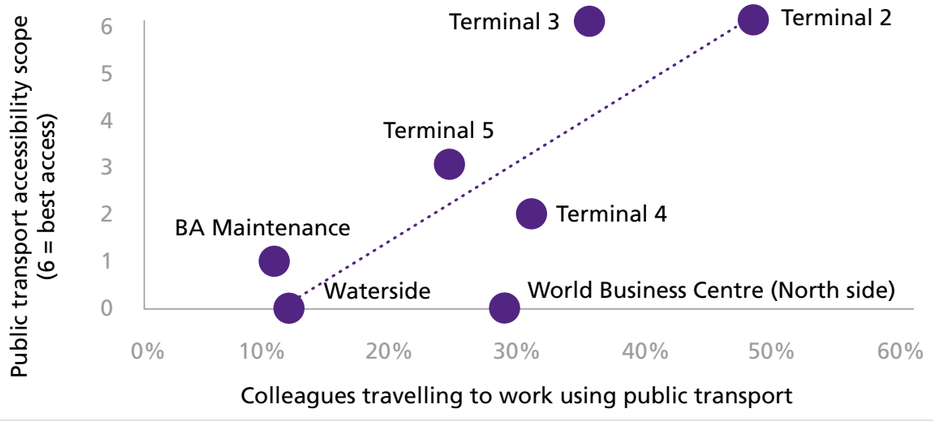
B2 Integrating employment and public transport

7.1.5 We want to develop a scheme that will support an increase in the use of public transport by passengers and colleagues. In developing our plans for an expanded Heathrow, there is a significant opportunity to locate places of work close to rail and bus stations that would make it easier for colleagues to travel by public transport.

7.1.6 The significant redevelopment of the airport during expansion provides an opportunity to relocate employment sites closer to public transport hubs. Making public transport more convenient by reducing overall travel times and the need to interchange between services will encourage public transport usage. We will encourage and prioritise further development on or near public transport across the airport campus.

CASE STUDY: Where there is better public transport, more colleagues use it

Evidence from our colleague travel to work survey shows that colleagues who work in areas of the campus with greater public transport accessibility are more likely to use public transport to get to work. While not everyone can take public transport to work, the more we can align employment centres and public transport the more mode shift we can create.



Source: Heathrow Employment Survey and TfL PTAL scores

8 Providing a resilient and reliable road network

8.1.1 The expansion of Heathrow will involve some changes to the road network. We will seek to ensure that our proposals for modifying the road network help relieve current points of congestion and provide connectivity for local people. Modifying the road network in a way that helps improve traffic flow and provide more reliable journey times will benefit those using coach and local bus services to reach Heathrow, increasing the attractiveness of these modes. As a major freight hub, the reliability of the highway network to the cargo facilities is essential to logistics companies and freight forwarding operations.

8.1.2 Highways England is planning a number of road improvements, regardless of the expansion of Heathrow, which are outlined in the Road Investment Strategy (RIS 1) which covers England's motorways and strategic roads during the 2015 to 2020 period. RIS 1 schemes that will improve the quality or capacity in the Heathrow area are shown below.

8.1.3 RIS 2, which covers planned road investment post 2020, is currently in the development phase. The M25 south west quadrant study has given strategic direction for the development of potential projects in RIS 2 and Highways England is currently working to develop a programme of improvements.

Scheme	Description	Status	Timescales
M25 junction 10 to A3 Wisley Interchange	Improvements to junction 10 of the M25	Committed change	2019/2020 start
M25 junction 10 to junction 16 smart motorway	We are improving the M25 between junction 10 and junction 16	Committed change	2020 start
M4 junctions 3-12: smart motorway	Making the M4 a 'smart motorway' between junction 3 and 12	Under construction	2017 start 2022 finish

Table 8.1: Road Investment Strategy (RIS1) schemes near Heathrow (2015 to 2020)[43]

C1 Changes to the M25 to accommodate runway expansion

8.1.4 The proposed alignment of the third runway crosses the M25. The road is critical for both airport and non-airport users alike and will need to serve users' needs during construction and future operations. We are working closely with Highways England, which operates the M25, to develop and deliver the best solution, that reflects the following strategic principles:

- Maintain operation of the M25 and minimise impacts on the travelling public;
- Retain the existing M25/M4 junction;
- Maintain performance from an operational and safety perspective; and
- Ensure resilient, safe and sufficient access to the new western campus.

8.1.5 Details of the specific options for the M25 on which we are consulting are covered within the Our Emerging Plans published as part of this consultation.

43 Source: Highways England

Figure 8.1: Parts of the road network around Heathrow that will be altered because of expansion (shown in red)[44]

C2 Changes to local roads to accommodate runway expansion

8.1.6 The proposed new runway location will result in the loss of the Western Perimeter Road and parts of the Northern Perimeter Road. It will also result in severance of the A4 (Bath Rd) and A3044 (Stanwell Moor Rd). These changes will require close working with a number of interested highway authorities: Slough Borough Council (A4), TfL (A4, A30 and A312), London Borough of Hillingdon (A3044), as well as Highways England as an interested party operating nearby and parallel roads.

8.1.7 We are investigating options for the re-provision of the A4 and A3044 and how they can provide capacity, connectivity and resilience while balancing the issues of community severance, adverse environmental impacts and engineering complexity. Details of the specific options for re-provision on which we are consulting are provided within Our Emerging Plans published as part of this consultation.

C3 A potential new Southern Access Tunnel and associated changes to Southern Perimeter Road

8.1.8 Heathrow is considering constructing a Southern Access Tunnel linking the Central Terminal Area to the Southern Perimeter Road via a new underground road beneath the southern runway.

8.1.9 The scheme currently under consideration includes two lanes per direction with the potential for one lane per direction being dedicated to public transport and freight. Any tunnel would have to be designed to discourage through traffic from passing through the airport. The potential benefits of a Southern Access Tunnel could include:

- A reduction of road based journey times and vehicle mileage by providing a road across the campus, helping to contribute to a reduction in emissions. For example, the journey length by road from CTA to Terminal 4 would be cut from approximately five miles today to little under one mile with the Southern Access Tunnel;

44 Source: Heathrow. Note: Diagram is illustrative only.

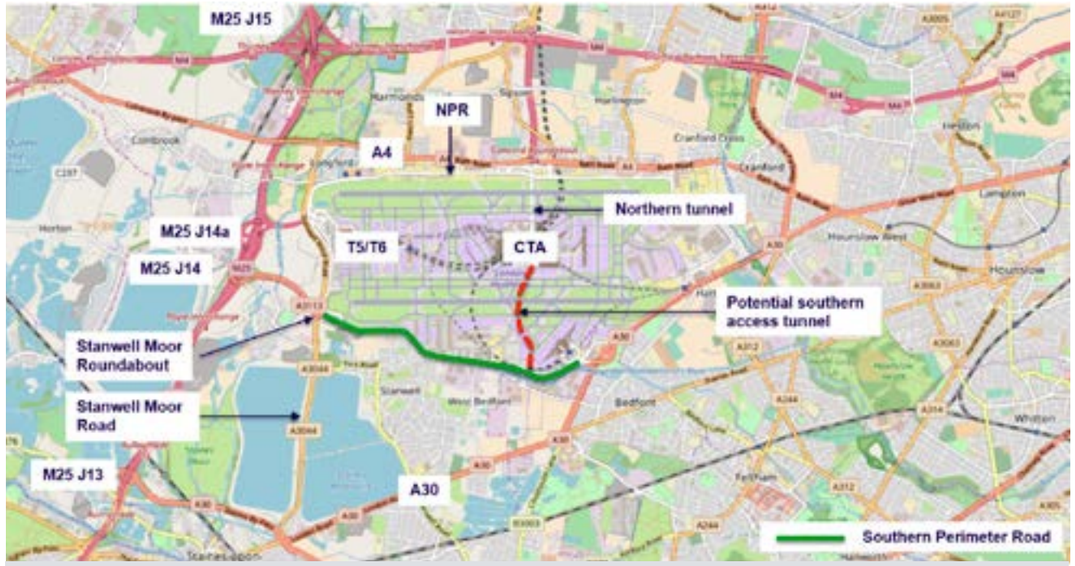


Figure 8.2: Local context / key features[45, 46]

- Opening up north south public transport connectivity – supporting the creation of more direct and reliable bus routes;
- Providing greater resilience and flexibility across the road network by providing alternative routes;
- Creating new and more viable opportunities for active travel through the tunnel, opening up the area to the south of Heathrow for active transport journeys for colleagues; and
- Redistributing some traffic to the airport away from air quality hot spots to the north.

The scheme could cause a re-distribution of traffic towards the south of the airport and may require modification to roads in the local area. If scheme was developed further a traffic assessment would be conducted to understand the full impact of the proposed scheme.

45 Alignment shown on map is illustrative only

46 Source: Mott MacDonald (© OpenStreetmap contributors)

9 Strengthening the coach hub at Heathrow

9.0.1 Heathrow is already the largest coach hub in the country. As part of plans for an expanded Heathrow we want to work with coach operators to grow the coach network further. We know that when coach services provide fast and convenient connections, passengers are more likely to use these services and switch from using their cars.

9.0.2 The success of existing coach services has shown that there are many opportunities for coaches to provide an alternative to private cars and taxis. Coaches could be particularly useful in filling gaps where rail services do not exist or where a long-term rail solution is being investigated.

9.0.3 In addition to improving the coach station, as discussed in Section B1 we want to work with new and existing coach operators to improve the extent and frequency of coach operations at the airport. Improving local bus services is also critical and is discussed separately under Section 10.

D1 Strengthening existing routes

9.1.1 Where an increase in frequency of services can be supported by growth in demand, we will work with operators to expand existing services. As demand grows, it may be possible to split existing multi-stop services into different routes. This will help to provide more direct routes which are more convenient and have faster journey times.

9.1.2 Areas of focus for improving routes and splitting services include:

- M11 corridor (Stansted/Ipswich and Cambridge/Norwich);
- M1 corridor (East Midlands, Sheffield/Leeds, Northampton);
- M40 corridor (Birmingham/Wolverhampton);
- West Country (Exeter/Torquay);
- M4 Corridor (Bristol/South Wales, Chippenham/Bath);
- South Coast (Bournemouth/Poole, Portsmouth/Southampton).

D2 New routes and operators

9.1.3 We will work with the coach industry to encourage new and innovative routes and operators to improve services for passengers and increase the travel options on offer. Areas for growth include the South coast, with urban areas like Worthing and Eastbourne, the M40 corridor including High Wycombe as well as North West London. Other growing cities in the North would also benefit from direct coach services.

9.1.4 This is part of an on-going effort from Heathrow to attract more coach services. This year we have worked with operators to add daily direct services between Heathrow and the following locations Tyneside, Teesside, Hartlepool, Sunderland, Doncaster, Darlington, York, Manchester and Torquay.

D3 Expanding the role of the Heathrow Coach Hub Further

9.1.5 The strategy for coaches in London is changing. Transport for London (TfL) has confirmed that the current coach station at Victoria will need to be replaced. In response to this, TfL is currently looking at a more dispersed model of coach stations across London, with the possibility of new coach stations being developed in parts of Outer London.

9.1.6 By encouraging more coach usage and interchange at Heathrow, it would be possible to deliver more coach routes to a broader range of destinations whilst operating at higher frequencies. This would benefit airport passengers at Heathrow through the introducing of additional coach services. We will work with TfL to understand what role the coach station at Heathrow could play in delivering this strategy.

10 Investing in local transport solutions

10.1.1 Heathrow plays an important role as a local transport hub. As a focus for local bus services it is a key interchange and provides access to the London Underground and local rail services. As rail and coach access improves at Heathrow, this role will only increase. There is an opportunity to ensure that local communities benefit from this improved access by making sure there are local services that connect communities to on airport stations. We will also seek to deliver solutions that work towards achieving local transport priorities that align with our own strategy, encouraging more sustainable travel in the local area by all users.

E1 Enhance existing bus services

10.1.2 Heathrow is already a key part of the local bus network. As the airport grows, demand for bus services will grow, creating opportunities to enhance existing services. This could include increasing frequencies, expanding hours of operation and introducing express services to meet demand from colleagues and passengers residing in the boroughs surrounding Heathrow. Providing fast and reliable links could encourage colleagues to travel to work by bus instead of by car.

10.1.3 The introduction of the Elizabeth line provides an opportunity to restructure the bus network so that it better complements and/or feeds rail links for longer journeys. With changes to the local road network as a result of expansion, there is also an opportunity to review and change the local bus services. Current services along the Bath Road could be diverted along the new route of the A4 and some services diverted around the south of the airport to enable them to serve both Terminal 5 and the Central Bus Station.

E2 Work with local bus operators to establish new bus routes

10.1.4 New routes can have a dramatic effect on shifting people to public transport. Exploring new bus routes could enhance north-south connectivity through Hillingdon, where currently over 9,000 (12%) of airport colleagues live. A particular focus will be routes to and from areas to the west and south, where there are pockets of demand as yet unmet.

10.1.5 In areas with an existing bus service, shuttle buses or express services could fill gaps in the early morning and late at night and provide fast and reliable journeys to Heathrow, encouraging passengers and colleagues to shift to using the bus instead of the car.

10.1.6 We will also work with stakeholders and operators to investigate the potential for demand-responsive minibus services, for example between Staines and Heathrow. Operators are currently trialling the technology that will underpin these services (for example, Citymapper's recent smartbus trial in Central London). Operators have expressed a desire to undertake data analysis to assess the feasibility of providing such services.

10.1.7 Looking further into the future, there is potential for demand-responsive services to be operated by autonomous electric vehicles. In the first instance, it is likely that such services would provide on-campus shuttle services before operating on the public highway.

E3 Bus priority measures

10.1.8 Working in partnership with local authorities and TfL, local bus priority measures could be introduced to improve bus services at Heathrow. This would help to deliver faster and more reliable journeys for bus users and operators. This would be possible within the airport, on new roads where they are being provided and on some existing routes. It would include defining new bus priority corridors at Heathrow, bus lanes, priority measures at junctions and small changes to routes so that buses would avoid traffic hotspots.

10.1.9 This reflects TfL and the Mayor's approach, as set out in the draft Mayor's Transport Strategy, which seeks to improve bus journey times and reliability by[47]:

- Making greater provision for bus priority lanes, junctions and signals to prioritise buses over other vehicular traffic;
- Delivering new bus priority corridors and protecting existing bus priority (in London); and
- Improving bus priority on key radial routes (from London), targeting those routes with high patronage to the benefit of bus users.

10.1.10 Heathrow will work with TfL and local authorities to identify new and improved bus priority measures that could be considered to improve the reliability and experience of bus users to/from Heathrow. We are specifically considering the following bus priority measures for Heathrow:

- Implementing an internal campus road network that enables easy access to terminals for buses
- Introducing bus-only corridors to Heathrow – exact locations to be determined; and
- Providing off-campus bus priority measures (re-allocate road space for buses (working with TfL/highway authorities) and coaches (working with Highways England) to improve journey times and reliability.

10.1.11 Approximately one third of colleagues (around 10 m trips per year) and around one million passengers per year use local buses to travel to and from Heathrow. The development of bus priority corridors into the airport, on corridors where there are larger concentrations of colleagues and passengers, could help achieve a bigger shift towards bus. Figure 10.1 shows the Heathrow employee density and the TfL bus routes to/from Heathrow.

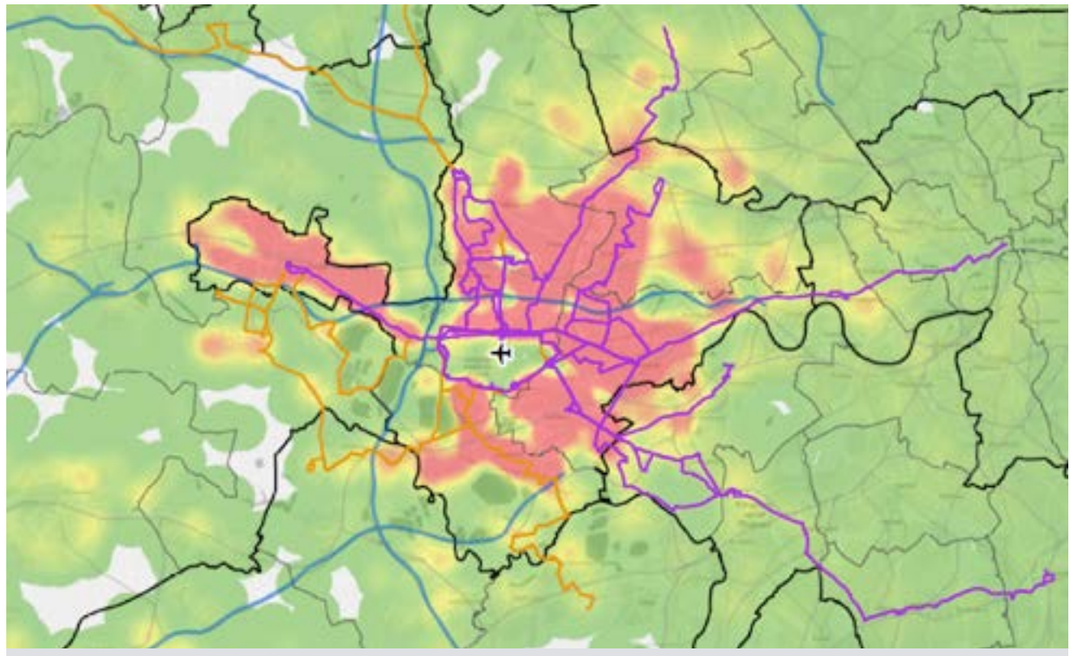


Figure 10.1: Heathrow colleague density and existing bus routes

47 Draft Mayor's Transport Strategy (2017)

E4 Upgrading walking and cycling infrastructure

10.1.12 There is significant potential to increase the number of colleagues who cycle to work; currently fewer than 1% do so. Almost 20,000 airport colleagues currently live within a 5km distance of the airport boundary – a comfortable cycling distance for many people.

10.1.13 We will continue to provide cycle parking and showers at all key locations and workplaces around the airport, as well as develop the road network on-airport to ensure safe and convenient active transport routes are provided.

10.1.14 We are also considering expanding the Heathrow Cycle Hub scheme which already has over 2,300 members and offers discounted cycles and equipment, free labour on maintenance and training to all airport employees. New cycle hub facilities could provide a single point of entry to and from Heathrow and a holistic service to users, including shower and changing facilities.

10.1.15 We will ensure that fast and frequent connections are available from the cycle hubs to relevant employment locations around the airport. It would be possible to build similar hubs at key entrances to the south and east of the airport, making cycling more convenient for many more of our colleagues.

10.1.16 Heathrow Airport Ltd is also currently re-purposing an existing tunnel to provide direct bicycle access to the Central Terminal Area from the north boundary of the airport. Proposals being developed for a new Southern Access Tunnel could include dedicated facilities for cyclists.

11 Making public transport easier to use

11.1.1 In order to make public transport more attractive we need to make it more convenient and easier to use for passengers and colleagues.

11.1.2 We will seek to advocate for and introduce measures that make public transport an easier choice for passengers and colleagues. This can be achieved through more convenient ticketing, promotion and the development of tools to improve the journey experience, as well as more convenient hours of operation. Options are outlined in proposals F1-F4.

F1 Building on the success of the Free Travel Zone

11.1.3 Heathrow has a strong track record of providing financial support for local travel. We support a range of early morning services for shift workers and fund the Free Travel Zone (FTZ) which provides free travel by public transport around the Heathrow campus area for all users, not just for passengers and colleagues. The FTZ currently covers Heathrow Express, the Piccadilly Line, London Bus services and other local bus services within the FTZ area.

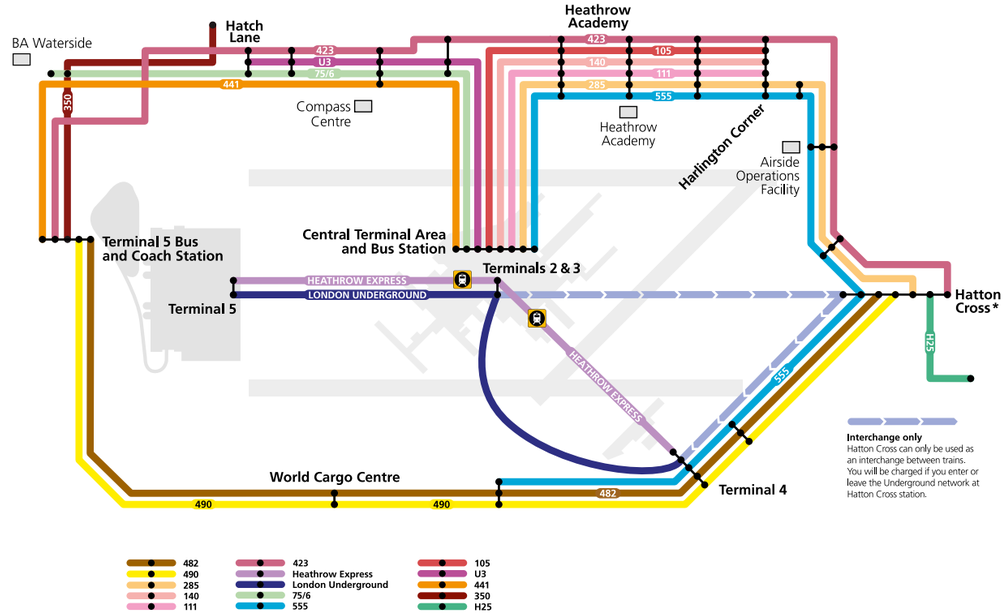


Figure 11.1: Free Travel Zone

11.1.4 We are keen to build on the success of the FTZ to facilitate greater public transport connectivity across the Heathrow campus and link services into the wider network.

F2 Promoting affordable fares

11.1.5 We want to work with local transport operators to make travel to and from the airport on public transport as affordable as possible. This could be through offers and promotions on our own services or negotiated discounts with other operators. We have already led a number of innovative pricing offers on Heathrow Express such as advanced fares for as little as £5.50, children travelling for free and our recent £15 summer price promotions.

11.1.6 With the significant upgrade in rail capacity and frequency due to the introduction of the Elizabeth line and Piccadilly line upgrade, there is an opportunity to review the pricing structure of Heathrow Express fares to ensure the service provides the optimal customer experience and demand requirements. Making efficient use of available rail capacity will be a key driver in making public transport more accessible for both passengers and colleagues.

F3 Encourage airlines and operators to offer seamless and easy ticketing

11.1.7 Use of public transport is becoming easier through increased use of smarter ticketing technology. TfL has led the way to enable passengers to use contactless and mobile pay systems on London's public transport network.

11.1.8 We will seek to build on this success through encouraging the development of tools and promotions to provide public transport tickets as part of the airline booking process, building on the examples which already exist at Heathrow, the most recent of which is the proposed introduction of Oyster and contactless payment on the Heathrow Express.

11.1.9 We are also investigating opportunities to book surface access journeys as an integrated package with airline tickets which would provide an opportunity to make it easier for passengers to use public transport.

Case Study: Rail-Fly and Coach-Fly from Singapore Airlines[48]

An example of this integrated ticketing is Singapore's Rail-Fly ticket. This allows passengers to book one ticket through Singapore Airlines website that will provide travel from eleven locations in South West England and Wales to the airline's 90 international destinations through an agreement with Heathrow Express and Great Western Railway. Coach-Fly tickets are also available from 25 National Express locations in South West England, Wales and the Midlands. Rail-Fly and Coach-Fly tickets allow passengers to more easily book door to door travel without having to book multiple tickets.

F4 Aligning public transport connectivity with airport operating hours

11.1.10 Heathrow attracts passengers and colleagues around the clock and it is essential that our surface access strategy offers choice and viable public transport alternatives to suit each individual's needs, irrespective of the time of day of travel.

11.1.11 Despite some 24-hour options, we want to encourage more public transport options outside peak hours. Achieving a public transport system which is more closely aligned with the needs of users will encourage more sustainable patterns of travel. This is especially the case for colleagues who travel to the airport regularly and whose travel choices can therefore be more easily influenced by the availability of convenient alternative modes.

11.1.12 To make public transport more attractive and easier to use we want to work with local transport operators, particularly within the rail industry, to understand opportunities to better align public transport operating hours with that of the airport itself. For example, the success of the all-night London Underground Night Tube services to Heathrow demonstrates that there is flexibility in maintenance schedules to be explored that could improve the rail industry's operating hours and customer offering.

48 Source: Singapore Airlines - http://www.singaporeair.com/en_UK/gb/plan-travel/intercity-transfers/rail-fly/

12 Enabling more efficient and responsible use of the road network

12.1.1 With Heathrow's expansion there will be more passengers, colleagues and freight at Heathrow. We want to manage and mitigate the impact of this on the road network by promoting more efficient vehicle operations and encouraging behaviour change with colleagues and passengers. Our objective is to expand the airport without growing the overall number of vehicles accessing the airport. This will be achieved through a combination of greater public transport use and more efficient and responsible use of the road network.

Opportunity for change: Too many empty journeys

Many taxis and private vehicles dropping off passengers have an 'empty' return journey, where a vehicle is driving to or from the airport without a passenger inside. These empty returns result in approximately 40,000 additional vehicle movements each day at the airport. This is over a quarter of current airport-related traffic. Our efforts to encourage more efficient use of taxis and private hire could potentially reduce the Heathrow related trips that are made without a passenger.

G1 Efficient use of taxis

12.1.2 Today, 32% of passengers travel to Heathrow by taxis and private hire vehicles (PHV). This is the highest share across all modes of transport[49]. It is, however, estimated that only a limited proportion of these taxi/PHV trips carry passengers in both directions.

12.1.3 Increasing the proportion of taxi and private hire vehicles that carry passengers in both directions, will reduce the number of vehicle trips that the airport will generate. Added to this, increasing the average occupancy of taxi and private hire vehicles will also help reduce the overall number of vehicles accessing Heathrow. For example, taxis and private hire vehicles currently carry on average, 1.6 passengers per journey to/from the airport.

12.1.4 We are considering a range of measures to make taxi operations more efficient, backfilling return journeys and delivering higher vehicle occupancy These measures could include:

- priority taxi queueing for full arrivals – taxis arriving with a passenger are given a preferential lane for re-ranking which would reduce the amount of time spent waiting for their next fare;
- a taxi sharing scheme – many taxi passengers are heading to central London and other high density urban locations, priority lanes within the forecourt for these customers that are willing to share a taxi could decrease vehicle traffic, reduce the waiting times and costs for passengers.

12.1.5 As an illustration, the example below demonstrates the potential impact of taxi backfilling 20% of all empty taxi and private hire vehicles trips combined with measures to increase average occupancy (taxi/passenger marshalling and the application of taxi booking/group booking technologies) from 1.6 to 2.2 passengers per trip.

12.1.6 The implementation of a package of measures to improve the efficiency of taxi operations is conservatively estimated to reduce the number of taxi trips in 2040 to levels only marginally greater than the 2013 baseline.

	No. trips (per day)		
Vehicle type	2013 Baseline	2040 'Do nothing'	2040 With efficiency measures
Black cab	4,000	4,900	4,000
Private Hire Vehicle	40,000	53,400	41,000

Table 12.1: Taxi backfilling and occupancy illustrative example (rounded to nearest thousand)

49 Source: CAA 2016

G2 Reducing emissions through vehicle charging

12.1.7 The measures outlined in this document would increase the range and quality of public transport options available for passengers and colleagues wishing to access Heathrow and encourage use of these options. They would significantly reduce the number of people who need to drive to the airport.

12.1.8 In the context of an expanded Heathrow, we need to ensure that, wherever possible, trips to and from the airport are made by public transport, cycling or walking. We are therefore considering the potential role of pricing and demand management to help to secure the outcomes that the government is seeking in the revised draft ANPS and to which we have ourselves committed.

12.1.9 The effectiveness of pricing and charges in influencing travel behaviour and reducing emissions is acknowledged across the world. In central London, the Congestion Charging scheme reduced inbound traffic by 14%[50]. The Ultra- Low Emission Zone is intended to increase the uptake of cleaner vehicles. We are exploring the potential for strategically-managed access charges, low emission zones, and parking charges at Heathrow to encourage the use of low emissions vehicles, reduce unnecessary trips.

12.1.10 Achieving these outcomes would help to reduce Heathrow's impacts on local roads and the environment. It would also enable us to deliver the benefits of expansion to the local and national economy without increasing Heathrow traffic and emissions.

12.1.11 Depending on the findings of this consultation, and if fuller analysis shows it to be necessary, we are considering a phased strategy for the implementation of charges broadly mirroring the approach set out by the Mayor of London in his draft Transport Strategy. We envisage that the focus in the early years would be on tackling existing issues around air quality, encouraging those who drive to the airport to do so in the cleanest possible vehicles.

12.1.12 Various activities could be subject to charges – some of which are already subject to charges today. The list below sets out some examples of the points at which we envisage charges could apply at Heathrow in future. Charges could be applied across one or more of these points in combination, with drivers paying charges reflective of the specific activities they have undertaken:

- **Emissions based surcharge** – Utilising existing charging structures at the airport (such as car parking, permits, facility charges) we would introduce a supplementary charge for the most polluting vehicles. This could mirror the Mayor of London's proposals for an Ultra Low Emission Zone.
- **Drop off charge** – Similar to several airports around the world, Heathrow is considering applying a charge to vehicles that are dropping off passengers directly outside the terminal buildings. This charge could apply to all vehicles that drop off/ pick up or be based on the vehicle emission standards.
- **Terminal low emission zone** – This would allow priority access to the terminal areas for low emission vehicles or those that operate in the most efficient way. This would encourage fleet operators and regular users to shift to low emissions vehicles.
- **Airport low emissions zone** – This would require all vehicles accessing the airport to be charged based on the emissions standard of the vehicle. This would target a wider range of users than the terminal low emission zone.
- **Airport access charge** – If there needed to be further shift towards public transport to reduce congestion, then a broader charge based on vehicle access could be applied to encourage passengers to shift onto public transport. This charge would apply regardless of the emission standard of the vehicle. This would be similar to the London congestion charge. However, this charge would be introduced in conjunction with major improvements to public transport connections to Heathrow, and strong support to find convenient alternative modes of transport for all Heathrow users.

50 Source: TfL - http://content.tfl.gov.uk/impacts-monitoring-report-2.pdf

12.1.13 An effective charging strategy would consider the sum of all charges paid by individual drivers across all the activities they undertake, and would seek to ensure that in aggregate they act to incentivise the appropriate behaviour.

12.1.14 The kind of behaviour that we might wish to incentivise would include car sharing, taking public transport, or driving cleaner vehicles – which lead to lower emissions and fewer car trips. The following list sets out some of the factors according to which charges could be imposed, or adjusted upwards or downwards:

- Emissions – charges could be higher for vehicles with higher emissions of environmental pollutants, and could be reduced or removed for cleaner vehicles.
- Vehicle occupancy level – charges might be reduced (or removed) for vehicles carrying several people, while those with only a driver could face higher charges.
- Time of travel – charges might differ by time of day – with those arriving outside the busiest time potentially paying less as they may contribute less to local congestion, while those travelling at the peak could pay more.

12.1.15 We recognise that for some people, driving is not a choice. If any charges are introduced, we would ensure that appropriate exemptions are made available to ensure that passengers who rely on their car (for instance because of reduced mobility or other disabilities) are not unfairly penalised.

12.1.16 As noted above, charges would only be introduced if they are necessary to meet specific requirements, and would be used in conjunction with our sustainable transport initiatives and investment in transport infrastructure to further support a shift away from private highway travel.

G3 Intelligent Mobility

12.1.17 The aim is to put the customer at the centre of transport decision making and to provide information so that they can make informed decisions. People already utilise apps for a range of transport related activities, such as cashless payment, journey option comparison (car, taxi, bus or rail) and navigation. Intelligent mobility can help to co-ordinate all these elements and provide a service to help people to plan, book and make their journeys. This could help passengers to book an entire journey from home to destination in an easy way that helps them use the fastest, cheapest or easiest form of transport.

Definition: Intelligent mobility

Intelligent Mobility refers to the use of new technologies and innovative data solutions to improve the efficiency and quality of movement of people and goods. It comprises a package of existing apps and information sources and seeks to develop this into a more coordinated offering for travellers.

- **Mobility Information Services** - to enable travellers to make informed travel choices in relation to their modes of transport, routes, time of travel, journey duration.
- **Smarter Working** – flexible working or 'work hubs', aimed at reducing commuting to and from the Heathrow campus.
- **Mobility Services** - providing a 'one stop' app for all the mobility needs of an individual covering all travel modes (including air) and all journey purposes.
- **Connected and Autonomous Vehicles (CAVs)** –proactively facilitating/managing the adoption of CAVs as they affect Heathrow.

12.1.18 Intelligent Mobility therefore relates to a package of information sources and new technologies, that use a common data platform, and which will provide a more coordinated basis for colleagues and passengers to make informed decisions regarding mobility and travel. This will contribute to more efficient use of vehicles travelling to and from Heathrow in the future. Our aim is to educate and empower passengers and colleagues by providing a framework to enable informed, sustainable and seamless door-to-door travel.

G4 Consolidation and prioritisation of parking

12.1.19 Currently there are many different car parks at the airport serving different purposes, covering approximately 100 hectares within the operational boundary of the airport . With expansion, it is proposed to keep the number of spaces at a similar level to today and to manage the parking that is available in a way that helps achieve the wider priorities for surface access and deliver benefits for passengers. This includes the following approach:

- Consolidation of parking for passengers – To move towards a more efficient operation of parking where clusters of car parks are grouped together with good access to the road network and direct links to airport terminals. This would help reduce the amount of traffic circulating around the airport and ensure car parks operate efficiently and are located where good road access can be secured. It will also help to improve service to passengers.
- Reduction and consolidation of colleague parking – In order to meet the overall target for a reduction in colleague car trips, the amount of parking available for colleagues will reduce with parking for colleagues managed in a more integrated way with incentives to encourage use of public transport and car sharing.
- Smart and clean parking – To maximise the use of new technology to ensure car parks operate in an efficient way, including better signage, different pricing structures and incentives for colleagues to switch to car sharing. This could also include a form of emissions based pricing for access to car parks with cleaner less polluting vehicles paying less and having better access to terminals.

G5 Measures to influence freight vehicles and delivery behaviour

12.1.20 Freight and logistics requirements will be greater with an expanded airport. Through expansion we are seeking to facilitate growth whilst minimising the number of journeys made on the road network. We have identified a number of measures to influence freight vehicles and delivery behaviour in order to minimise the impact of Heathrow-related freight vehicles on traffic and air quality. We will also continue to assess any innovative technology or approach that may help us achieve this goal.

12.1.21 As set out in our blueprint for sustainable freight, our strategy will seek to target three area for Heathrow to work with the freight industry to:

- Increase efficiency;
- Be a responsible operations;
- Drive forward sustainability

Increasing efficiency

12.1.22 As part of the development of the master plan we will help major partners deliver a modernised, more efficient cargo village on airport. This will increase capacity to allow more cargo to be processed on airport, helping to reduce the need for moving goods to and from off airport warehousing, which represent around a third of cargo related trips.

12.1.23 Working with local authorities we will seek to make more efficient land use. The expansion of Heathrow provides an excellent opportunity to consolidate freight activity. This will allow vehicle operators to utilise their vehicles more efficiently, reducing the number of trips required to deliver the goods and services that support our customers, colleagues and neighbours.

12.1.24 We will work with industry to seek to increase load factors and ensure as many vehicles as possible are fully loaded as they arrive at and depart the airport. This will help reduce the number of Heathrow related trips by consolidating two trips made by half full vehicles into one single trip made by a full vehicle. We recently launched a Heathrow CargoCloud app to support and connect those with goods to ship and those with unutilised vehicle capacity. We will continue to work with the freight industry to explore new technology solutions to increase efficiency and to ensure that we design our facilities to allow for optimal vehicle operations

A responsible operator

12.1.25 We are currently working with industry and local authorities to establish a code of conduct for operators using the airport. This will help to improve incidents of anti-social behaviour as well as inappropriate driving and parking by HGVs. Through a more integrated approach to enforcement, we will seek to ensure that all responsible authorities are working together to reduce these behaviours.

12.1.26 Better long term land use planning will help to reduce the need for freight vehicles to pass close to or through residential areas. We will work with local authorities to identify appropriate sites for freight and logistics uses that reduce impacts on local communities. This may allow existing logistics sites to become more appropriate

Driving sustainability

12.1.27 We want to improve the environmental standard of Heathrow-related vehicles. This includes acting as a trial location for future technology. Through our sustainable freight group we will help to identify new opportunities to reduce trips and improve emissions. We strive to be a leading location for the trial of new and emerging technology to reduce emissions from freight vehicles. Accordingly, we have the Heathrow Clean Vehicles Partnership to facilitate such trials and promote best practice. We also have a Sustainable Freight Group which supports the roll out of freight accreditation schemes with emissions reduction targets, such as FORS (Freight Operator Recognition Scheme), and helps to identify new technology that needs a test location and would support a more sustainable freight operation at Heathrow. A good example of this is the trial of electric trucks by DNATA at the airport.

12.1.28 We are investigating options to ensure that new vehicle technology can be supported at the airport through appropriate electric vehicle charging or fuel infrastructure at the airport. This is already happening with the introduction of a hydrogen filling station at the airport and our investment of over £4million on electric vehicle charging infrastructure since 2014.

Heathrow's Retail Consolidation Centre already reduces the number of retail supplier vehicles on the roads entering the airport by 42%. This policy has also driven behaviour change through the supply chain helping to consolidate loads before they arrive at the Consolidation Centre.

13 Building on the success of our Commuter Programme

13.1.1 Heathrow has a dedicated commuter team, which supports all 76,000+ people who work at the airport. This has led to a reduction in the number of colleagues commuting to work by car. In 1991, around 80% of colleagues travelled to work by car. With a range of initiatives, products and change campaigns – this reduced to just over 50% by 2013[52,53].

13.1.2 During expansion, additional construction colleagues will be at the airport. We will ensure they also can benefit from our Commuter Programme and access the airport in the most sustainable way possible.

Opportunity for change: Small behavioural change making a big difference

If all of those currently driving to work could be encouraged to travel differently one day a week it would reduce colleague car trips to Heathrow by 20%.

H1 Targeted personalised travel planning for colleagues

13.1.3 We intend to introduce personalised travel plans for each person who starts work at the airport to establish sustainable patterns of travel from the outset, rather than having to change established behaviour. We have already rolled out trials of personalised travel planning to colleagues and as a result this will focus on new starters and when people move home. Establishing sustainable trends from the outset is the most effective way of changing behaviour.

H2 Support discounted colleague public transport travel

13.1.4 Heathrow has already negotiated a wide range of discounted travel products for all colleagues working at the airport. These include monthly and annual passes that give unlimited travel for a range of bus and coach routes (ranging from £25 to £100 a month) or Heathrow Express (£180 a month).

13.1.5 We will seek to deliver an expanded discounted product range for any new bus, rail and coach services. We also want to be able to offer products for TfL services and will continue to engage with TfL to understand what is possible.

H3 Reduction and prioritisation of colleague parking

13.1.6 Heathrow Airport Ltd controls around 39,000 on-airport car parking spaces, with approximately 23,500 spaces for passengers and 15,500 for colleagues. There are a further 12,500 spaces that are under the control of other tenants around the airport including British Airways.

13.1.7 There are currently approximately 28,000 employee car parking spaces at Heathrow, including 15,500 controlled by the airport. As a result of (or to help achieve) our target of reducing the number of colleague car trips to Heathrow we anticipate that by 2030 the number of Heathrow controlled colleague car parking spaces will need to reduce.

13.1.8 This will be managed through a gradual transition to ensure the airport can continue to operate efficiently. Policies and procedures will be developed in partnership with airlines and other key Heathrow employers to promote sustainable travel modes and ensure a fair and reasonable process for allocating parking passes. An outline of the options is set out below:

- Adoption of a new parking allocation policy to ensure those that need car parking are able to access it and those with alternative options are encouraged to use them;
- Develop incentives for colleagues to give up car parking permits;
- Offer more flexible parking passes, featuring incentives for car sharing or less frequent usage. Rather than simply owning a pass, passes would be paid for based on usage in order to incentivise more sustainable travel behaviour;
- Reduce parking spaces and parking pass availability over time – as the airport grows, the number of passes on issue and spaces available to employees will be reduced to encourage a shift to public transport.

13.1.9 We will also work with local authorities to develop schemes to prevent colleagues parking on local residential roads, including support for the introduction of Controlled Parking Zones (CPZs) and their enforcement.

H4 Creating a culture of active travel

13.1.10 We want to promote active modes of travel such as walking and cycling to and around the airport campus. This is an important part of our wider strategy for mental and physical wellbeing and will support the Mayor of London in his ambitions to deliver healthy streets[54].

13.1.11 Key measures will include:

- Continuing to promote walking and cycling as part of our wider wellbeing initiatives;
- Events to build a culture of walking and cycling and promote airport and local community involvement;
- Providing safe and practical routes on key desire lines;
- Clear wayfinding;
- Providing better connections to and around the local community through our green space strategy.

52 1991 Heathrow Employment Survey

53 2013 Heathrow Employment Survey

54 Active modes are defined as walking and cycling)

14 Developing the options

14.1.1 The surface access options represent a broad range of schemes and initiatives which work together to achieve the surface access related targets and pledges set out for expansion of Heathrow.

14.1.2 Different packages of the schemes and initiatives outlined in Sections 6 to 13 can be developed to meet the passenger mode share targets, colleague car use reduction targets and Heathrow's commitment to no more Heathrow related traffic with expansion. These packages are being assessed by Heathrow to determine which ones best meet the targets, whilst remaining affordable, financeable and delivering benefits to the UK economy and local communities.

14.1.3 Our analysis shows that the various targets and commitments for surface access can be met through a combination of measures including:

- Expansion of the rail network at Heathrow;
- Bus and coach improvements, including better service frequency and new routes;
- Better management of colleague car travel and parking to reduce single occupancy car trips;
- Measures to make taxi operations more efficient, such as taxi backfilling;
- Supporting measures to make public transport more accessible and attractive;
- Making freight trips more efficient;
- Investment in active travel like cycle lanes to improve first and last mile access to public transport;
- Some form of vehicle charging to manage Heathrow-related traffic levels and encourage people who have a choice to use public transport to access the airport.

14.1.4 On the basis of the analysis carried out to date we are confident that this broad range of measures provides an effective means of meeting the surface access targets and pledges. Further assessment and analysis is ongoing by Heathrow to determine exactly which combinations of measures are required by which date to deliver the best surface access for the expanded airport.

14.2 Initial assessment against surface access targets

Passenger public transport mode share

14.2.1 Figure 14.1 illustrates the increase in the passenger public transport mode share required to meet the target of 50% public transport mode share by 2030, and 55% by 2040. It shows that an 11 percentage point increase in public transport mode share is required by 2030. Some of this additional mode share will be achieved through schemes that are already planned such as the Piccadilly line upgrade and the introduction of Elizabeth line services.

14.2.2 The remaining increase in public transport mode share is expected to be secured through a range of other measures including a combination of rail and coach enhancements and proposals that secure more efficient and responsible use of the road network. Our strategy will not require all of the measures set out in sections 6-13 to enable the mode share targets to be met. Our strategy will be to ensure that the right measures are in place at the right times as passenger numbers grow.

14.2.3 If any the individual measures are not delivered, then other measures can be scaled up to achieve the required targets.

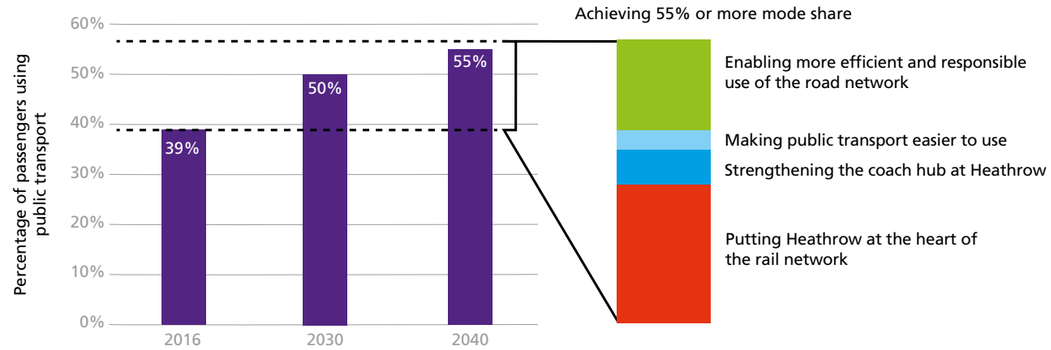


Figure 14.1: Meeting the passenger public transport mode share target (illustrative)

Exact contribution of each intervention subject to further assessment

Reduction in colleague car trips

14.2.4 Figure 14.2 illustrates the reduction in colleague car trips required to meet the target. It shows that a reduction of 12,000 car trips is required by 2030 (compared to 2013 levels) and a reduction of 24,000 car trips is required by 2040. This reduction can be achieved through a range of measures including improvements to walking, cycling and public transport provision, as well as integrating employment sites with public transport and further development of our successful Commuter Programme.

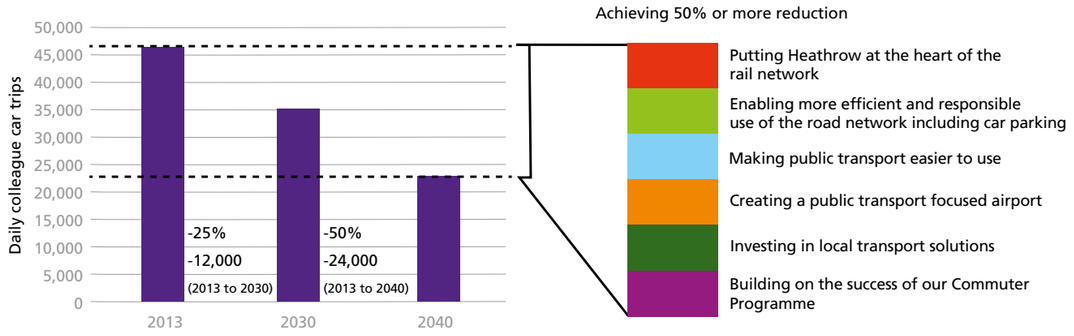


Figure 14.2: Meeting the colleague car trip target (illustrative)

Exact contribution of each intervention subject to further assessment

No increase in Heathrow-related vehicle traffic

14.2.5 We have made a commitment that the expansion of Heathrow will not lead to an overall increase in Heathrow related traffic volumes compared to today (2017). This reflects our commitment to change the way in which people travel to and from Heathrow through a combination of measures which lead to more public transport use and more efficient use of vehicles. This commitment captures Heathrow passengers and colleagues accessing the airport in cars and Heathrow related freight trips by road.

14.2.6 Our assessments show that meeting the targets set out in the draft ANPS will go a long way towards meeting this objective. Our proposals include a range of measures that will specifically target traffic volumes rather than mode share, in order to enable expansion of the airport will not lead to an overall increase in Heathrow related traffic volumes compared to today.

Public transport capacity at Heathrow

14.2.7 Given the significant increase in public transport usage expected with achieving the public transport mode share, we need to assess the impacts on existing and planned public transport at Heathrow.

14.2.8 The increase in public transport demand in 2040 is the equivalent of approximately 146,000 additional person trips per day across the different public transport modes serving Heathrow. Whilst this is a significant increase in demand, rail capacity is being increased substantially from schemes such as the Elizabeth line and Piccadilly line upgrade. The increase in bus demand will need to be accommodated through a combination of improved existing services and additional new routes.

14.2.9 Our initial assessments indicate that the measures set out in this consultation document can achieve the surface access targets and that the impacts associated with these options can be effectively mitigated and managed. Further assessment of both bus, coach and rail capacity and demand will be undertaken as part of the transport assessment.

15 Delivering surface access improvements

15.1 Collaboration

15.1.1 The delivery of our strategy will require us to work with other agencies such as Transport for London, Highways England, Network Rail and Local Authorities. We have a strong history in working with partners to deliver surface access improvements that benefit both Heathrow and the surrounding area.

15.1.2 This offers a unique opportunity to plan the UK's infrastructure needs in an integrated way and will help ensure the surface access plans for Heathrow are embedded in key strategic long-term planning processes and investment opportunities. For example:

- Highways England is currently delivering a programme of activity that was set out in its first Road Investment Strategy. There are a number of projects in the Heathrow area including M25 J10 improvements, M25 J10-16 and the M4 Smart Motorway between J3 and J12. Plans are currently being developed for the RIS2 (2021-2026) which will include outputs from the M25 Southwest quadrant study and other strategic studies.
- Network Rail is also preparing its plan for the next investment period (2019-24) known as Control Period 6 (CP6).
- The Mayor and Transport for London have set out their priorities for transport in London over the period to 2041.

15.1.3 There is an opportunity to develop a co-ordinated plan for Heathrow surface access that brings together the emerging plans for Heathrow with the programmes developed by Highways England, Network Rail, Transport for London, Local Authorities and others.

15.2 Delivery

15.2.1 This consultation document contains a range of schemes and initiatives, some of which are in the process of being delivered already and others where delivery will be secured through the DCO for expansion. A more detailed programme for delivery of surface access improvements will be developed taking account of comments from the public consultation exercise.

15.3 Funding

15.3.1 The schemes and initiatives within this consultation document will draw on funding from a variety of sources including funding from Heathrow. We are committed to paying our fair share of improvements but as recognised in the ANPS, the proposals that deliver wider benefits will also attract funding from government and other sources. Any funding contribution from Heathrow would be subject to full cost recovery through the regulatory framework.

15.4 Next steps

15.4.1 As a result of the comments received during our consultation we will develop the set of options into a draft Surface Access Strategy that will form part of our statutory consultation. We will continue to engage with interested parties to develop our detailed proposals. If you are interested in being part of that process then please indicate this in your consultation response.

15.4.2 We will also be developing a full Transport Assessment that will form an important part of our Environmental Impact Assessment and our DCO application. We will consult on the scope of this assessment with relevant and interested parties.

If you would like a large text or alternative format of this document, please contact us on 0800 307 7996 or send an email to us at: info@heathrowconsultation.com

There are lots of ways you can contact us and find out more

online via our project website
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send an **email** to us at:
info@heathrowconsultation.com

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