14. Ground Noise and Vibration

14.1 Introduction

14.1.1 This chapter is a replacement to that in the revised EIAR submitted in September 2021 (2021 EIAR). The update is in response to a number of changes that have taken place in the interim that could affect the findings of the earlier assessment. These changes comprise:

- using updated air traffic forecast data which reflects earlier fleet modernisation, recent levels of activity at the airport;
- assuming that segregated mode is in use from 06:00 to 08:00. This reverts a change made in 2021 EIAR;
- allowing for consented developments approved since the original application was made.

14.1.2 The update also corrects an error with the earlier predictions. Specifically, that the predicted aircraft noise levels had not been A weighted when they should have been. The A weighting reflects how the human ear responds to noise at different frequencies and has a negative correction for lower frequencies which are more prominent at larger distances from sources of noise due to atmospheric attenuation being greater at higher frequencies. This correction has a limited effect for locations close to the airport perimeter, but for more distant locations where most of the housing is located the corrected level is noticeably lower.

14.1.3 This chapter reports the findings of an assessment of the likely significant effects from ground noise and vibration as a result of the proposed Relevant Action. This assumes that in all future scenarios Apron 5H is in use. Ground noise in this context encompasses aircraft ground noise, i.e. noise associated with aircraft activity on the ground, as well as road traffic noise.

14.1.4 This assessment and the replacement EIAR chapter have been produced by Bickerdike Allen Partners LLP (BAP), with road traffic noise predictions provided by AECOM.

14.1.5 The focus of this chapter is aircraft ground noise. This excludes any start of roll or reverse thrust activities, which are considered to be part of the air noise and covered in replacement *Chapter 13: Aircraft Noise and Vibration*. The key aircraft ground operations are aircraft taxiing and aircraft using Auxiliary Power Units (APUs) when on stands.

14.1.6 Aircraft ground operations do not typically produce any significant vibration effects at sensitive receptors outside of the airport site, and the assessment of vibration due to aircraft ground operations does not need further assessment.

14.1.7 This chapter considers the Current State of the Environment and the Future Receiving Environment in the Permitted and Proposed Scenarios for the Assessment Years of 2025 and 2035. The Permitted and Proposed Scenarios are described in the *'Key Concepts and Terminology Used in the EIAR'* section at the front of this EIAR Supplement.

14.1.8 An assessment of road traffic noise effects and a cumulative assessment of all noise impacts from the proposed Relevant Action are also included in this chapter and additionally considered in *Chapter 21: Interactions and Cumulative Effects Addendum* (see Appendix 1B of this EIAR Supplement). The changes to road traffic flows are discussed in more detail in *Chapter 9: Traffic and Transport*.

14.2 Legislation and Planning Policy Context

14.2.1 The Environmental Impact Assessment (EIA) process is described in *Chapter 1: Introduction* of the 2021 EIAR.

14.2.2 *Chapter 6: Planning and Development Context* sets out the legislative and planning policy context for the proposed Relevant Action. It includes reference to relevant national and local planning policies,

including those that have been considered when determining the EIAR scope, method and mitigation. Those considered relevant to this chapter are summarised below with additional material also considered relevant. More detail on this additional material, and selected policies included in Chapter 6, is given in Appendix 14A of the 2021 EIAR.

Strategic Planning Context

14.2.3 The Applicant has a number of obligations to fulfil with regard to the management of Dublin Airport which are described in Chapter 6. The following regulations are relevant to noise:

- S.I. No 549/2018 – Environmental Noise Regulations 2018[1]
- Aircraft Noise (Dublin Airport) Regulation Act 2019 (the Aircraft Noise Act)[2]

14.2.4 The last of these implements European Union (EU) Regulation 598/2014[3] on the establishment of rules and procedures with regard to the introduction of noise related operating restrictions at EU airports within the ICAO Balanced Approach[4]. Further details of this regulation, and the two listed above are contained in Appendix 14A.

National Planning Policy

14.2.5 National planning policy which is relevant to the proposed Relevant Action is described in Chapter 6.

Local Planning Policy

14.2.6 Local planning policy which is relevant to the proposed Relevant Action is described in Chapter 6 of the 2021 EIAR. The following policy documents are relevant to noise and are discussed further in Section 14.6.

- Fingal Development Plan 2023-2029[5]
- Dublin Airport Local Area Plan (2020)[6]
- Noise Action Plan for Dublin Airport (2019-2023)[7]

International Policy, Standards and Guidance

14.2.7 The following international policies, standards and guidance documents are considered relevant to this assessment. More detail is given in Appendix 14A.

- ICAO Convention on International Civil Aviation, Annex 16, Volume 1[8]

[1] Government of Ireland (2018). S.I. No. 549/2018 - European Communities (Environmental Noise) Regulations 2018, [Online]. Available at: http://www.irishstatutebook.ie/eli/2018/si/549/made/en/ [Checked 17/08/2023]
[2] Government of Ireland (2019). Aircraft Noise (Dublin Airport) Regulation Act 2019, [Online]. Available at: http://www.irishstatutebook.ie/eli/2019/act/12/enacted/en/html [Checked 17/08/2023]
[3] 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://eur-lex.europa.eu/eli/reg/2014/598/oj [Checked 17/08/2023]
[4] ICAO (2010). Doc 9829 Guidance on the Balanced Approach to Aircraft Noise Management, ICAO
[5] Fingal County Council (2023). Fingal Development Plan 2023-2029, [Online]. Available at: https://www.fingal.ie/development-plan [Checked 17/08/2023]
[6] Fingal County Council (2020). Dublin Airport Local Area Plan, [Online]. Available at: https://www.fingal.ie/sites/default/files/2020-01/dublin-airport-lap-2020.pdf [Checked 17/08/2023]
[7] Fingal County Council (2019). Noise Action Plan for Dublin Airport 2019-2023, [Online]. Available at: https://www.fingal.ie/sites/default/files/2019-04/NAP%20Final.pdf http://www.irishstatutebook.ie/eli/2019/act/12/enacted/en/html[Checked 17/08/2023]
[8] ICAO (2020). Annex 16 to the Convention on International Civil Aviation, Environmental Protection, Volume 1 Aircraft Noise, 8th Edition, ICAO

- Environmental Noise Directive 2002/49/EC[9]
- EU Commission Directive 2020/367[10]
- WHO Guidelines for Community Noise (1999)[11]
- WHO Night Noise Guidelines for Europe (2009)[12]
- WHO Environmental Noise Guidelines for the European Region (2018)[13]
- ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation[14]

Relevant UK Policy, Standards and Guidance

14.2.8 The National and International Policy, Standards and Guidance described above set out the overall approach, and much of the subsequent detail required to implement it. There are however some areas where additional information is considered beneficial, such as in relation to the significance of particular noise levels and criteria for particular types of buildings.

14.2.9 To provide this, information has been taken from the following UK policies, standards and guidance documents are considered relevant to this assessment. More detail is given in Appendix 14A.

- Noise Policy Statement for England (2010)[15]
- UK Aviation Policy Framework (2013)[16]
- BS 8233:2014 Sound insulation and noise reduction in buildings – code of practice[17]
- Department of Education - Acoustic design of schools: performance standards BB93 (2015)[18]
- Department of Health - Specialist Services, Health Technical Memorandum 08-01: Acoustics (2013)[19]

[9] 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 17/08/2023]

[10] European Commission (2020). Commission Directive (EU) 2020/367 of 4 March 2020 amending Annex III to Directive 2002/49/EC of the European Parliament and of the Council as regards the establishment of assessment methods for harmful effects of environmental noise (Text with EEA relevance), [Online]. Available at: https://eur-lex.europa.eu/eli/dir/2020/367/oj [Checked 21/08/2023]

[11] Berglund, B. et al (1999). Guidelines for community noise, [Online]. Available at: https://apps.who.int/iris/bitstream/handle/10665/326486/9789289041737-eng.pdf?sequence=1&isAllowed=y [Checked 21/08/2023]

[12] World Health Organisation Europe (2009). Night Noise Guidelines for Europe, [Online]. Available at: https://apps.who.int/iris/bitstream/handle/10665/326486/9789289041737-eng.pdf?sequence=1&isAllowed=y [Checked 21/08/2023]

[13] World Health Organization Regional Office for Europe (2018). Environmental Noise Guidelines for the European Region, [Online]. Available at https://www.who.int/europe/publications [Checked 21/08/2023]

[14] International Organization for Standardization (1996). ISO 9613 Acoustics — Attenuation of sound during propagation outdoors, [Online]. Available at: https://www.iso.org/ics/17.140.01/x/ [Checked 21/08/2023]

[15] 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 21/08/2023]

[16] UK Department for Transport (2013). Aviation Policy Framework, [Online]. Available at: https://www.gov.uk/government/publications/aviation-policy-framework [Checked 21/08/2023]

[17] 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=000000000030241579 [Checked 21/08/2023]

[18] UK Department of Education (2015). BB93: acoustic design of schools – performance standards, [Online]. Available at: https://www.gov.uk/government/publications/bb93-acoustic-design-of-schools-performance-standards [Checked 21/08/2023]

[19] UK 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 21/08/2023]

- CAP1616a Airspace Change: Environmental requirements technical annex[20]
- BS7445 Description and measurement of environmental noise[21]

14.3 Assessment Methodology

14.3.1 This section describes the approach to the ground noise assessment and covers the methodology, terminology and significance criteria used.

14.3.2 Key sources of information that have been utilised for this assessment are:

- The physical location of the airport, in particular the runways, taxiways and stands (taken from the Aeronautical Information Package (AIP) for Dublin Airport).
- The number of flights in each relevant assessment period, including their aircraft type and operation. This has been supplied by the Applicant for both actual (e.g. 2018) and air traffic movement forecasts (these forecasts prepared by Mott Macdonald).
- The road traffic flows on a network of roads around the airport (provided by AECOM).

Ground Noise Modelling Methodology

14.3.3 The assessment of ground noise relies heavily on the modelling of noise levels. This has been carried out using the CadnaA noise modelling software produced by Datakustik. This industry standard software uses the methodology set out in ISO 9613-2:1996[22] to produce noise contours and to predict noise levels at specific locations. Details of the modelling methodology are given in replacement Appendix 14B.

14.3.4 The ground operations associated with all aircraft taking off from or landing at Dublin Airport, with the exception of helicopter and military aircraft, have been assessed. Operations by helicopter and military aircraft make up a small proportion of the total and are not able to be assessed to the same level of accuracy. In 2018 there were 820 operations by helicopters and 2 operations by military aircraft, making up 0.4% of the annual total of aircraft movements. Their inclusion would have a negligible effect on the findings of this assessment.

14.3.5 The road traffic flows on a network of roads around the airport have been assessed. These flows comprise varying amounts of airport related traffic but in each case the total traffic is considered. Additional details of the modelling methodology relating to the road traffic noise assessment are given in Appendix 14F.

Primary Assessment Metrics

14.3.6 There are various noise metrics available for the assessment of aircraft ground noise. These are described in detail in Appendix 14A.

14.3.7 Aircraft ground noise has historically been assessed using different metrics and criteria depending on the application. It is, however, common for aircraft ground noise at busy airports such as Dublin Airport to be assessed using a metric based on L_{Aeq}, i.e. one that averages the noise energy over a defined time period and that accounts for the number, duration and noise level of aircraft ground operations over a typical day. For example many assessments at UK airports in recent years have used the L_{Aeq} metric, such as London Heathrow, London Stansted, Leeds Bradford, and Bristol. Adopted aircraft ground noise thresholds are typically not dissimilar from those used for air noise, and therefore the metrics used here mirror those that have been used for the air noise assessment in replacement *Chapter 13: Aircraft Noise and Vibration*:

[20] Civil Aviation Authority (2020). CAP1616a: Airspace Change: Environmental requirements technical annex, [Online]. Available at: https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=8128 [Checked 21/08/2023]

[21] British Standards Institution (2003). BS 7445:2003 Description and measurement of environmental noise [Online]. Available at: https://shop.bsigroup.com/ProductDetail?pid=000000000030098820 [Checked 21/08/2023]

[22] International Organization for Standardization (1996). ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation, [Online]. Available at: https://www.iso.org/standard/20649.html [Checked 21/08/2023].

- L_{den}, which takes into account the annual activity throughout the 24-hour period, with a 5 dB penalty applied to noise in the evening (19:00-23:00) period and a 10 dB penalty applied to noise in the night (23:00-07:00) period. The key effect linked with this metric is annoyance.
- L_{night}, which takes into account the annual activity during the night (23:00-07:00) period. The key effect linked with this metric is sleep disturbance.

14.3.8 The noise produced by road traffic has also been produced in these metrics. This is the same approach as used for the modelling undertaken to comply with the Environmental Noise Directive 2002/49/EC and reported in the Dublin Agglomeration Environmental Noise Action Plan December 2018 – July 2023[23].

14.3.9 The number of people 'highly sleep disturbed' and 'highly annoyed' by road traffic noise has also been predicted in accordance with the method set out in the World Health Organisation's Environmental Noise Guidelines 2018 as endorsed by the European Commission through Directive 2020/367. These metrics aim to give an overall picture of the noise exposure by assessing a percentage chance of people being highly annoyed or highly sleep disturbed at different noise levels. For example, the association in the WHO Guidelines has around 8% of people assessed as being highly annoyed at a noise level of 45 dB L_{den}, increasing to around 28% of people at a noise level of 70 dB L_{den}.

14.3.10 This chapter does not assign significance to these results as there is not published guidance regarding significance thresholds for a collective community-level assessment. On an individual level however, high annoyance and high sleep disturbance is considered harmful to health, as outlined in EU Directive 2020/367.

Supplementary Noise Metrics

14.3.11 In some other jurisdictions, particularly the UK, aircraft ground noise is often assessed in terms of the $L_{Aeq,16h}$ metric for the daytime (07:00-23:00) period and the $L_{Aeq,8h}$ metric for the night-time (23:00-07:00) period. These periods relate to an average summer day. Summer in this instance is defined as the 92-day period between 16 June and 15 September inclusive. Noise contours and population assessments have also been carried out using these metrics in replacement Appendix 14C.

14.3.12 For air noise it is common to utilise a number of additional supplementary metrics in order to fully describe the nature of the noise and its effects on the community. Compared to noise produced by airborne aircraft, aircraft ground noise is characterised by steady noise at a lower level but with a longer duration and, as a result, the metrics based on L_{Aeq} are considered sufficient for ground noise. Single noise events are not typically a concern, although to provide additional information details of the diurnal pattern of noise from ground operations during the night have been provided in replacement Appendix 14C.

14.3.13 The exception to this is when high power engine running is carried out for testing and maintenance. When engines are run at high power, this can cause very high noise levels near the test location. However, historically at Dublin Airport this occurs no more than 1-2 times per day on average, only during daytime hours and is only permitted at a designated location, away from populated neighbouring areas. The noise from engine testing is considered negligible in the context of the overall airport ground noise and there is no expectation that this would change due to the proposed Relevant Action. Therefore, it has not been included as part of this assessment.

Methodology for Determining Sensitive Receptors

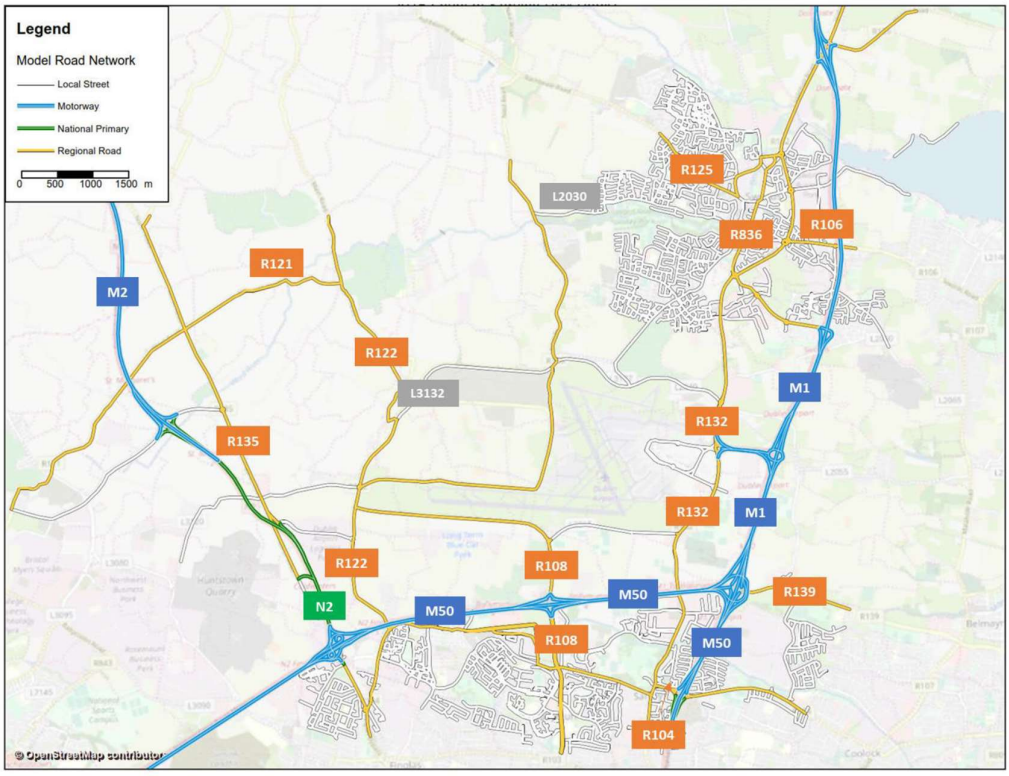
14.3.14 The study area for aircraft ground noise is contained within a rectangle that extends approximately 3 km to the west, 3 km to the east, 3 km to the north and 2 km to the south of the centre of the South Runway (10R/28L) at Dublin Airport. The study area contains all receptors exposed to ground noise levels of at least 45 dB L_{den} or 40 dB L_{night}. This includes all of the receptors that have the potential to experience significant effects.

14.3.15 The study area for the assessment of road traffic noise is the same as that for aircraft ground noise. The road links included in the modelling are included in Figure 14-1. These links are the main roads in the

[23] Dublin Agglomeration Action Plan Relating to The Assessment and Management of Environmental Noise December 2018 – July 2023 https://www.dublincity.ie/sites/default/files/2021-04/dcc-volume-1-dublin-agglomeration-noise-action-plan-dec-2018_july2023.pdf [Checked 21/08/2023]

area such as the motorways, and so do not include the majority of residential streets where no change to the flows due to the Relevant Action are expected.

Figure 14-1: Road Traffic Noise Study Modelled Road Links



14.3.16 The following have been considered as potential receptors of high sensitivity for this assessment:

- Dwellings;
- Schools;
- Residential healthcare facilities; and
- Places of worship.

14.3.17 Receptors with a lower sensitivity to noise, such as offices and hotels, have not been considered as part of this assessment.

14.3.18 The assessment of dwellings includes an allowance for those which are consented but not yet constructed. These have been presented separately to the totals for existing dwellings.

Methodology for Determining Construction Effects

14.3.19 The proposed Relevant Action will result in no physical changes to the any parts of Dublin Airport or its surroundings. As a result, the proposed Relevant Action will not result in any new effects on the noise environment arising from construction, and further assessment is therefore not required.

Methodology for Determining Operational Effects

14.3.20 The Regulation 598 assessment considered a number of different options for the use of the runway system at night. The resulting preferred option, presented in this EIAR as the Proposed Scenario, is described in *Chapter 1: Introduction*.

14.3.21 The effects of the Proposed Scenario are determined by comparison with the Permitted Scenario for the relevant Assessment Year. The Permitted Scenario represents the situation if the proposed Relevant

Action is not consented and is also described in the *'Key Concepts and Terminology Used in the EIAR' section at the front of this EIAR Supplement*.

14.3.22 The Permitted and Proposed Scenarios are examined in the Assessment Years 2025 and 2035.

14.3.23 The general assessment methodology involves the following:

- Derivation of assessment criteria;
- Computation of existing and future noise levels under the scenarios and Assessment Years described above;
- Assessment of magnitude of impacts (absolute) on sensitive receptors, for each scenario;
- Determination of the change in noise levels, and associated impacts (relative) as a result of the proposed Relevant Action;
- Consideration of the likely significant effects of the proposed Relevant Action, based on both the absolute and relative noise levels;
- Description of the potential effects (beneficial and adverse) associated with the proposed Relevant Action; and
- Description of any mitigation measures, where appropriate, in relation to the proposed Relevant Action and description of any residual effects.

Significance Criteria – Aircraft Ground Noise

14.3.24 The effects from aircraft ground noise are considered in terms of both the absolute noise level and the change in noise level due to the proposed Relevant Action to determine their significance. Both need to be considered to determine whether a significant effect arises from the proposed Relevant Action in an EIA context; for example if a receptor experiences a high absolute noise level but no change due to the proposed Relevant Action then this is not a significant effect. Equally if a receptor experiences a large change in noise level but the resulting level is still very low then this receptor is not considered to be significantly affected.

Residential Receptors

14.3.25 Absolute noise impact criteria for residential receptors have been developed against an effect scale and are given in Table 14-1. The derivation of these is discussed in Appendix 14A.

Table 14-1: Aircraft Ground Noise Impact Criteria (Absolute) – Residential

Scale Description	Annual dB L_{den}	Annual dB L_{night}
Negligible	<45	<40
Very Low	45 – 49.9	40 – 44.9
Low	50 – 54.9	45 – 49.9
Medium	55 – 64.9	50 – 54.9
High	65 – 69.9	55 – 59.9
Very High	≥70	≥60

14.3.26 The effect scale used to assess the change in noise level is given in Table 14-2. A semantic scale of this type, following the format of examples given in the Institute of Environmental Management and Assessment (IEMA[24]) guidelines, has been applied in previous air noise assessments and accepted in Public Inquiries for airport developments in the UK and Ireland, for example the application for the North

[24] Institute of Environmental Management and Assessment (2014). Guidelines for Environmental Noise Impact Assessment. London: IEMA.

Runway at Dublin Airport. The thresholds are derived from the difference contour bands recommended in CAP1616a[25].

Table 14-2: Aircraft Ground Noise Impact Criteria (Relative)

Scale Description	Change in noise level, dB(A)
Negligible	0 – 0.9
Very Low	1 – 1-9
Low	2 – 2.9
Medium	3 – 5.9
High	6 – 8.9
Very High	≥9

14.3.27 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 night-time noise level at a dwelling were to change from 45 dB to 50 dB L_{night}, the overall effect for the occupants would be less than if the night-time noise level were to increase by the same amount from 55 dB to 60 dB L_{night}.

14.3.28 There is no clearly accepted method of how to rate the magnitude of the effect of a change in ground noise level and the associated absolute noise level. Some guidance, however, is provided in the UK's Planning Practice Guidance (PPG[26]) which states:

"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 may result in a significant adverse effect occurring even though little or no change in behaviour would be likely to occur."

14.3.29 The magnitude of an effect from changing between one scenario and another (i.e. Permitted Scenario to Proposed Scenario) has been established by considering both the absolute noise level in the higher of the two scenarios and the relative change in noise level that occurs at a given receptor.

14.3.30 Table 14-3 shows how the absolute and relative impacts are interpreted into magnitude of effect. This takes into account the criteria presented above, other guidance and professional judgement. The effect rating scale is taken from the Environmental Protection Agency (EPA) EIAR Guidelines[27].

Table 14-3: Summary of Magnitude of Effect – Aircraft Ground Noise

Absolute Noise Level Rating	Change in Noise Level Rating					
	Negligible	Very Low	Low	Medium	High	Very High
Negligible	Imperceptible	Imperceptible	Imperceptible	Not Significant	Slight	Moderate
Very Low	Imperceptible	Imperceptible	Not Significant	Slight	Moderate	Significant
Low	Imperceptible	Not Significant	Slight	Moderate	Significant	Significant
Medium	Not Significant	Slight	Moderate	Significant	Significant	Very Significant
High	Slight	Moderate	Significant	Significant	Very Significant	Profound
Very High	Moderate	Significant	Significant	Very Significant	Profound	Profound

14.3.31 A potential significant effect (adverse or beneficial) would be considered to arise if in Table 14-3 the magnitude of the effect was rated as significant or higher.

[25] Civil Aviation Authority (2020). CAP 1616a Airspace Change: Environmental requirements technical annex https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=8128 [Checked 21/08/2023]
[26] Ministry of Housing, Communities & Local Government, Planning practice guidance Noise (2019) https://www.gov.uk/guidance/noise--2 [Checked 21/08/2023]
[27] Environmental Protection Agency (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports

Non-Residential Receptors

14.3.32 For receptors other than dwellings, absolute levels rated as medium have been derived from the relevant guidance documents, as described in Appendix 14A. These are given in Table 14-4. The impact on each non-residential receptor has been rated as significant if the absolute noise level is above this threshold and the change in noise level is also rated medium or higher, i.e. at least 3 dB(A).

Table 14-4: Aircraft Ground Noise Impact Criteria (Absolute) – Non-Residential

Receptor Type	Threshold for Medium Absolute Effect
Schools (08:00-16:00)	55 dB $L_{Aeq,30m}$ (approx. 55 dB L_{den})
Residential Healthcare Facilities – Day (07:00-23:00)	55 dB $L_{Aeq,1h}$ (approx. 55 dB L_{den})
Residential Healthcare Facilities – Night (23:00-07:00)	50 dB $L_{Aeq,1h}$ (approx. 45 dB L_{night})
Places of Worship	55 dB L_{den}

Significance Criteria – Road Traffic Noise

14.3.33 For the ground noise effects from road traffic noise a full set of significance criteria have not been developed as the initial work indicated that the resulting changes would be limited.

14.3.34 The criteria utilised has been that changes of less than 1 dB are negligible and do not give rise to significant effects. This is consistent with the other sources of noise considered, and also with the guidance in the UK's Design Manual for Road and Bridges[28]. That document sets out the magnitude of changes, with short term changes of less than 1.0 dB described as negligible, over the long term changes of less than 3.0 dB are described as negligible. It goes on to state that *where the magnitude of change in the short term is negligible at noise sensitive buildings, it shall be concluded that the noise change will not cause changes to behaviour or response to noise and as such, will not give rise to a likely significant effect*.

14.3.35 Consideration has also been limited to residential receptors, which are the most numerous and are considered the most noise sensitive. They also cover a larger area, so if there are no significant effects for them it is not expected there will be for any non-residential receptors.

Consultation

14.3.36 *Chapter 5: Consultation* details the consultation on this application.

Limitations and Assumptions

14.3.37 Planned background noise surveys have been hampered by the Covid-19 pandemic and subsequent recovery, which means that even if measurements were taken at this time, the ambient conditions may not currently be representative. A detailed survey was carried out in 2016. In any event, the ground noise assessment criteria are dependent on the absolute levels from the aircraft and road traffic rather than the background noise.

14.3.38 There is always some uncertainty associated with forecasting future aircraft traffic, and this has been increased by the Covid-19 pandemic, particularly in the short term. It was previously expected that a throughput of 32 mppa would be reached in 2025 under the Proposed Scenario. The latest forecasts suggest this may now occur in 2024 but that activity will be similar in 2025. For this reason the initial assessment year of 2025 has been retained.

14.3.39 Some aircraft in the forecasts are either not currently in service or have limited noise data available. Although there is some data that suggests newer aircraft types will perform similarly or slightly better

[28] Design Manual for Road and Bridges LA 111 Noise and vibration
https://www.standardsforhighways.co.uk/dmrb/search/cc8cfcf7-c235-4052-8d32-d5398796b364 [Checked 21/08/2023]

than those they replace, a conservative assumption of no improvement over current aircraft types has been made.

14.3.40 Although a number of aircraft using Dublin Airport use Fixed Electrical Ground Power (FEGP) rather than the noisier Auxiliary Power Units (APUs), data on the extent of FEGP use was not available. This ground noise assessment has taken a conservative assumption that all aircraft use APUs. In practice there is likely to be significant use of FEGP at some stands in all assessment years which will lead to lower noise levels than assessed here.

14.3.41 In addition to 'high annoyance' and 'high sleep disturbance' EU Directive 2020/367 lists ischaemic heart disease (IHD) as a harmful effect that should be considered and provides a calculation procedure to estimate the number of cases based on the road traffic noise level. This calculation has not been carried out due to the focus of the assessment being the aircraft ground noise effects and the limited changes to the road traffic noise levels.

14.4 Current State of the Environment

14.4.1 This section describes the current state of the environment in the vicinity of Dublin Airport. In view of the location of the airport, the surrounding community is affected primarily by noise from the local road network and airport operations.

14.4.2 This assessment of the current state of the environment relates to the long-term situation and considers the noise levels prior to the onset of the Covid-19 pandemic, and utilises field studies undertaken in 2016 and 2019.

14.4.3 Noise surveys were carried out in 2016 at key receptor positions around Dublin Airport to establish the prevailing ambient and background noise conditions during both the daytime and night-time. Additionally, an attended survey of aircraft taxi operations was undertaken in 2019 to measure aircraft taxi noise levels for use in the modelling of current and future ground noise scenarios. These surveys are summarised in this section and reported in more detail in Appendix 14D.

14.4.4 Aircraft ground noise levels have been modelled for 2018. The primary assessment metrics are presented later in this section, and the supplementary metrics are presented in replacement Appendix 14C.

14.4.5 Road traffic noise levels have been modelled for 2018 based on actual recorded flows from Transport Infrastructure Ireland (TII) permanent traffic counters, as well as survey flows from 2019, factored to reflect observed differences between 2018 and 2019 flows at relevant adjacent TII count sites. The primary assessment metrics are presented later in this section.

Noise Surveys

Methodology

14.4.6 The survey work described here comprises three discrete elements: long- and short-term surveys undertaken by AWN Consulting Ltd in 2016, and an aircraft taxi noise survey undertaken by BAP in 2019. These surveys are reported in more detail in Appendix 14D.

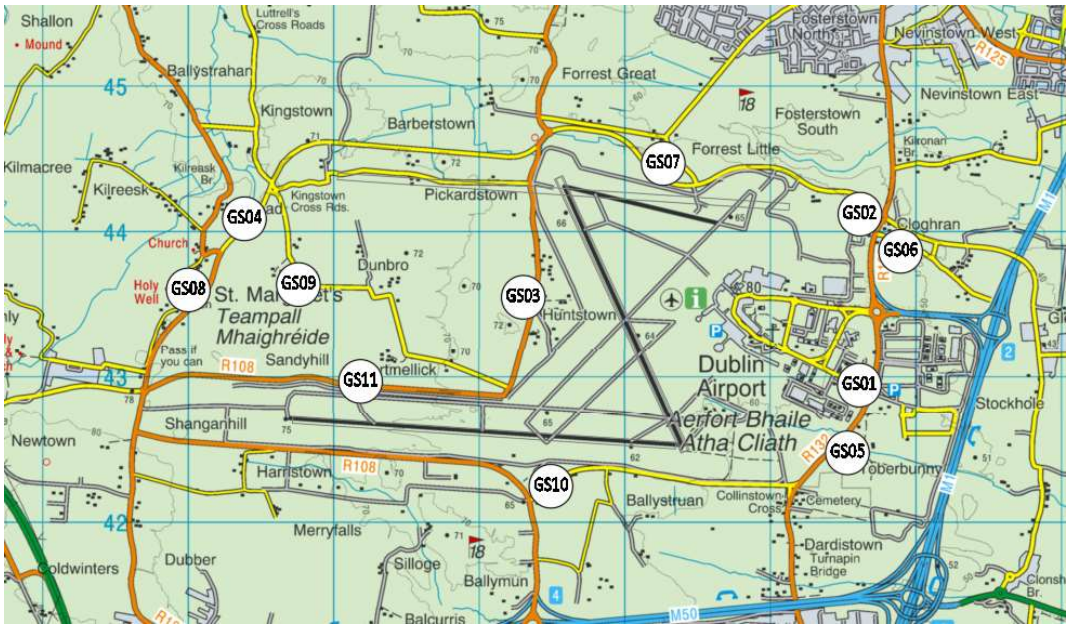
14.4.7 The survey locations and dates are summarised in Table 14-5 and illustrated in Figure 14-2. Survey monitoring locations were selected to obtain representative ambient and background noise levels close to the airport. Because ground noise does not reach as far as air noise, the area covered is more focused compared to the air noise survey receptor set.

Table 14-5: Aircraft Ground Noise Survey Locations and Dates

Receptor	Survey	Location	Dates of Survey
GS01	Short-term	Cloughran House car park off the R132, E of airport	25/07/2016 - 28/07/2016
GS02	Short-term	Creche off Naul Road, NE of airport	25/07/2016 - 28/07/2016
GS03	Short-term	Residential properties on the R108, W of airport	25/07/2016 - 28/07/2016

GS04	Short-term	Field off the R122 at St. Margaret's, W of airport	25/07/2016 - 28/07/2016
GS05	Long-term	daa owned site on the R132, SE of airport	02/08/2016 - 10/08/2016
GS06	Long-term	daa owned site on Old Stockhole Lane, NE of airport	02/08/2016 - 10/08/2016
GS07	Long-term	Field adjacent to Cooks Road and Forest Road, N of airport	24/08/2016 - 01/09/2016
GS08	Long-term	Field adjacent to St. Margaret's School, W of airport	28/07/2016 - 29/07/2016
GS09	Long-term	daa owned site on Dunbro lane, W of airport	10/08/2016 - 17/08/2016
GS10	Long-term	daa owned site on Old Airport Road, S of airport	11/08/2016 - 17/08/2016
GS11	Aircraft Taxi	Airport perimeter road, facing taxiways S5 and S6	02/10/2019

Figure 14-2: Ground Noise Survey Locations



14.4.8 Noise levels have been presented in terms of the $L_{Aeq,T}$ and $L_{AF90,T}$ metrics for the 16 hour daytime (07:00-23:00) and 8 hour night-time (23:00-07:00) periods.

14.4.9 $L_{Aeq,T}$ is commonly used to denote the ambient noise level and signifies the average noise level which is equivalent in energy terms to that produced by the various fluctuating noise levels that occur in the measurement period.

14.4.10 $L_{AF90,T}$ is commonly used to denote the prevailing background noise level and signifies the level of noise which is exceeded for 90% of the time.

14.4.11 For the aircraft taxi noise survey, both spectral and A-weighted $L_{eq,T}$ measurements were taken and used to estimate the sound power L_{WA} of each aircraft type. Each measurement typically lasted around 90 seconds and was taken at a fixed position on the airport perimeter road, approximately 70 m from the junction of taxiway S6 and taxiway S. This was the primary exit from the runway used by R28 arrivals on the day of the survey.

Results – Short-Term Noise Monitoring

14.4.12 A summary of average values for each measurement location is given in Table 14-6. Detailed results are provided in Appendix 14D.

Table 14-6: Short-Term Noise Monitoring Results Summary

Metric	Location

		GS01	GS02	GS03	GS04
Daytime (07:00 to 23:00)	$L_{Aeq,T}$ (dB)	59	57	56	70
	L_{AF90} (dB)[1]	55	53	44	51
Night-time (23:00 to 07:00)	$L_{Aeq,T}$ (dB)	54	53	52	64
	L_{AF90} (dB)[1]	49	48	41	49

[1] Arithmetic average of $L_{AF90,15min}$ measurements

Results – Long-Term Noise Monitoring

14.4.13 A summary of average values for each measurement location is given in Table 14-7. Detailed results are provided in Appendix 14D.

14.4.14 The results indicate that the ambient noise level around Dublin Airport lies in the range of 50 to 70 dB $L_{Aeq,16h}$ during the daytime with an underlying background noise level in the range of 45 to 55 dB L_{AF90}. The wide range of ambient noise levels indicate that this is dependent on the proximity to local noise sources, for example airborne aircraft, road traffic, or schools.

14.4.15 During the night, ambient noise levels are generally around 3-5 dB lower than during the day and background noise levels are typically 5-10 dB quieter. Road traffic is again a factor, with roadside locations tending to have higher ambient noise levels.

Table 14-7: Long-Term Noise Monitoring Results Summary

Metric	Location					
	GS05	**GS06**	**GS07**	**GS08**	**GS09**	**GS10**
$L_{Aeq,16h}$ (dB)	71	53	58	65	59	66
$L_{AF90,day}$ (dB)[1]	50	49	52	51[2]	47	55
$L_{Aeq,8h}$ (dB)	68	50	56	57	54	63
$L_{AF90,night}$ (dB)[1]	45	45	48	38[2]	39	48

[1] Arithmetic average of $L_{AF90,15min}$ measurements

[2] Arithmetic average of $L_{AF90,5min}$ measurements

Results – Aircraft Taxi Noise Survey

14.4.16 The results of the aircraft taxi noise survey are summarised in Table 14-8 by aircraft type. Movements by Airbus A320 and Boeing 737-800 aircraft types constitute the bulk of operations at Dublin Airport, and this is reflected in the data.

Table 14-8: Location GS11, Aircraft Taxi Noise Survey Results by Aircraft Type

Aircraft Type	No. Measured	Sound Power, dB L_{WA}
Airbus A220	1	123
Airbus A320	14	128
Airbus A321	1	130
Airbus A330	2	135
Boeing 737-800	15	129
Boeing 787	1	129
Embraer E190	1	127
Learjet 60	1	121

Noise Modelling L_{den} Metric – Aircraft Ground Noise

14.4.17 Noise contours have been produced for the primary assessment metric of L_{den} using the methodology described in Section 14.3. These are based on the actual aircraft movements in 2018.

14.4.18 The results are detailed below and are also presented in replacement Appendix 14C along with the noise contours, and the results for the supplementary noise metrics.

14.4.19 The noise contours representing a high impact, 65 dB L_{den}, do not extend farther than the airport site except at Portmellick and as a result contain no noise sensitive receptors. The noise contours representing a medium impact, 55 dB L_{den}, extend west towards Shanganhill, north to Naul Road. The contours do not extend east beyond the airport site. The noise contours representing a low impact, 50 dB L_{den}, extend farther west into Shanganhill, north into Forrest Little and south into Collinstown Cross and Silloge. These contours can be seen in Figure 14C-1.

14.4.20 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results for 2018 in terms of the L_{den} metric are given in Table 14-9.

Figure 14-3: Representative Location Points

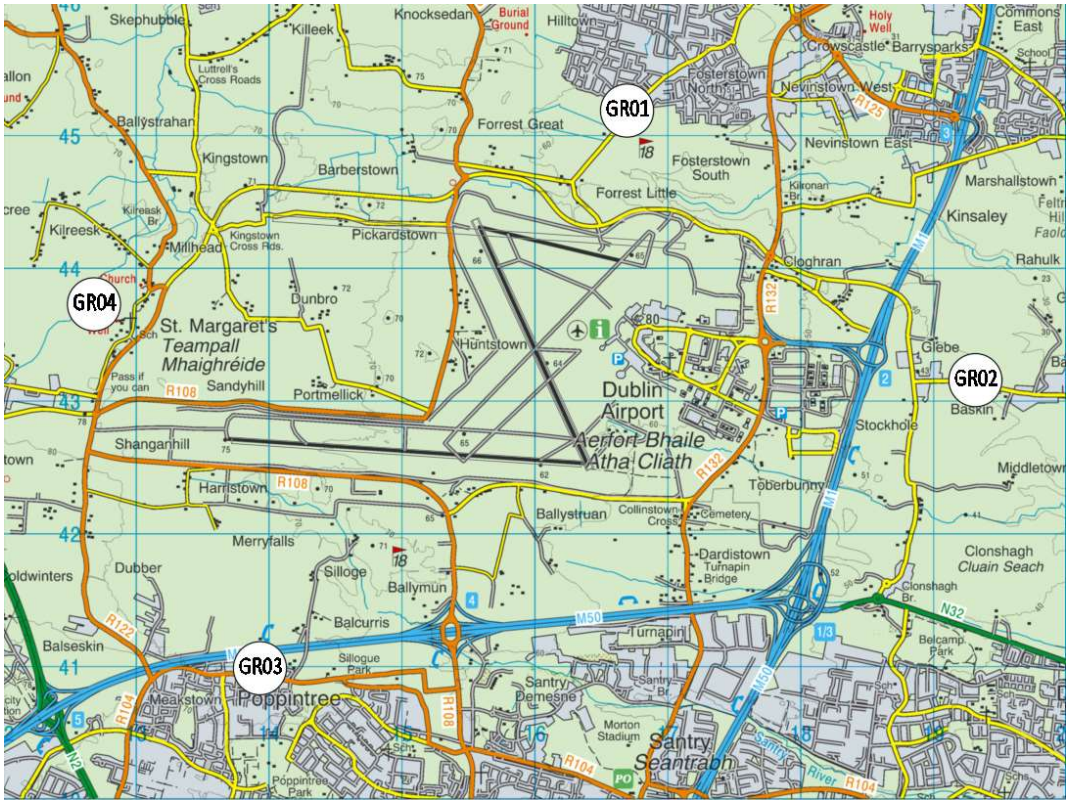


Table 14-9: 2018 Aircraft Ground Noise Levels at Representative Locations (L_{den})

Representative Location	Reference No.	2018 Aircraft Ground Noise Level, dB (L_{den})
Ridgewood	GR01	42
The Baskins	GR02	35
Mayeston Hall	GR03	41
St Margret's	GR04	38

Note – noise levels rounded to nearest whole number.

14.4.21 For each contour, the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and population excluding consented developments, and also including consented developments. The results are given in Table 14-10.

Table 14-10: Number of Dwellings and Population in 2018 Annual L_{den} Contours – Aircraft Ground Noise

Scenario	2018			
Contour L_{den} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
45	65	171	65	171
50	21	59	21	59
55	9	29	9	29
60	1	3	1	3
65	0	0	0	0
70	0	0	0	0

14.4.22 The World Health Organisation's Environmental Noise Guidelines 2018, as endorsed by the European Commission through Directive 2020/367, provide methods for calculating the number of people highly annoyed by specific noise sources, one of which uses road traffic noise and so the numbers have been determined where road traffic noise is considered in this Chapter. There is also a comparable method for airborne aircraft noise, and this has been used in replacement *Chapter 13: Aircraft Noise and Vibration*, where that noise source is considered, but it has not been used here for aircraft ground noise. The difference in approach relates to the different characteristics of the noise sources.

14.4.23 Section 1.2 of the Environmental Noise Guidelines relates to its interface with the EU policy and states that the main aim of the Environmental Noise Directive (END) is "to define a common approach intended to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise". It also notes that the END obliges the European Commission to adapt the END Annexes I–III to technical and scientific progress.

14.4.24 Annex II of the END was replaced by EU Directive 2015/996[29]. Section 2.7.1 of the Annex to the Directive states that noise from taxiing and use of APUs may not contribute materially to the overall population exposure to aircraft noise.

14.4.25 Where noise generating activities associated with airport operations do not contribute materially to the overall population exposure to aircraft noise and associated noise contours, they may be excluded. These activities include: helicopters, taxiing, engine testing and use of APUs. This does not necessarily mean that their impact is insignificant and where these activities occur assessment of the sources can be undertaken as set out in paragraphs 2.7.21 and 2.7.22 of the Annex to Directive 2015/996.

14.4.26 Section 2.7.1 advises that where taxiing and APUs are assessed this can be undertaken as set out in paragraph 2.7.22. This advises that where noise associated with engine testing and APUs is to be modelled, it is modelled according to the chapter on industrial noise. This requires that, when calculating the attenuation due to atmospheric absorption, the temperature and humidity conditions are used in the calculation according to ISO 9613-1:1993[14]. The ground noise predictions have utilised this standard.

[29] COMMISSION DIRECTIVE (EU) 2015/996 of 19 May 2015 establishing common noise assessment methods according to Directive 2002/49/EC of the European Parliament and of the Council https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32015L0996 [Checked 21/08/2023]

14.4.27 Annex III of the END was replaced by EU Directive 2020/367[30]. This notes in paragraph (4) that currently, limited knowledge is available on the harmful effects of industrial noise so that it is not possible to propose a common method for its assessment. This means there is no common method of assessment for taxiing and APUs as they are treated by the Directive as industrial noise.

14.4.28 In addition to the consideration of residential properties, other potential receptors of high sensitivity have been included in this assessment, specifically schools, residential healthcare facilities and places of worship.

14.4.29 There are no schools, residential healthcare facilities or places of worship above the L_{den} thresholds given in Table 14-4 for 2018.

Noise Modelling L_{night} Metric – Aircraft Ground Noise

14.4.30 Noise contours have been produced for the primary assessment metric of L_{night} using the methodology described in Section 14.3. These are based on the actual aircraft movements in 2018.

14.4.31 The results are detailed below and are also presented in replacement Appendix 14C along with the noise contours, and results for supplementary noise metrics.

14.4.32 The noise contours representing a high impact, 55 dB L_{night}, do not extend farther than the airport site except at Portmellick and as a result contain no noise-sensitive receptors. The noise contours representing a medium impact, 50 dB L_{night}, extend west towards Shanganhill and south to the Old Airport Road and R108. The contours do not extend east or north beyond the airport site. The noise contours representing a low impact, 45 dB L_{night}, extend farther west into Shanganhill, north to Naul Road and south towards Collinstown and Silloge. These contours can be seen in Figure 14C-2.

14.4.33 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results for 2018 in terms of the L_{night} metric are given in Table 14-11.

Table 14-11: 2018 Aircraft Ground Noise Levels at Representative Locations (L_{night})

Representative Location	Reference No.	2018 Aircraft Ground Noise Level, dB (L_{night})
Ridgewood	GR01	34
The Baskins	GR02	27
Mayeston Hall	GR03	33
St Margret's	GR04	30

Note – noise levels rounded to nearest whole number.

14.4.34 For each contour, the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and population excluding consented developments, and also including consented developments. The results are given in Table 14-12.

Table 14-12: Number of Dwellings and Population in 2018 Annual L_{night} Contours – Aircraft Ground Noise

Scenario	2018			
Contour L_{night} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*

[30] COMMISSION DIRECTIVE (EU) 2020/367 of 4 March 2020 amending Annex III to Directive 2002/49/EC of the European Parliament and of the Council as regards the establishment of assessment methods for harmful effects of environmental noise https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020L0367 [Checked 21/08/2023]

40	35	94	35	94
45	10	31	10	31
50	2	6	2	6
55	0	0	0	0
60	0	0	0	0
65	0	0	0	0

14.4.35 The World Health Organisation's Environmental Noise Guidelines 2018, as endorsed by the European Commission through Directive 2020/367, provide methods for calculating the number of people highly sleep disturbed by specific noise sources, one of which uses road traffic noise and so the numbers have been determined where road traffic noise is considered in this Chapter. There is also a comparable method for airborne aircraft noise, and this has been used in replacement *Chapter 13: Aircraft Noise and Vibration* where that noise source is considered. It has not been used here for aircraft ground noise for the same reasons as set out earlier in relation to not using the airborne aircraft noise method to determine the number of people highly annoyed from aircraft ground noise.

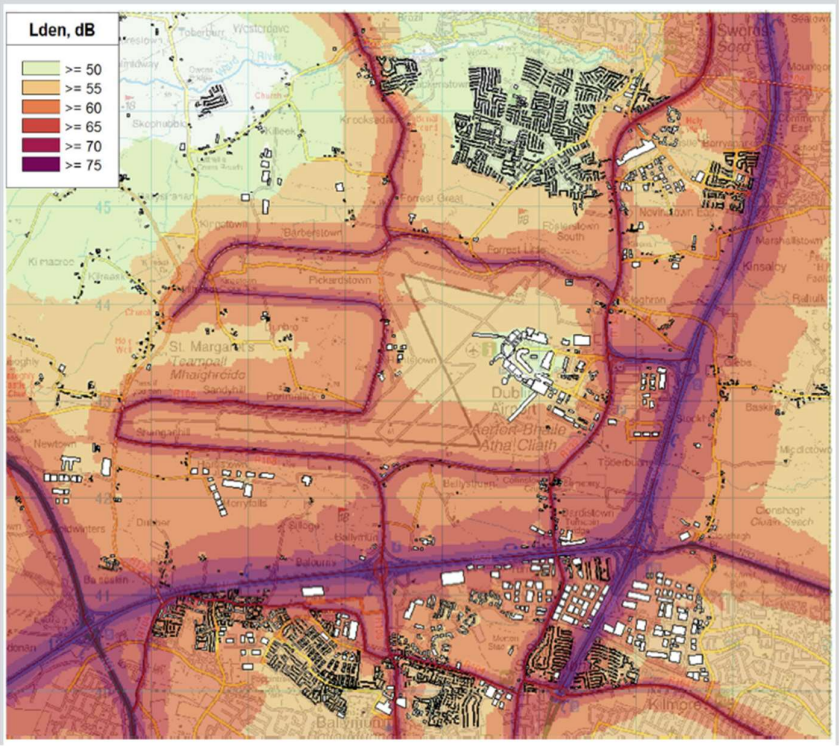
14.4.36 In addition to the consideration of residential properties, other potential receptors of high sensitivity have been included in this assessment, specifically schools, residential healthcare facilities and places of worship. Of these, only residential healthcare facilities are highly sensitive to noise at night and there are none above the L_{night} thresholds given in Table 14-4 for 2018.

Noise Modelling L_{den} Metric – Road Traffic Noise

14.4.37 Noise contours have been produced for the primary assessment metric of L_{den} using the methodology described in Section 14.3. The results are detailed below and are also presented in Appendix 14F.

14.4.38 The noise contours are shown in Figure 14-4.

Figure 14-4: 2018 L_{den} Road Traffic Noise Contours



14.4.39 The noise contours show that the highest noise levels of 70 dB L_{den} and above are concentrated along the M1 and M50 motorways. Closer to the other roads modelled noise levels are often above 65 dB L_{den} and in almost all areas the noise levels are above 50 dB L_{den}.

14.4.40 Lower levels are shown near the R122 in St Margaret's compared to the surrounding roads. This is due to the absence of road traffic information for 2018 for these road links. However, road traffic information is available for the Assessment Years of 2025 and 2035, and so any changes due to the Relevant Action can still be assessed.

14.4.41 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results for 2018 in terms of the L_{den} metric are given in Table 14-13.

Table 14-13: 2018, Road Traffic Noise Levels at Representative Locations (L_{den})

Representative Location	Reference No.	Road Traffic Noise Level, dB (L_{den})
Ridgewood	GR01	52
The Baskins	GR02	60
Mayeston Hall	GR03	73
St Margret's	GR04	55

Note – noise levels rounded to nearest whole number.

14.4.42 For each contour, the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and population excluding consented developments, and also including consented developments. The results are given in Table 14-14.

Table 14-14: Number of Dwellings and Population in 2018 Annual L_{den} Contours – Road Traffic Noise

Scenario	2018			
Contour L_{den} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
45	2,442	7,096	2,623	7,627
50	2,332	6,773	2,495	7,254
55	1,044	2,894	1,207	3,375
60	806	2,177	969	2,658
65	720	1,943	847	2,309
70	628	1,710	724	1,976

14.4.43 The number of people assessed to be highly annoyed by road traffic noise in 2018 is given in Table 14-15.

Table 14-15: Number of People Highly Annoyed by Road Traffic Noise – 2018

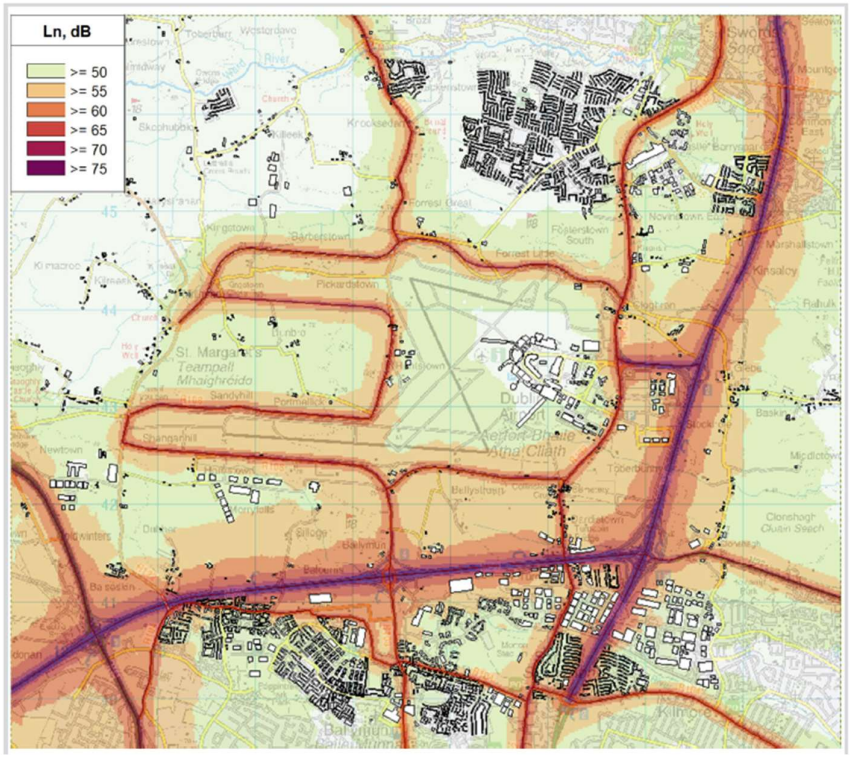
Scenario	No. People Highly Annoyed by Road Traffic Noise	
	Excluding Consented Developments	Including Consented Developments
2018	1191	1347

Noise Modelling L_{night} Metric – Road Traffic Noise

14.4.44 Noise contours have been produced for the primary assessment metric of L_{night} using the methodology described in Section 14.3. The results are detailed below and are also presented in Appendix 14F.

14.4.45 The noise contours are shown in Figure 14-5.

Figure 14-5: 2018 L_{night} Road Traffic Noise Contours



14.4.46 The noise contours show that the highest noise levels of 65 dB L_{night} and above are concentrated along the M1 and M50 motorways. Closer to the other roads modelled noise levels are often above 55 dB L_{night} and in most areas the noise levels are above 50 dB L_{night}.

14.4.47 Lower levels are shown near the R122 in St Margaret's compared to the surrounding roads. This is due to the absence of road traffic information for 2018 for these road links. However, road traffic information is available for the Assessment Years of 2025 and 2035, and so any changes due to the Relevant Action can still be assessed.

14.4.48 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results for 2018 in terms of the L_{night} metric are given in Table 14-16.

Table 14-16: 2018, Road Traffic Noise Levels at Representative Locations (L_{night})

Representative Location	Reference No.	Road Traffic Noise Level, dB (L_{night})
Ridgewood	GR01	44
The Baskins	GR02	52
Mayeston Hall	GR03	64
St Margret's	GR04	47

Note – noise levels rounded to nearest whole number.

14.4.49 For each contour, the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and population excluding consented developments, and also including consented developments. The results are given in Table 14-17.

Table 14-17: Number of Dwellings and Population in 2018 Annual L_{night} Contours – Road Traffic Noise

Scenario	2018			
Contour L_{night} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
40	2,442	7,096	2,605	7,577
45	1,540	4,371	1,703	4,852
50	855	2,320	1,018	2,801
55	776	2,096	903	2,462
60	661	1,795	788	2,161
65	381	1,032	477	1,298

14.4.50 The number of people assessed to be highly sleep disturbed by road traffic noise in 2018 is given in Table 14-18.

Table 14-18: Number of People Highly Sleep Disturbed by Road Traffic Noise – 2018

Scenario	No. People Highly Sleep Disturbed by Road Traffic Noise	
	Excluding Consented Developments	Including Consented Developments
2018	331	385

14.5 Future Receiving Environment

14.5.1 This section describes the future receiving environment in the Assessment Years of 2025 and 2035. This is the environment in the absence of the proposed Relevant Action and is represented by the Permitted Scenario in each Assessment Year.

14.5.2 Aircraft ground noise levels have been modelled for the Permitted Scenario in each Assessment Year. The primary assessment metrics are presented later in this section, and the supplementary metrics are presented in replacement Appendix 14C.

14.5.3 Road traffic noise levels have been modelled for the Permitted Scenario in each Assessment Year. The primary assessment metrics are presented later in this section.

Noise Modelling L_{den} Metric – Aircraft Ground Noise

14.5.4 Noise contours have been produced for the primary assessment metric of L_{den} using the methodology described in Section 14.3. For the future Assessment Years these are based on forecast aircraft movements.

14.5.5 The results are detailed below and are also presented in replacement Appendix 14C along with the noise contours, and the results for the supplementary noise metrics.

14.5.6 The extent of the noise contours is similar to the current environment, although their shape and extent to the north is modified and increased slightly. The contours representing a low impact, 50 dB L_{den}, extend further into Forrest Little. The extent of the contours is similar in both Assessment Years. The contours can be seen in Figures 14C-5 and 14C-17.

14.5.7 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results of these predictions for the Permitted Scenario in terms of the L_{den} metric are given in Table 14-19.

Table 14-19: Permitted Scenario Aircraft Ground Noise Levels at Representative Locations (L_{den})

Representative Location	Reference No.	Permitted Scenario Aircraft Ground Noise Level, dB (L_{den})	
		2025	*2035*
Ridgewood	GR01	45	45
The Baskins	GR02	35	35
Mayeston Hall	GR03	40	40
St Margret's	GR04	38	38

Note – noise levels rounded to nearest whole number.

14.5.8 For each set of contours, the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and population excluding consented developments, and also including consented developments. The results are given by scenario and contour in Table 14-20 to Table 14-21.

Table 14-20: Number of Dwellings and Population in 2025 Permitted Scenario Annual L_{den} Contours – Aircraft Ground Noise

Scenario	2025 Permitted			
Contour L_{den} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
45	158	472	158	472
50	26	74	26	74
55	10	32	10	32
60	1	3	1	3
65	0	0	0	0
70	0	0	0	0

Table 14-21: Number of Dwellings and Population in 2035 Permitted Scenario Annual L_{den} Contours – Aircraft Ground Noise

Scenario	2035 Permitted			
Contour L_{den} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
45	158	472	158	472
50	26	74	26	74

55	10	32	10	32
60	1	3	1	3
65	0	0	0	0
70	0	0	0	0

14.5.9 In addition to the consideration of residential properties, other potential receptors of high sensitivity have been included in this assessment, specifically schools, residential healthcare facilities and places of worship.

14.5.10 There are no schools, residential healthcare facilities or places of worship above the L_{den} thresholds given in Table 14-4 for the Permitted Scenario.

Noise Modelling L_{night} Metric – Aircraft Ground Noise

14.5.11 Noise contours have been produced for the primary assessment metric of L_{night} using the methodology described in Section 14.3. For the future Assessment Years these are based on forecast aircraft movements.

14.5.12 The results are detailed below and are also presented in replacement Appendix 14C along with the noise contours, and the results for supplementary noise metrics.

14.5.13 The extent of the noise contours is similar to the current environment, although their shape to the north is modified and increased slightly. The extent of the contours is similar in both Assessment Years. These contours can be seen in Figures 14C-6 and 14C-18.

14.5.14 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results of these predictions for the Permitted Scenario in terms of the L_{night} metric are given in Table 14-22.

Table 14-22: Permitted Scenario Aircraft Ground Noise Levels at Representative Locations (L_{night})

Representative Location	Reference No.	Permitted Scenario Aircraft Ground Noise Level, dB (L_{night})	
		2025	*2035*
Ridgewood	GR01	33	33
The Baskins	GR02	25	25
Mayeston Hall	GR03	31	31
St Margret's	GR04	29	29

Note – noise levels rounded to nearest whole number.

14.5.15 For each set of contours, the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and population excluding consented developments, and also including consented developments. The results are given by scenario and contour in Table 14-23 to Table 14-24.

Table 14-23: Number of Dwellings and Population in 2025 Permitted Scenario Annual L_{night} Contours – Aircraft Ground Noise

Scenario	2025 Permitted

Contour L_{night} (dB)	Excluding Consented Developments		Including Consented Developments	
	Dwellings	Population.	Dwellings	Population
40	26	74	26	74
45	9	29	9	29
50	1	3	1	3
55	0	0	0	0
60	0	0	0	0
65	0	0	0	0

Table 14-24: Number of Dwellings and Population in 2035 Permitted Scenario Annual L_{night} Contours – Aircraft Ground Noise

Scenario 2035 Permitted

Contour L_{night} (dB)	Excluding Consented Developments		Including Consented Developments	
	Dwellings	Population.	Dwellings	Population
40	26	74	26	74
45	9	29	9	29
50	1	3	1	3
55	0	0	0	0
60	0	0	0	0
65	0	0	0	0

14.5.16 In addition to the consideration of residential properties, other potential receptors of high sensitivity have been included in this assessment, specifically schools, residential healthcare facilities and places of worship. Of these, only residential healthcare facilities are highly sensitive to noise at night and there are none above the L_{night} thresholds given in Table 14-4 for any of the Permitted Scenario Assessment Years.

Noise Modelling L_{den} Metric – Road Traffic Noise

14.5.17 Noise contours have been produced for the primary assessment metric of L_{den} using the methodology described in Section 14.3. For the future Assessment Years these are based on forecast road traffic flows. The results are detailed below and are also presented in Appendix 14F.

14.5.18 The noise contours for 2025 are shown in Figure 14-6 and those for 2035 in Figure 14-7. The noise contours show that the highest noise levels of 70 dB L_{den} and above are concentrated along the M1 and M50 motorways. Closer to the other roads modelled noise levels are often above 65 dB L_{den} and in almost all areas the noise levels are above 50 dB L_{den}.

Figure 14-6: 2025 L_{den} Road Traffic Noise Contours

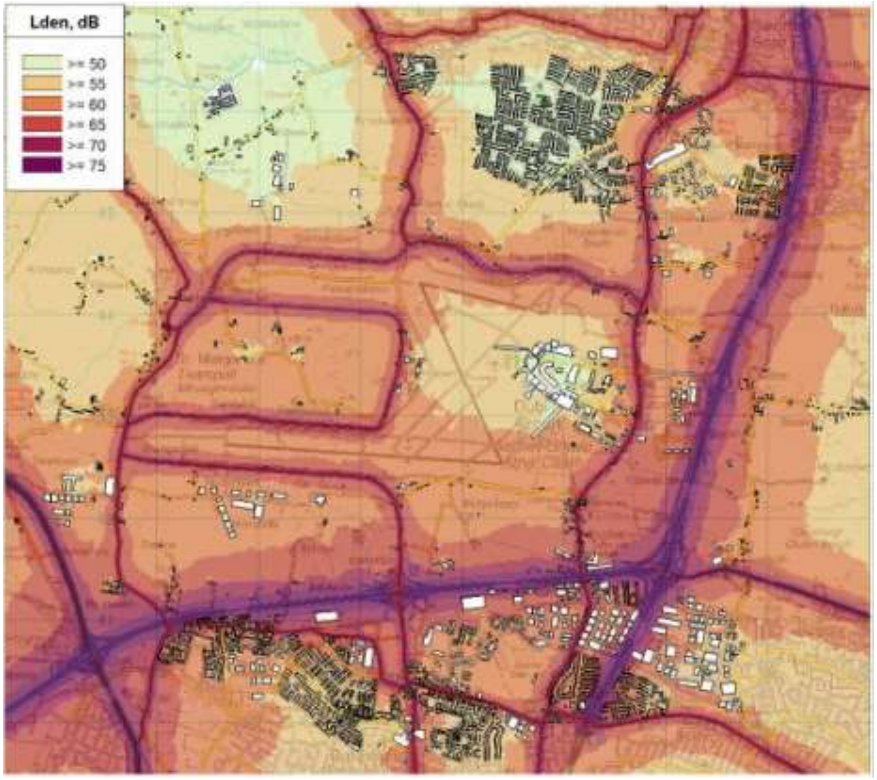
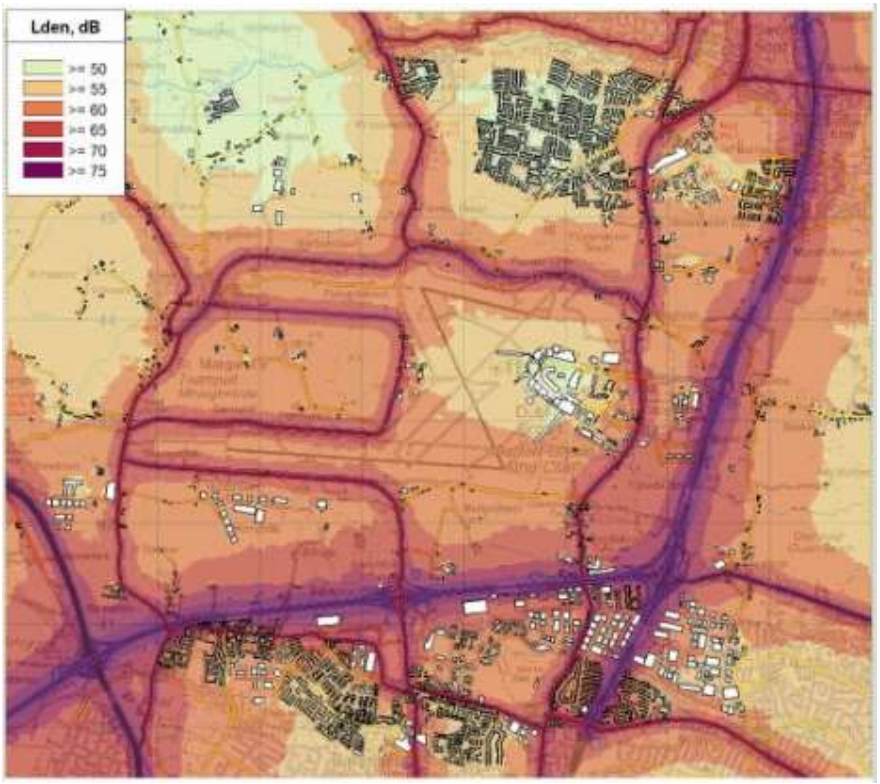


Figure 14-7: 2035 L_{den} Road Traffic Noise Contours



14.5.19 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a

number of representative locations which are shown on Figure 14-3. The results of these predictions for the Permitted Scenario in terms of the L_{den} metric are given in Table 14-25.

Table 14-25: Permitted Scenario Road Traffic Noise Levels at Representative Locations (L_{den})

Representative Location	Reference No.	Permitted Scenario Road Traffic Noise Level, dB (L_{den})	
		2025	*2035*
Ridgewood	GR01	53	54
The Baskins	GR02	60	60
Mayeston Hall	GR03	73	73
St Margret's	GR04	57	58

Note – noise levels rounded to nearest whole number.

14.5.20 For each set of contours, the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and population excluding consented developments, and also including consented developments. The results are given by scenario and contour in Table 14-26 to Table 14-27.

Table 14-26: Number of Dwellings and Population in 2025 Permitted Scenario Annual L_{den} Contours – Road Traffic Noise

Scenario	2025 Permitted			
Contour L_{den} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
45	2,437	7,080	2,618	7,611
50	2,402	6,976	2,565	7,457
55	1,135	3,178	1,298	3,659
60	824	2,225	987	2,706
65	735	1,979	862	2,345
70	631	1,714	727	1,980

Table 14-27: Number of Dwellings and Population in 2035 Permitted Scenario Annual L_{den} Contours – Road Traffic Noise

Scenario	2035 Permitted			
Contour L_{den} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
45	2,437	7,080	2,618	7,611
50	2,437	7,080	2,600	7,561
55	1,252	3,525	1,415	4,006

60	828	2,237	991	2,718
65	746	2,009	873	2,375
70	645	1,751	772	2,117

Noise Modelling L_{night} Metric – Road Traffic Noise

14.5.21 Noise contours have been produced for the primary assessment metric of L_{night} using the methodology described in Section 14.3. For the future Assessment Years these are based on forecast road traffic flows. The results are detailed below and are also presented in Appendix 14F.

14.5.22 The noise contours for 2025 are shown in Figure 14-8 and those for 2035 in Figure 14-9. The noise contours show that the highest noise levels of 65 dB L_{night} and above are concentrated along the M1 and M50 motorways. Closer to the other roads modelled noise levels are often above 55 dB L_{night} and in most areas the noise levels are above 50 dB L_{night}.

Figure 14-8: 2025 L_{night} Road Traffic Noise Contours

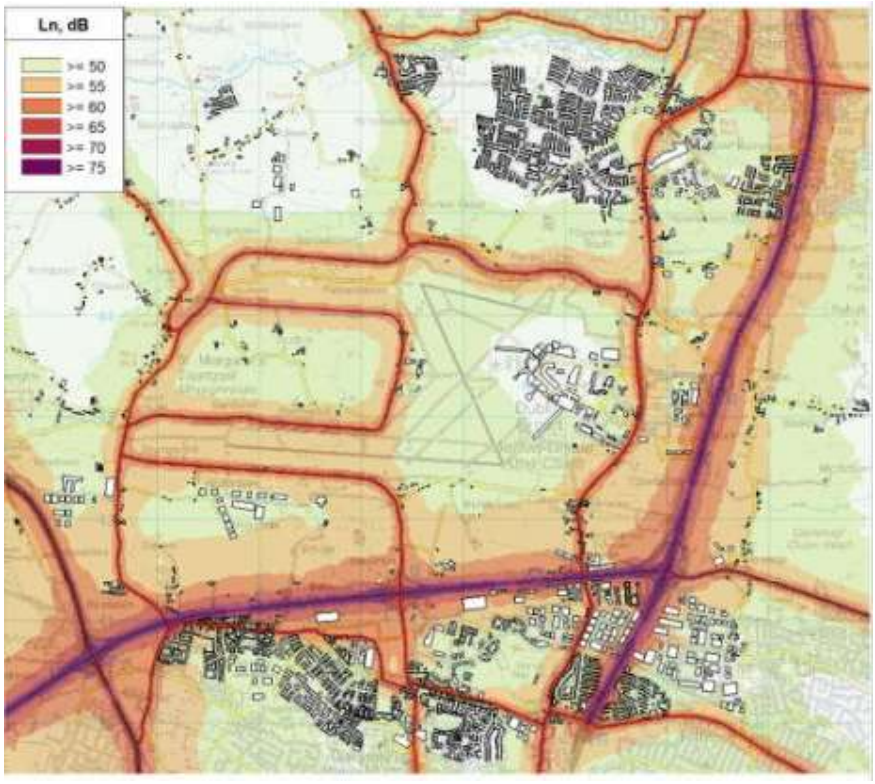
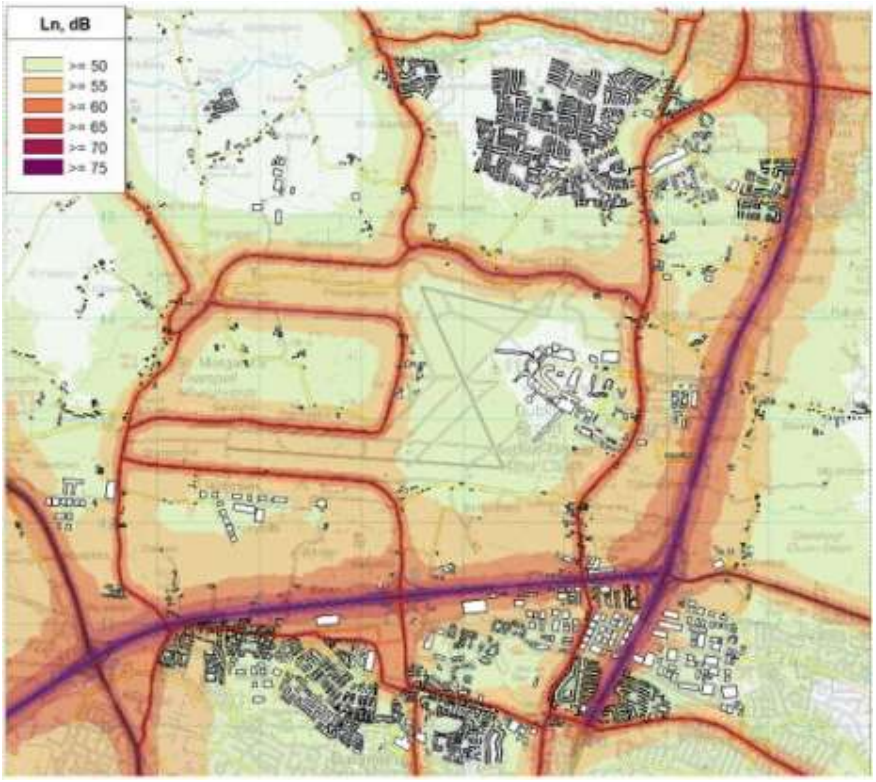


Figure 14-9: 2035 L_{night} Road Traffic Noise Contours



14.5.23 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results of these predictions for the Permitted Scenario in terms of the L_{night} metric are given in Table 14-28.

Table 14-28: Permitted Scenario Road Traffic Noise Levels at Representative Locations (L_{night})

Representative Location	Reference No.	Permitted Scenario Road Traffic Noise Level, dB (L_{night})	
		2025	*2035*
Ridgewood	GR01	46	46
The Baskins	GR02	52	52
Mayeston Hall	GR03	64	65
St Margret's	GR04	50	50

Note – noise levels rounded to nearest whole number.

14.5.24 For each set of contours, the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and population excluding consented developments, and also including consented developments. The results are given by scenario and contour in Table 14-29 to Table 14-30.

Table 14-29: Number of Dwellings and Population in 2025 Permitted Scenario Annual L_{night} Contours – Road Traffic Noise

Scenario	2025 Permitted	
Contour L_{night} (dB)	*Excluding Consented Developments*	*Including Consented Developments*

	Dwellings	*Population.*	*Dwellings*	*Population*
40	2,437	7,080	2,600	7,561
45	1,708	4,888	1,871	5,369
50	867	2,352	1,030	2,833
55	781	2,102	928	2,532
60	676	1,831	803	2,197
65	466	1,252	562	1,518

Table 14-30: Number of Dwellings and Population in 2035 Permitted Scenario Annual L_{night} Contours – Road Traffic Noise

Scenario	2035 Permitted			
Contour L_{night} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
40	2,437	7,080	2,600	7,561
45	1,908	5,487	2,071	5,968
50	876	2,377	1,039	2,858
55	785	2,112	938	2,561
60	684	1,852	811	2,218
65	474	1,274	570	1,540

14.6 Environmental Design and Management

14.6.1 There are a number of measures already in place at Dublin Airport that reduce or mitigate aircraft ground noise effects. These are described in this section.

Reduction of Noise at Source

14.6.2 Over the past 20 years, the models and types of aircraft using Dublin Airport have evolved, and improvements in technology have meant that the typical aircraft using the airport are quieter than they used to be.

14.6.3 The ICAO Noise 'Chapter' rating defines specific air noise performance criteria which aircraft must meet in order to be certificated. Equivalent certification for ground noise does not exist, and therefore it is difficult to predict the noise levels of aircraft which do not currently operate in significant numbers at Dublin Airport but are forecast to do so in the future, such as the Airbus A320neo and Boeing 737 MAX 8.

14.6.4 It is expected that aircraft such as these will be quieter than those they replace when carrying out ground operations, although the improvement is expected to be of a smaller magnitude than for air noise. For this assessment, a conservative assumption has been made that future aircraft perform similarly to those operating today.

14.6.5 The Applicant has begun to incentivise quieter aircraft particularly at night in accordance with Action 1 of the Dublin Airport Noise Action Plan 2019-2023[31]. An initial noise charging consultation was circulated to airlines at the end of November 2020. This consultation outlined a range of questions relating to the implementation of noise charging and the potential methodology. Airline responses were received in mid-February 2021. Discussions continued throughout 2022 on the promotion of quieter aircraft and the appropriate use of metrics and methodology to track performance improvement. Live charging for noise was introduced on 1st July 2022 and applied a rate for night time use only (23:00 – 06:59).

Land Use Planning and Management

Noise Zones

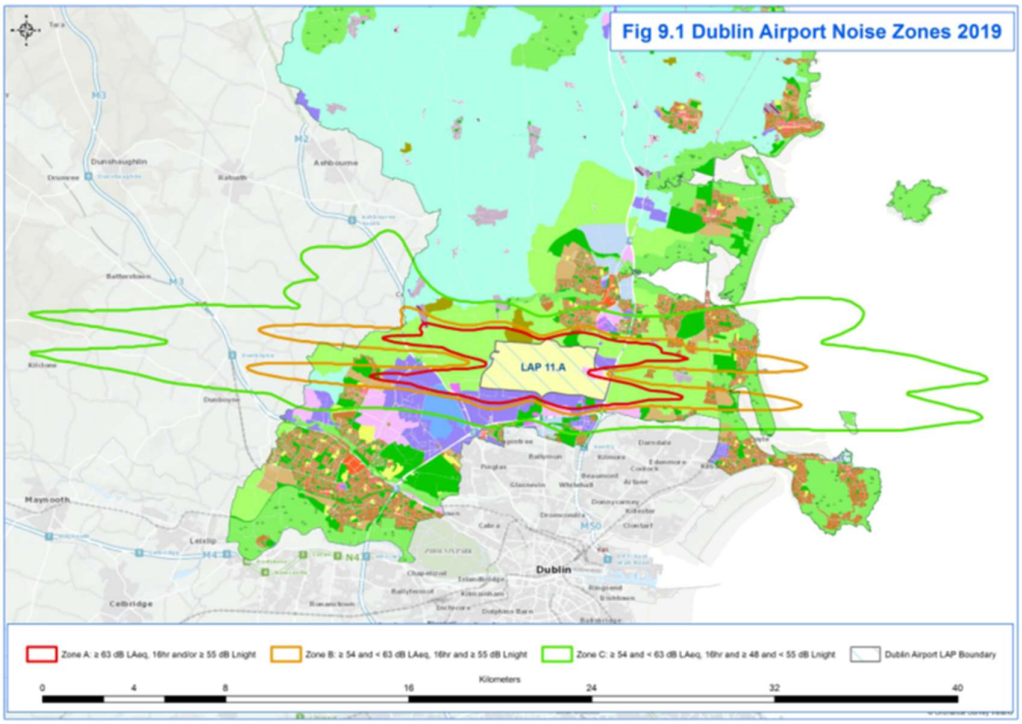
14.6.6 Noise Zones have been in use for a number of years in the Fingal Development Plan. Most recently they were updated in the 2020 Dublin Airport Local Area Plan (LAP). The LAP dedicates an entire Section (section 9.1) to noise. In that section it notes the following:.

"The Dublin Airport LAP is a land use plan for the purposes of effective land-use planning and safeguarding the use of the Airport. Noise zones relating to Dublin Airport have been in place for many years to aid land use planning. Since the publication of previous noise zones in 2005, and over the last decade, further evidence has emerged that has updated understanding of how aircraft noise can affect health and quality of life. With the north runway set to become operational in 2022, updated information is available relating to aircraft noise performance and flight paths. For these reasons, it was considered appropriate to update the noise zones for Dublin Airport to allow for more effective land use planning for development within airport noise zones.

14.6.7 The updated noise zones are set out in Fig. 9.1. Dublin Airport Noise Zones and policies relating to development in Noise Zones are set out in Variation No. 1 to the Fingal Development Plan 2017 - 2023."

14.6.8 This figure is reproduced as Figure 14-10 below.

Figure 14-10: Extract of Figure 9.1 from Dublin Airport Local Area Plan



[31] Fngal County Council Noise Action Plan for Dublin Airport 2019 – 2023 December 2018 https://www.fingal.ie/sites/default/files/2019-04/NAP%20Final.pdf [Checked 21/08/2023]

14.6.9 The actions to restrict inappropriate development in the noise zones are described in the Fingal Development Plan 2017-2023 Variation No. 1, which states:

"Three noise zones are shown in the Development Plan maps, Zones B and C within which the Council will continue to restrict inappropriate development, and Zone A within which new provisions for residential development and other noise sensitive uses will be actively resisted. An additional assessment zone, Zone D is also proposed to identify any larger residential developments in the vicinity of the flight paths serving the Airport in order to promote appropriate land use and to identify encroachment."

14.6.10 Table 7.2 of the Fingal Development Plan 2017-2023 Variation No. 1 is reproduced below for reference as Table 14-31. The table considers two noise metrics, L_{night} which is one of the primary metrics used in this chapter, and $L_{Aeq,16hr}$ which is one of the supplementary noise metrics. Due to the distribution of flights across the day, evening and night periods at larger airports, the noise exposure expressed using the $L_{Aeq,16hr}$ metric is typically 2 dB lower than if it is expressed using the L_{den} metric, the other primary metric used in this chapter.

Table 14-31: Extract from Fingal Development Plan 2017-2023 (Table 7.2)

Zone	Indication of Potential Noise Exposure during Airport Operations	Objective
D	≥ 50 and < 54 dB $L_{Aeq,16hr}$ and ≥ 40 and < 48 dB L_{night}	To identify noise sensitive developments which could potentially be affected by aircraft noise and to identify any larger residential developments in the vicinity of the flight paths serving the Airport in order to promote appropriate land use and to identify encroachment. All noise sensitive development within this zone is likely to be acceptable from a noise perspective. An associated application would not normally be refused on noise grounds, however where the development is residential-led and comprises non-residential noise sensitive uses, or comprises 50 residential units or more, it may be necessary for the applicant to demonstrate that a good acoustic design has been followed. Applicants are advised to seek expert advice.
C	≥ 54 and < 63 dB $L_{Aeq,16hr}$ and ≥ 48 and < 55 dB L_{night}	To manage noise sensitive development in areas where aircraft noise may give rise to annoyance and sleep disturbance, and to ensure, where appropriate, noise insulation is incorporated within the development Noise sensitive development in this zone is less suitable from a noise perspective than in Zone D. A noise assessment must be undertaken in order to demonstrate good acoustic design has been followed. The noise assessment must demonstrate that relevant internal noise guidelines will be met. This may require noise insulation measures. An external amenity area noise assessment must be undertaken where external amenity space is intrinsic to the development's design. This assessment should make specific consideration of the acoustic environment within those spaces as required so that they can be enjoyed as intended. Ideally, noise levels in external amenity spaces should be designed to achieve the lowest practicable noise levels. Applicants are strongly advised to seek expert advice.
B	≥ 54 and < 63 dB $L_{Aeq,16hr}$ and ≥ 55 dB L_{night}	To manage noise sensitive development in areas where aircraft noise may give rise to annoyance and sleep disturbance, and to ensure noise insulation is incorporated within the development. Noise sensitive development in this zone is less suitable from a noise perspective than in Zone C. A noise assessment must be undertaken in order to demonstrate good acoustic design has been followed. Appropriate well-designed noise insulation measures must be incorporated into the development in order to meet relevant internal noise guidelines. An external amenity area noise assessment must be undertaken where external amenity space is intrinsic to the developments design. This assessment should make specific consideration of the acoustic environment within those spaces as required so that they can be enjoyed as intended. Ideally, noise levels in external amenity spaces should be designed to achieve the lowest practicable noise levels.

		Applicants must seek expert advice.
A	≥ 63 dB $L_{Aeq,16hr}$ and/or ≥ 55 dB L_{night}	To resist new provision for residential development and other noise sensitive uses. All noise sensitive developments within this zone may potentially be exposed to high levels of aircraft noise, which may be harmful to health or otherwise unacceptable. The provision of new noise sensitive developments will be resisted

Notes:

- 'Good acoustic design' means following the principles of assessment and design as described in ProPG: 'Planning & Noise – New Residential Development', May 2017;
- Internal and external amenity and the design of noise insulation measures should follow the guidance provided in British Standard BS8233:2014 'Guidance on sound insulation and noise reduction for buildings'

Residential Sound Insulation Schemes

14.6.11 Dublin Airport operates sound insulation schemes for dwellings and schools based on the level of air noise they are exposed to. Although not based on the aircraft ground noise or road traffic noise levels, many of the properties with the highest ground noise levels are eligible for insulation works through these existing schemes which are described in replacement *Chapter 13: Aircraft Noise and Vibration*.

Operational Procedures

14.6.12 Dublin Airport have in place a range of operational procedures which serve to minimise aircraft ground noise. These include:

- Engine test runs are only permitted at certain times, to minimise aircraft ground noise.
- The engine test site which was located at the northern end of the airfield has been relocated to the centre of the airfield, away from populated neighbouring areas.
- Fixed Electrical Ground Power (FEGP) is a ground power system that allows aircraft to plug directly into a fixed, electrical power source while they are parked on the airfield. This has noise (and other environmental) benefits when compared to aircraft using Auxiliary Power Units (APUs) or engine-driven Ground Power Units (GPUs). FEGP is available at a large number of stands at Dublin Airport, and aircraft are required to use it where available, in preference to APUs or GPUs.

Operating Restrictions

14.6.13 In addition to the mitigation measures already in place at Dublin Airport, as part of this application the Applicant is proposing to adopt the mitigation measures and controls as follows:

- An Annual Noise Quota (ANQ) system to replace the limit of 65 flights per night,
- A preferential runway use system at night with activity on the North Runway limited to a total of two hours.

14.7 Assessment of Effects and Significance

Effects During Operation with Proposed Relevant Action

2025 Proposed Scenario L_{den} Metric – Aircraft Ground Noise

14.7.1 Noise contours have been produced for the primary assessment metric of L_{den} using the methodology described in Section 14.3. For the 2025 Proposed Scenario these are based on forecast aircraft movements.

14.7.2 Replacement Appendix 14C presents the resulting noise contours for each scenario. The noise contours representing a high impact, 65 dB L_{den}, do not extend further than the airport site except at Portmellick and as a result contain no noise-sensitive receptors in the 2025 Proposed Scenario or the 2025 Permitted Scenario.

14.7.3 The 2025 Proposed Scenario noise contours representing a medium impact, 55 dB L_{den}, and a low impact, 50 dB L_{den}, extend slightly farther in all directions compared to the 2025 Permitted Scenario. These contours can be seen in Figure 14C-21.

14.7.4 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results of these predictions for the 2025 Proposed Scenario in terms of the L_{den} metric are given in Table 14-32, where they are compared with the 2025 Permitted Scenario.

Table 14-32: 2025 Proposed Scenario Aircraft Ground Noise Levels at Representative Locations (L_{den})

Representative Location	Reference No.	Aircraft Ground Noise Level, dB (L_{den})	
		2025 Proposed Scenario	*Difference to 2025 Permitted Scenario*
Ridgewood	GR01	46	+2
The Baskins	GR02	36	+1
Mayeston Hall	GR03	42	+2
St Margret's	GR04	40	+2

Note – values rounded to nearest whole number. Differences based on unrounded values.

14.7.5 L_{den} noise levels at representative locations close to the airport site in all directions are forecast to increase by around 1 to 2 dB(A) compared to the 2025 Permitted Scenario.

14.7.6 For the 2025 Proposed Scenario L_{den} contours the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and population excluding consented developments, and also including consented developments. The results are given by contour in Table 14-33.

Table 14-33: Number of Dwellings and Population in 2025 Proposed Scenario L_{den} Contours – Aircraft Ground Noise

Scenario	2025 Proposed Scenario			
Contour L_{den} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
45	519	1,541	519	1,541

50	33	91	33	91
55	17	51	17	51
60	1	3	1	3
65	0	0	0	0
70	0	0	0	0

14.7.7 Comparing the 2025 Proposed Scenario with the 2025 Permitted Scenario, the number of people exposed to at least a low level of aircraft ground noise (i.e. 50 dB L_{den} or above) is forecast to increase from 74 to 91 excluding consented developments. The number of people exposed to at least a high level of aircraft ground noise (i.e. 65 dB L_{den} or above) is not forecast to change.

14.7.8 It is also important to consider the change in noise level when assessing the differences between the scenarios. Section 14.3, and specifically Table 14-3, set out the method for interpreting the absolute noise level and change in noise level into a magnitude of effect. The 2025 Proposed Scenario is compared with the 2025 Permitted Scenario in Table 14-34. This includes all people in existing dwellings who are within the study area and are exposed to at least 45 dB L_{den} in at least one of the scenarios. People who are exposed to negligible absolute noise levels in both scenarios or are outside the study area are assessed as not being subject to significant effects and so have not been included.

Table 14-34: Aircraft Ground Noise (L_{den}) Number of People by Magnitude of Effect – 2025 Proposed Scenario vs 2025 Permitted Scenario

Magnitude of effect	No. people with Beneficial Effect	No. people with Adverse Effect
Imperceptible	0	1,447
Not Significant	0	38
Slight	0	53
Moderate	0	3
Significant	0	0
Very Significant	0	0
Profound	0	0

14.7.9 Going from the 2025 Permitted Scenario to the 2025 Proposed Scenario, no people are assessed as having a significant effect, either beneficial or adverse.

14.7.10 In addition to the consideration of residential properties, other potential receptors of high sensitivity have been included in this assessment, specifically schools, residential healthcare facilities and places of worship.

14.7.11 There are no schools, residential healthcare facilities or places of worship above the L_{den} thresholds given in Table 14-4 for the 2025 Proposed Scenario or the 2025 Permitted Scenario.

2025 Proposed Scenario L_{night} Metric – Aircraft Ground Noise

14.7.12 Noise contours have been produced for the primary assessment metric of L_{night} using the methodology described in Section 14.3. For the 2025 Proposed Scenario these are based on forecast aircraft movements.

14.7.13 Replacement Appendix 14C presents the resulting noise contours for each scenario. The noise contours representing a high impact, 55 dB L_{night}, do not extend farther than the airport site except at Portmellick where there is a single dwelling in the 2025 Proposed Scenario.

14.7.14 The 2025 Proposed Scenario noise contours representing a medium impact, 50 dB L_{night}, and a low impact, 45 dB L_{night}, extend farther in all directions compared to the 2025 Permitted Scenario. These contours can be seen in Figure 14C-22.

14.7.15 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results of these predictions for the 2025 Proposed Scenario in terms of the L_{night} metric are given in Table 14-35, where they are compared with the 2025 Permitted Scenario.

Table 14-35: 2025 Proposed Scenario Noise Levels at Representative Locations (L_{night})

Representative Location	Reference No.	Aircraft Ground Noise Level, dB (L_{night})	
		2025 Proposed Scenario	*Difference to 2025 Permitted Scenario*
Ridgewood	GR01	38	+5
The Baskins	GR02	29	+3
Mayeston Hall	GR03	34	+3
St Margret's	GR04	32	+3

Note – values rounded to nearest whole number. Differences based on unrounded values.

14.7.16 L_{night} noise levels at representative locations close to the north of the airport site, for example Ridgewood, are forecast to increase by around 5 dB(A) compared to the 2025 Permitted Scenario. Noise levels at other representative locations are forecast to increase by 3 dB(A).

14.7.17 For the 2025 Proposed Scenario L_{night} contours the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and population excluding consented developments, and also including consented developments. The results are given by contour in Table 14-36.

Table 14-36: Number of Dwellings and Population in 2025 Proposed Scenario L_{night} Contours

Scenario	2025 Proposed Scenario			
Contour L_{night} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
40	51	133	51	133
45	20	57	20	57
50	7	22	7	22
55	1	3	1	3

60	0	0	0	0
65	0	0	0	0

14.7.18 Comparing the 2025 Proposed Scenario with the 2025 Permitted Scenario, the number of people exposed to at least a low level of aircraft ground noise (i.e. 45 dB L_{night} or above) is forecast to increase from 29 to 57. The number of people exposed to at least a high level of aircraft ground noise (i.e. 55 dB L_{night} or above) is forecast to increase from 0 to 3.

14.7.19 It is also important to consider the change in noise level when assessing the differences between the scenarios. Section 14.3, and specifically Table 14-3, set out the method for interpreting the absolute noise level and change in noise level into a magnitude of effect. The 2025 Proposed Scenario is compared with the 2025 Permitted Scenario in Table 14-37. This table includes all people in existing dwellings who are within the study area and are exposed to at least 40 dB L_{night} in at least one of the scenarios. People who are exposed to negligible absolute noise levels in both scenarios or are outside the study area are assessed as not being subject to significant effects and so have not been included.

Table 14-37: Aircraft Ground Noise (L_{night}) Number of People by Magnitude of Effect – 2025 Proposed Scenario vs 2025 Permitted Scenario

Magnitude of effect	No. people with Beneficial Effect	No. people with Adverse Effect
Imperceptible	0	0
Not Significant	0	10
Slight	0	44
Moderate	0	29
Significant	0	6
Very Significant	0	0
Profound	0	0

14.7.20 Going from the 2025 Permitted Scenario to the 2025 Proposed Scenario, no people are assessed as having a significant beneficial effect, and 6 people are assessed as having a significant adverse effect. No people are assessed as having the highest effect levels, i.e. very significant and profound.

14.7.21 In addition to the consideration of residential properties, other potential receptors of high sensitivity have been included in this assessment, specifically schools, residential healthcare facilities and places of worship. Of these, only residential healthcare facilities are highly sensitive to noise at night. There are no residential healthcare facilities above the L_{night} thresholds given in Table 14-4 for the 2025 Proposed Scenario or the 2025 Permitted Scenario.

2035 Proposed Scenario L_{den} Metric – Aircraft Ground Noise

14.7.22 Noise contours have been produced for the primary assessment metric of L_{den} using the methodology described in Section 14.3. For the 2035 Proposed Scenario these are based on forecast aircraft movements.

14.7.23 Replacement Appendix 14C presents the resulting noise contours for each scenario. The noise contours representing a high impact, 65 dB L_{den}, do not extend further than the airport site except at Portmellick and as a result contain no noise-sensitive receptors in the 2035 Proposed Scenario or the 2035 Permitted Scenario.

14.7.24 The 2035 Proposed Scenario noise contours representing a medium impact, 55 dB L_{den}, and a low impact, 50 dB L_{den}, extend slightly further in all directions compared to the 2035 Permitted Scenario. These contours can be seen in Figure 14C-33.

14.7.25 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results of these predictions for the 2035 Proposed Scenario in terms of the L_{den} metric are given in Table 14-38, where they are compared with the 2035 Permitted Scenario.

Table 14-38: 2035 Proposed Scenario Aircraft Ground Noise Levels at Representative Locations (L_{den})

Representative Location	Reference No.	Aircraft Ground Noise Level, dB (L_{den})	
		2035 Proposed Scenario	*Difference to 2035 Permitted Scenario*
Ridgewood	GR01	47	+2
The Baskins	GR02	36	+1
Mayeston Hall	GR03	42	+2
St Margret's	GR04	40	+2

Note – values rounded to nearest whole number. Differences based on unrounded values.

14.7.26 L_{den} noise levels at representative locations close to the airport site in all directions are forecast to increase by around 1 to 2 dB(A) when compared to the 2035 Permitted Scenario.

14.7.27 For the 2035 Permitted Scenario L_{den} contours the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and population excluding consented developments, and also including consented developments. The results are given by contour in Table 14-39.

Table 14-39: Number of Dwellings and Population in 2035 Proposed Scenario L_{den} Contours – Aircraft Ground Noise

Scenario	2035 Proposed Scenario			
Contour L_{den} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
45	532	1,583	532	1,583
50	33	91	33	91
55	17	51	17	51
60	1	3	1	3
65	0	0	0	0
70	0	0	0	0

14.7.28 Comparing the 2035 Proposed Scenario with the 2035 Permitted Scenario, the number of people exposed to at least a low level of aircraft ground noise (i.e. 50 dB L_{den} or above) is forecast to increase from 26 to 33. The number of people exposed to at least a high level of aircraft ground noise (i.e. 65 dB L_{den} or above) is not forecast to change.

14.7.29 It is also important to consider the change in noise level when assessing the differences between the scenarios. Section 14.3, and specifically Table 14-3, set out the method for interpreting the absolute noise level and change in noise level into a magnitude of effect. The 2035 Proposed Scenario is compared with the 2035 Permitted Scenario in Table 14-40. This includes all people in existing dwellings who are within the study area and are exposed to at least 45 dB L_{den} in at least one of the scenarios. People who are exposed to negligible absolute noise levels in both scenarios or are outside the study area are assessed as not being subject to significant effects and so have not been included.

Table 14-40: Aircraft Ground Noise (L_{den}) Number of People by Magnitude of Effect – 2035 Proposed Scenario vs 2035 Permitted Scenario

Magnitude of effect	No. people with Beneficial Effect	No. people with Adverse Effect
Imperceptible	0	1,490
Not Significant	0	40
Slight	0	50
Moderate	0	3
Significant	0	0
Very Significant	0	0
Profound	0	0

14.7.30 Going from the 2035 Permitted Scenario to the 2035 Proposed Scenario, no people are assessed as having a significant effect, either beneficial or adverse.

14.7.31 In addition to the consideration of residential properties, other potential receptors of high sensitivity have been included in this assessment, specifically schools, residential healthcare facilities and places of worship.

14.7.32 There are no schools, residential healthcare facilities or places of worship above the L_{den} thresholds given in Table 14-4 for the 2035 Proposed Scenario or the 2035 Permitted Scenario.

2035 Proposed Scenario L_{night} Metric – Aircraft Ground Noise

14.7.33 Noise contours have been produced for the primary assessment metric of L_{night} using the methodology described in Section 14.3. For the 2035 Proposed Scenario these are based on forecast aircraft movements.

14.7.34 Replacement Appendix 14C presents the resulting noise contours for each scenario. The noise contours representing a high impact, 55 dB L_{night}, do not extend farther than the airport site except at Portmellick where there is a single dwelling in the 2035 Proposed Scenario.

14.7.35 The 2035 Proposed Scenario noise contours representing a medium impact, 50 dB L_{night}, and a low impact, 45 dB L_{night}, extend further in all directions compared to the 2035 Permitted Scenario. These contours can be seen in Figure 14C-34.

14.7.36 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results of these predictions for the 2035 Proposed Scenario in terms of the L_{night} metric are given in Table 14-41, where they are compared with the 2035 Permitted Scenario.

Table 14-41: 2035 Proposed Scenario Aircraft Ground Noise Levels at Representative Locations (L_{night})

Representative Location	Reference No.	Aircraft Ground Noise Level, dB (L_{night})	
		2035 Proposed Scenario	*Difference to 2035 Permitted Scenario*
Ridgewood	GR01	38	+5
The Baskins	GR02	29	+3
Mayeston Hall	GR03	34	+3
St Margret's	GR04	32	+3

Note – values rounded to nearest whole number. Differences based on unrounded values.

14.7.37 L_{night} noise levels at representative locations close to the north of the airport site, for example Ridgewood, are forecast to increase by around 5 dB(A) compared to the 2035 Permitted Scenario. Noise levels at representative locations in other location are forecast to increase by 3 dB(A).

14.7.38 For the 2035 Proposed Scenario L_{night} contours the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and population excluding consented developments, and also including consented developments. The results are given by contour in Table 14-42.

Table 14-42: Number of Dwellings and Population in 2035 Proposed Scenario L_{night} Contours – Aircraft Ground Noise

Scenario	2035 Proposed Scenario			
Contour L_{night} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
40	51	133	51	133
45	20	57	20	57
50	7	22	7	22
55	1	3	1	3
60	0	0	0	0
65	0	0	0	0

14.7.39 Comparing the 2035 Proposed Scenario with the 2035 Permitted Scenario, the number of people exposed to at least a low level of aircraft ground noise (i.e. 45 dB L_{night} or above) is forecast to increase from 29 to 57. The number of people exposed to at least a high level of aircraft ground noise (i.e. 55 dB L_{night} or above) is forecast to increase from 0 to 3.

14.7.40 It is also important to consider the change in noise level when assessing the differences between the scenarios. Section 14.3, and specifically Table 14-3, set out the method for interpreting the absolute noise level and change in noise level into a magnitude of effect. The 2035 Proposed Scenario is compared with the 2035 Permitted Scenario in Table 14-43. This table includes all people in existing dwellings who are within the study area and are exposed to at least 40 dB L_{night} in at least one of the scenarios. People who are exposed to negligible absolute noise levels in both scenarios or are outside the study area are assessed as not being subject to significant effects and so have not been included.

Table 14-43: Aircraft Ground Noise (L_{night}) Number of People by Magnitude of Effect – 2035 Proposed Scenario vs 2035 Permitted Scenario

Magnitude of effect	No. people with Beneficial Effect	No. people with Adverse Effect
Imperceptible	0	0
Not Significant	0	31
Slight	0	43
Moderate	0	24
Significant	0	35
Very Significant	0	0
Profound	0	0

14.7.41 Going from the 2035 Permitted Scenario to the 2035 Proposed Scenario, no people are assessed as having a significant beneficial effect, and 35 people are assessed as having a significant adverse effect. No people are assessed as having the highest effect levels, i.e. very significant and profound.

14.7.42 In addition to the consideration of residential properties, other potential receptors of high sensitivity have been included in this assessment, specifically schools, residential healthcare facilities and places of worship. Of these, only residential healthcare facilities are highly sensitive to noise at night. There are no residential healthcare facilities above the L_{night} thresholds given in Table 14-4 for the 2035 Proposed Scenario or the 2035 Permitted Scenario.

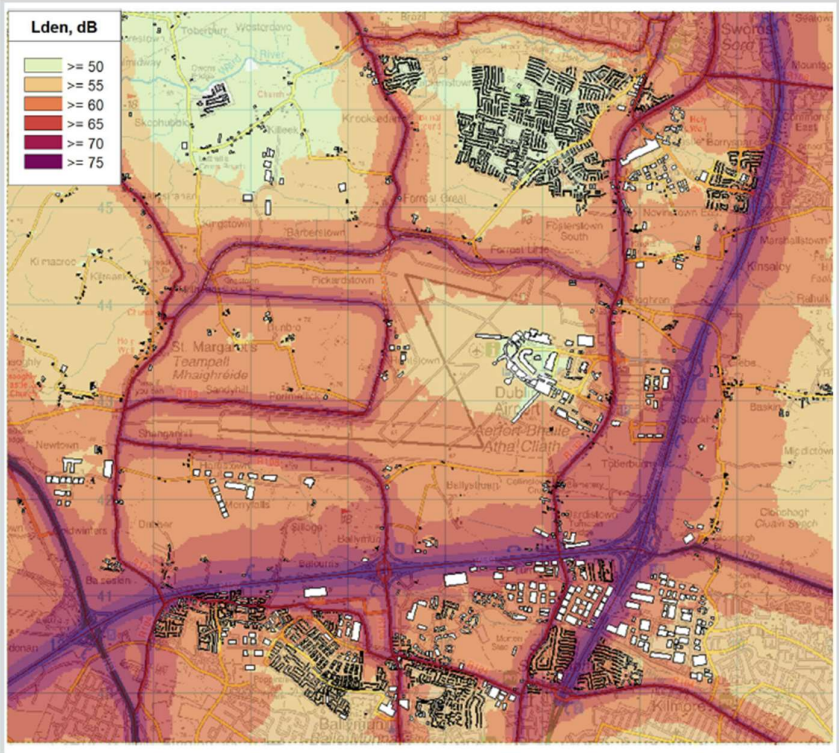
Effects During Operation with Proposed Relevant Action

2025 Proposed Scenario L_{den} Metric – Road Traffic Noise

14.7.43 Noise contours have been produced for the primary assessment metric of L_{den} using the methodology described in Section 14.3. For the 2025 Proposed Scenario these are based on forecast road traffic flows. The results are detailed below and are also presented in Appendix 14F.

14.7.44 The noise contours for 2025 are shown in Figure 14-11.

Figure 14-11: 2025 L_{den} Road Traffic Noise Contours



14.7.45 The noise contours show that the highest noise level of 70 dB L_{den} and above are concentrated along the M1 and M50 motorways. Closer to the other roads modelled noise levels are often above 65 dB L_{den} and in almost all areas the noise levels are above 50 dB L_{den}.

14.7.46 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results of these predictions for the 2025 Proposed Scenario in terms of the L_{den} metric are given in Table 14-44, where they are compared with the 2025 Permitted Scenario.

Table 14-44: 2025 Proposed Scenario Road Traffic Noise Levels at Representative Locations (L_{den})

Representative Location	Reference No.	Road Traffic Noise Level, dB (L_{den})	
		2025 Proposed Scenario	*Difference to 2025 Permitted Scenario*
Ridgewood	GR01	53	+0
The Baskins	GR02	60	+0
Mayeston Hall	GR03	73	+0
St Margret's	GR04	58	+0

Note – values rounded to nearest whole number. Differences based on unrounded values.

14.7.47 L_{den} noise levels at the receptors are not forecast to increase compared to the 2025 Permitted Scenario when rounded to the nearest whole number. The changes that do arise are illustrated in Appendix 14F and are under 0.5 dB(A).

14.7.48 For the 2025 Proposed Scenario L_{den} contours the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and

population excluding consented developments, and also including consented developments. The results are given by contour in Table 14-45.

Table 14-45: Number of Dwellings and Population in 2025 Proposed Scenario L_{den} Contours – Road Traffic Noise

Scenario	2025 Proposed Scenario			
Contour L_{den} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
45	2,437	7,080	2,618	7,611
50	2,402	6,976	2,565	7,457
55	1,147	3,212	1,310	3,693
60	824	2,225	987	2,706
65	735	1,979	862	2,345
70	631	1,714	727	1,980

14.7.49 The number of people assessed to be highly annoyed by road traffic noise in the 2025 Proposed Scenario is given in Table 14-46, where it is compared with the 2025 Permitted Scenario.

Table 14-46: Number of People Highly Annoyed by Road Traffic Noise – 2025 Proposed vs 2025 Permitted

Scenario	No. People Highly Annoyed by Road Traffic Noise	
	Excluding Consented Developments	Including Consented Developments
2025 Proposed	1240	1399
2025 Permitted	1237	1394

14.7.50 Comparing the 2025 Proposed scenario with the 2025 Permitted Scenario, the number of people exposed to road traffic noise is forecast to remain almost constant, for all contour levels.

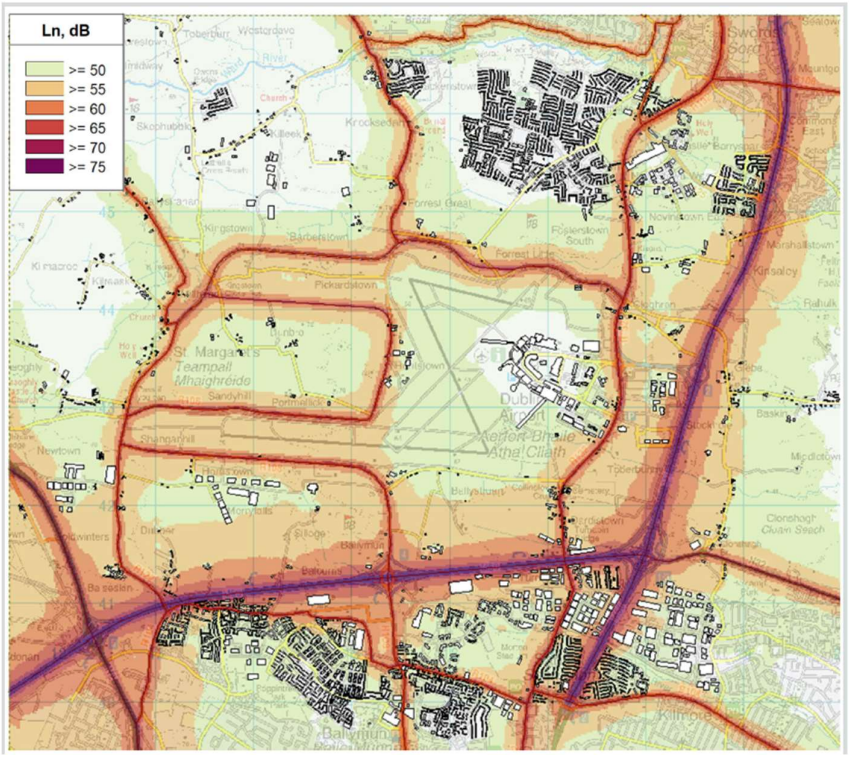
14.7.51 It is important to consider the change in noise level when assessing the differences between the scenarios. Going from the 2025 Permitted Scenario to the 2025 Proposed Scenario, the changes that do arise are under 0.5 dB(A). Consequently, no people are assessed as having a significant effect, either beneficial or adverse.

2025 Proposed Scenario L_{night} Metric – Road Traffic Noise

14.7.52 Noise contours have been produced for the primary assessment metric of L_{night} using the methodology described in Section 14.3. For the 2025 Proposed Scenario these are based on forecast road traffic flows. The results are detailed below and are also presented in Appendix 14F.

14.7.53 The noise contours for 2025 are shown in Figure 14-12.

Figure 14-12: 2025 L_{night} Road Traffic Noise Contours



14.7.54 The noise contours show that the highest noise level of 65 dB L_{night} and above are concentrated along the M1 and M50 motorways. Closer to the other roads modelled noise levels are often above 55 dB L_{night} and in most areas the noise levels are above 50 dB L_{night}.

14.7.55 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results of these predictions for the 2025 Proposed Scenario in terms of the L_{night} metric are given in Table 14-47, where they are compared with the 2025 Permitted Scenario.

Table 14-47: 2025 Proposed Scenario Road Traffic Noise Levels at Representative Locations (L_{night})

Representative Location	Reference No.	Road Traffic Noise Level, dB (L_{night})	
		2025 Proposed Scenario	*Difference to 2025 Permitted Scenario*
Ridgewood	GR01	46	+0
The Baskins	GR02	52	+0
Mayeston Hall	GR03	64	+0
St Margret's	GR04	50	+0

Note – values rounded to nearest whole number. Differences based on unrounded values.

14.7.56 L_{night} noise levels at receptors at the receptors are not forecast to increase compared to the 2025 Permitted Scenario when rounded to the nearest whole number. The changes that do arise are illustrated in Appendix 14F and are under 0.5 dB(A).

14.7.57 For the 2025 Proposed Scenario L_{night} contours the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and

population excluding consented developments, and also including consented developments. The results are given by contour in Table 14-48.

Table 14-48: Number of Dwellings and Population in 2025 Proposed Scenario L_{night} Contours – Road Traffic Noise

Scenario	2025 Proposed Scenario			
Contour L_{night} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
40	2,437	7,080	2,600	7,561
45	1,731	4,960	1,894	5,441
50	869	2,355	1,032	2,836
55	783	2,107	930	2,537
60	682	1,847	809	2,213
65	466	1,252	562	1,518

14.7.58 The number of people assessed to be highly sleep disturbed by road traffic noise in the 2025 Proposed Scenario is given in Table 14-49, where it is compared with the 2025 Permitted Scenario.

Table 14-49: Number of People Highly Sleep Disturbed by Road Traffic Noise – 2025 Proposed vs 2025 Permitted

Scenario	No. People Highly Sleep Disturbed by Road Traffic Noise	
	Excluding Consented Developments	Including Consented Developments
2025 Proposed	362	417
2025 Permitted	357	411

14.7.59 Comparing 2025 Proposed Scenario with the 2025 Permitted scenario, the number of people exposed to road traffic noise is forecast to remain almost constant, for all contour levels.

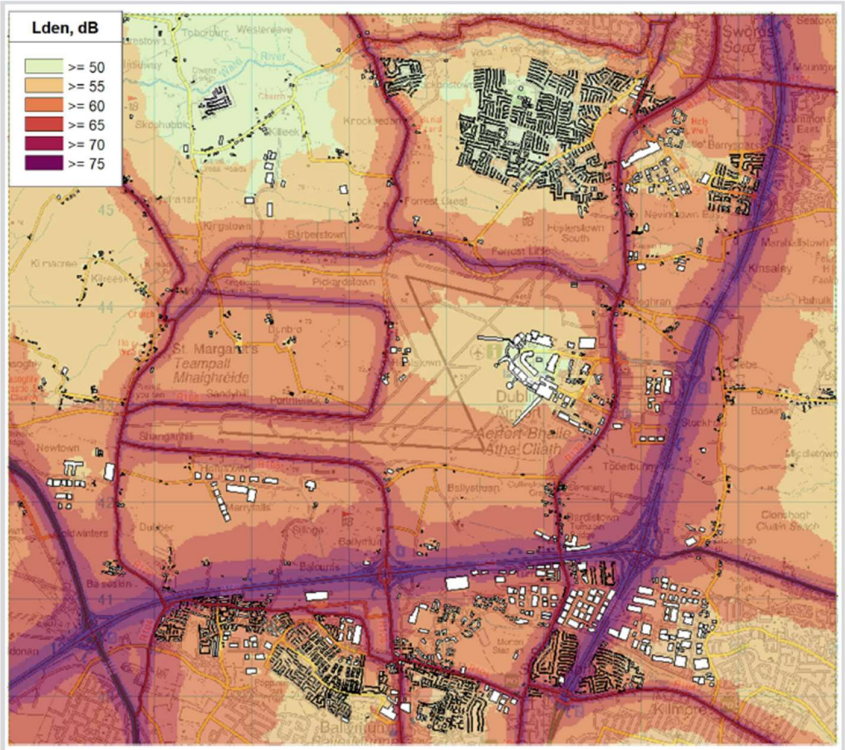
14.7.60 It is important to consider the change in noise level when assessing the differences between the scenarios. Going from the 2025 Permitted Scenario to the 2025 Proposed Scenario, the changes that do arise are under 0.5 dB(A). Consequently, no people are assessed as having a significant effect, either beneficial or adverse.

2035 Proposed Scenario L_{den} Metric – Road Traffic Noise

14.7.61 Noise contours have been produced for the primary assessment metric of L_{den} using the methodology described in Section 14.3. For the 2035 Proposed Scenario these are based on forecast road traffic flows. The results are detailed below and are also presented in Appendix 14F.

14.7.62 The noise contours for 2035 are shown in Figure 14-13.

Figure 14-13: 2035 L_{den} Road Traffic Noise Contours



14.7.63 The noise contours show that the highest noise level of 70 dB L_{den} and above are concentrated along the M1 and M50 motorways. Closer to the other roads modelled noise levels are often above 65 dB L_{den} and in almost all areas the noise levels are above 50 dB L_{den}.

14.7.64 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results of these predictions for the 2035 Proposed Scenario in terms of the L_{den} metric are given in Table 14-50, where they are compared with the 2035 Permitted Scenario.

Table 14-50: 2035 Proposed Scenario Road Traffic Noise Levels at Representative Locations (L_{den})

Representative Location	Reference No.	Road Traffic Noise Level, dB (L_{den})	
		2035 Proposed Scenario	*Difference to 2035 Permitted Scenario*
Ridgewood	GR01	54	+0
The Baskins	GR02	60	+0
Mayeston Hall	GR03	73	+0
St Margret's	GR04	58	+0

Note – values rounded to nearest whole number. Differences based on unrounded values.

14.7.65 L_{den} noise levels at receptors not forecast to increase compared to the 2035 Permitted Scenario when rounded to the nearest whole number. The changes that do arise are illustrated in Appendix 14F and are under 0.5 dB(A).

14.7.66 For the 2035 Permitted Scenario L_{den} contours the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and

population excluding consented developments, and also including consented developments. The results are given by contour in Table 14-51.

Table 14-51: Number of Dwellings and Population in 2035 Proposed Scenario L_{den} Contours – Road Traffic Noise

Scenario	2035 Proposed Scenario			
Contour L_{den} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
45	2,437	7,080	2,618	7,611
50	2,437	7,080	2,600	7,561
55	1,257	3,538	1,420	4,019
60	828	2,237	991	2,718
65	746	2,009	873	2,375
70	645	1,751	772	2,117

14.7.67 The number of people assessed to be highly annoyed by road traffic noise in the 2035 Proposed Scenario is given in Table 14-52, where it is compared with the 2035 Permitted Scenario.

Table 14-52: Number of People Highly Annoyed by Road Traffic Noise – 2035 Proposed vs 2035 Permitted

Scenario	No. People Highly Annoyed by Road Traffic Noise	
	Excluding Consented Developments	Including Consented Developments
2035 Proposed	1275	1437
2035 Permitted	1274	1436

14.7.68 Comparing the 2035 Proposed scenario with the 2035 Permitted Scenario, the number of people exposed to road traffic noise is forecast to remain almost constant, for all contour levels.

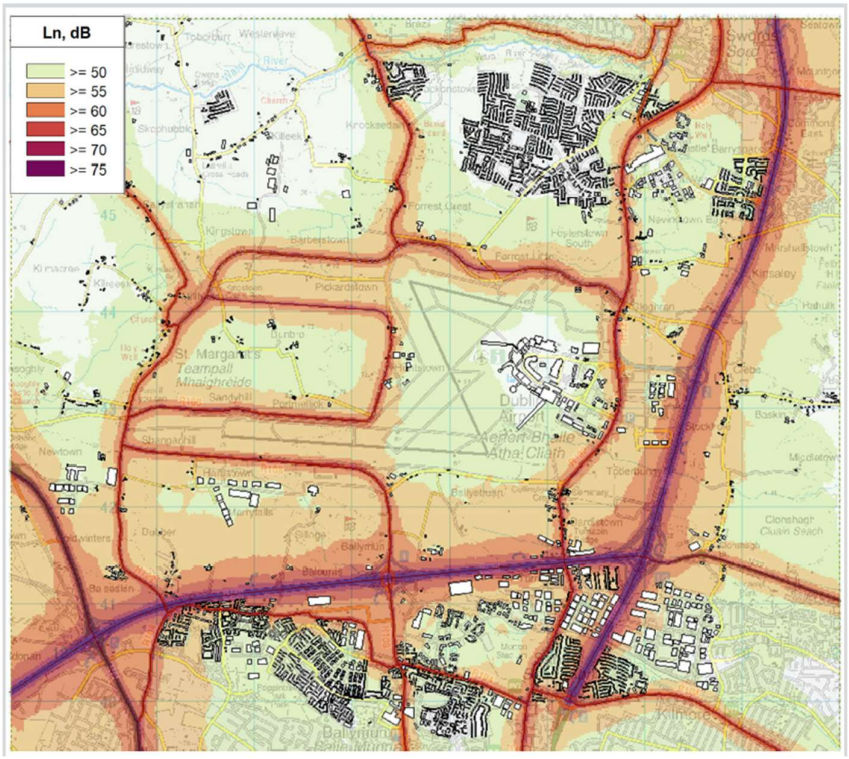
14.7.69 It is important to consider the change in noise level when assessing the differences between the scenarios. Going from the 2035 Permitted Scenario to the 2035 Proposed Scenario, the changes that do arise are under 0.5 dB(A). Consequently, no people are assessed as having a significant effect, either beneficial or adverse.

2035 Proposed Scenario L_{night} Metric – Road Traffic Noise

14.7.70 Noise contours have been produced for the primary assessment metric of L_{night} using the methodology described in Section 14.3. For the 2035 Proposed Scenario these are based on forecast road traffic flows. The results are detailed below and are also presented in Appendix 14F.

14.7.71 The noise contours for 2035 are shown in Figure 14-14.

Figure 14-14: 2035 L_{night} Road Traffic Noise Contours



14.7.72 The noise contours show that the highest noise level of 65 dB L_{night} and above are concentrated along the M1 and M50 motorways. Closer to the other roads modelled noise levels are often above 55 dB L_{night} and in most areas the noise levels are above 50 dB L_{night}.

14.7.73 To provide further information on changes in the noise environment for specific communities, the methodology described in Section 14.3 has also been used to make predictions of the noise levels at a number of representative locations which are shown on Figure 14-3. The results of these predictions for the 2035 Proposed Scenario in terms of the L_{night} metric are given in Table 14-53, where they are compared with the 2035 Permitted Scenario.

Table 14-53: 2035 Proposed Scenario Road Traffic Noise Levels at Representative Locations (L_{night})

Representative Location	Reference No.	Road Traffic Noise Level, dB (L_{night})	
		2035 Proposed Scenario	*Difference to 2035 Permitted Scenario*
Ridgewood	GR01	46	+0
The Baskins	GR02	52	+0
Mayeston Hall	GR03	65	+0
St Margret's	GR04	50	+0

Note – values rounded to nearest whole number. Differences based on unrounded values.

14.7.74 L_{night} noise levels at receptors at the receptors are not forecast to increase compared to the 2035 Permitted Scenario when rounded to the nearest whole number. The changes that do arise are illustrated in Appendix 14F and are under 0.5 dB(A).

14.7.75 For the 2035 Proposed Scenario L_{night} contours the number of dwellings and the estimated population that they contain have been determined. This has been done based on the existing dwellings and

population excluding consented developments, and also including consented developments. The results are given by contour in Table 14-54.

Table 14-54: Number of Dwellings and Population in 2035 Proposed Scenario L_{night} Contours – Road Traffic Noise

Scenario	2035 Proposed Scenario			
Contour L_{night} (dB)	*Excluding Consented Developments*		*Including Consented Developments*	
	Dwellings	*Population.*	*Dwellings*	*Population*
40	2,437	7,080	2,600	7,561
45	1,940	5,581	2,103	6,062
50	876	2,377	1,039	2,858
55	786	2,115	939	2,564
60	685	1,855	812	2,221
65	475	1,277	571	1,543

14.7.76 The number of people assessed to be highly sleep disturbed by road traffic noise in the 2035 Proposed Scenario is given in Table 14-55, where it is compared with the 2035 Permitted Scenario.

Table 14-55: Number of People Highly Sleep Disturbed by Road Traffic Noise – 2035 Proposed vs 2035 Permitted

Scenario	No. People Highly Sleep Disturbed by Road Traffic Noise	
	Excluding Consented Developments	Including Consented Developments
2035 Proposed	388	445
2035 Permitted	384	440

14.7.77 Comparing 2035 Proposed Scenario with the 2035 Permitted scenario, the number of people exposed to road traffic noise is forecast to remain almost constant, for all contour levels.

14.7.78 It is important to consider the change in noise level when assessing the differences between the scenarios. Going from the 2035 Permitted Scenario to the 2035 Proposed Scenario, the changes that do arise are under 0.5 dB(A). Consequently, no people are assessed as having a significant effect, either beneficial or adverse.

Effects During Operation with Proposed Relevant Action

Total Ground Noise from Aircraft and Road Traffic

14.7.79 This chapter has considered noise from two different sources on the ground, namely aircraft ground noise and road traffic noise. The character of the two noise sources differs, with the aircraft ground noise a combination of periods of steady noise from auxiliary power units interspersed with noise from taxiing aircraft, whereas the road traffic noise is from multiple vehicle passbys which result in a relatively steady noise for busy roads, such as many of those in the vicinity of Dublin Airport.

14.7.80 As discussed previously in relation to assessing the number of people highly annoyed, the World Health Organisation's Environmental Noise Guidelines 2018, as endorsed by the European Commission

through Directive 2020/367, provide methods for calculating the number of people highly annoyed by specific noise sources. It is therefore consistent, when considering the significance of noise effects to consider each of the noise sources in isolation.

14.7.81 Combining the noise levels from individual noise sources can be undertaken, subject to an assumption as to which noise metric best represents the in-combination noise emissions at receptors, but there are no current standards or guidance available specific to the consideration of in-combination noise effects associated with the Relevant Action.

14.7.82 When considering combined noise levels, a number of factors also need to be considered. While the resulting noise level will be higher than for the individual sources unless one source is much louder than the others (in which case the combined noise level will be the same as that of the loudest individual source), the change in noise level will be no higher than the largest change for any of the individual sources, often being lower than this in situations where more than one source is relevant to the combined noise level or the largest change is not by the loudest source. Consequently, the significance of a source that experiences the largest change in noise level might be under-represented if a louder source shows a smaller change.

14.7.83 Despite these limitations, to provide information on the relative contribution of the noise sources the L_{den} and L_{night} noise metrics have been used to represent the relative contributions of the noise sources in isolation and cumulatively under the Permitted scenario and the Proposed scenario. This has been undertaken for representative locations, with the L_{den} noise levels for the assessment years 2025 and 2035 given in Table 14-56to Table 14-57.

Table 14-56: 2025 Aircraft Ground Noise and Road Traffic Noise Levels at Representative Locations (L_{den})

Representative Location	Reference No.	Ground Noise Level, dB (L_{den})						
		Permitted Scenario			*Proposed Scenario*			*Change*
		Aircraft	*Road*	*Total*	*Aircraft*	*Road*	*Total*	*Total*
Ridgewood	GR01	45	53	54	46	53	54	+0
The Baskins	GR02	35	60	60	36	60	60	+0
Mayeston Hall	GR03	40	73	73	42	73	73	+0
St Margret's	GR04	38	57	58	40	58	58	+0

Note – values rounded to nearest whole number. Differences based on unrounded values.

Table 14-57: 2035 Aircraft Ground Noise and Road Traffic Noise Levels at Representative Locations (L_{den})

Representative Location	Reference No.	Ground Noise Level, dB (L_{den})						
		Permitted Scenario			*Proposed Scenario*			*Change*
		Aircraft	*Road*	*Total*	*Aircraft*	*Road*	*Total*	*Total*
Ridgewood	GR01	45	54	54	47	54	55	+0
The Baskins	GR02	35	60	60	36	60	60	+0
Mayeston Hall	GR03	40	73	73	42	73	73	+0
St Margret's	GR04	38	58	58	40	58	58	+0

Note – values rounded to nearest whole number. Differences based on unrounded values.

14.7.84 For both of the assessment years the situation is similar. The road traffic noise is considerably higher than the aircraft ground noise. This results in the total ground noise either being the same as the road traffic noise, when rounded to the nearest whole number, or 1 dB(A) higher. In each assessment year

no change in the total ground noise from the Permitted scenario to the Proposed scenario is found, despite increases in the aircraft ground noise of 1 or 2 dB(A).

14.7.85 The relative contribution of the noise sources in terms of the L_{night} noise metric under the Permitted Scenario and the Proposed Scenario for the assessment years 2025 and 2035 given in Table 14-58 to Table 14-59.

Table 14-58: 2025 Aircraft Ground Noise and Road Traffic Noise Levels at Representative Locations (L_{night})

Representative Location	Reference No.	Ground Noise Level, dB (L_{night})						
		Permitted Scenario			*Proposed Scenario*			*Change*
		Aircraft	*Road*	*Total*	*Aircraft*	*Road*	*Total*	*Total*
Ridgewood	GR01	33	46	46	38	46	46	+1
The Baskins	GR02	25	52	52	29	52	52	+0
Mayeston Hall	GR03	31	64	64	34	64	64	+0
St Margret's	GR04	29	50	50	32	50	50	+0

Note – values rounded to nearest whole number. Differences based on unrounded values.

Table 14-59: 2035 Aircraft Ground Noise and Road Traffic Noise Levels at Representative Locations (L_{night})

Representative Location	Reference No.	Ground Noise Level, dB (L_{night})						
		Permitted Scenario			*Proposed Scenario*			*Change*
		Aircraft	*Road*	*Total*	*Aircraft*	*Road*	*Total*	*Total*
Ridgewood	GR01	33	46	46	38	46	47	+0
The Baskins	GR02	25	52	52	29	52	52	+0
Mayeston Hall	GR03	31	65	65	34	65	65	+0
St Margret's	GR04	29	50	50	32	50	50	+0

Note – values rounded to nearest whole number. Differences based on unrounded values.

14.7.86 For both of the assessment years the situation is similar. The road traffic noise is considerably higher than the aircraft ground noise. This results in the total ground noise either being the same as the road traffic noise, when rounded to the nearest whole number, or 1 dB(A) higher. In each assessment year no change in the total ground noise from the Permitted scenario to the Proposed Scenario is found, despite increases in the aircraft ground noise of up to 5 dB(A).

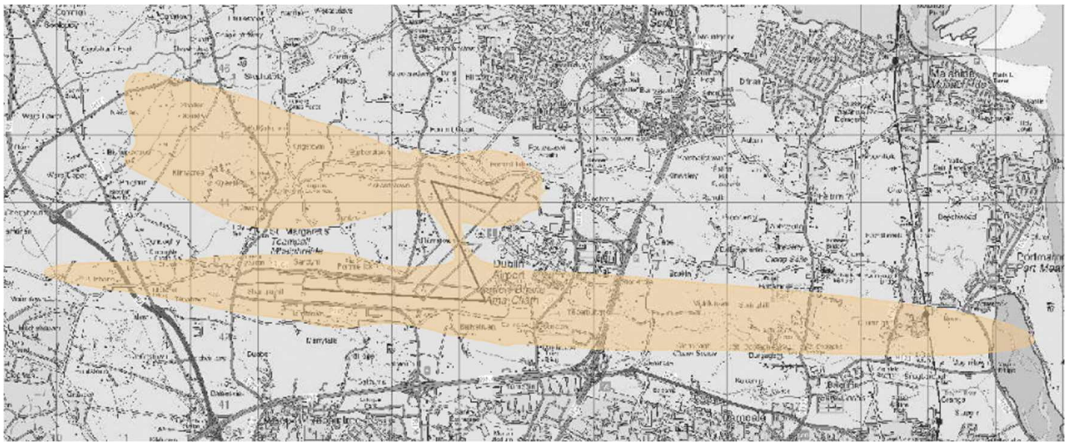
14.8 Mitigation and Monitoring

Mitigation During Operation of Proposed Relevant Action

14.8.1 In addition to the mitigation measures already in place at Dublin Airport as detailed in Section 14.6, as part of this application the Applicant is proposing mitigation measures in relation to the air noise effects which are described in replacement *Chapter 13: Aircraft Noise and Vibration*. Of relevance to the ground noise effects is the proposal to enhance the sound insulation scheme such that dwellings will be eligible for a grant to pay for sound insulation improvement works based on their night time air noise level. The area this is expected to include is shown in Figure 14-15. No specific mitigation is proposed based on ground noise, however properties which benefit from this scheme based on their air noise level will also

benefit from a reduction in the ground noise level. The area forecast to be eligible for the proposed insulation scheme in 2025 is shown in Figure 14-15.

Figure 14-15: Forecast Boundary of Proposed Sound Insulation Scheme – 2025



14.9 Residual Effects and Conclusions

14.9.1 In relation to road traffic noise the expected changes are such that no people are assessed as having a significant effect, either beneficial or adverse. There are therefore no significant residual effects from road traffic noise as a result of the Relevant Action.

14.9.2 When it comes to aircraft ground noise, the commonly accepted metrics for assessment all relate to external noise levels. Therefore, the assessment of effects presented in Section 14.7 does not allow for any benefit of the residential sound insulation schemes, as sound insulation reduces the internal noise level. However, the internal noise level is more representative of the effects, in particular for night noise which is the main focus of this application.

14.9.3 To assess the residual effects, the benefit of the residential sound insulation schemes has been allowed for by considering a residual effective noise level for properties with sound insulation of 5 dB(A) lower than the modelled noise level.

14.9.4 Dwellings eligible for the existing schemes in a given scenario have been considered here as having a reduction of 5 dB for both their L_{den} and L_{night} exposure, on the basis that the existing schemes offer to insulate the whole property.

14.9.5 Dwellings not eligible for the existing schemes but eligible for the new scheme proposed as part of this application have been considered here as having a reduction of 5 dB for their L_{night} exposure, and a reduction of 5 dB for the night component of their L_{den} exposure, on the basis that the new scheme is intended to cover insulation of bedrooms.

14.9.6 The assumed 5 dB(A) reduction is based on testing carried out on a sample of the properties treated under the existing scheme, which found that a reduction of at least 5 dB(A) in the internal noise level has been achieved in almost all cases.

14.9.7 This residual effective noise level has then been used to determine residual effects, following the same methodology as the assessment of effects in Section 14.7.

14.9.8 Allowing for the benefit of the residential sound insulation schemes in general reduces the number of people assessed with significant adverse effects.

Likely Significant Environmental Effects

14.9.9 The residual effects, after the benefit of the residential sound insulation schemes has been allowed for, are summarised in Table 14-60 for the Proposed Scenario. These tables include all people in existing dwellings who are within the study area and are exposed to at least 45 dB L_{den} or 40 dB L_{night} in at least one of the scenarios.

Table 14-60: Summary of Residual Aircraft Ground Noise Effects, Proposed Scenario

Year	L_{den} Residual Effects Proposed Scenario			L_{night} Residual Effects Proposed Scenario		
	Significant Beneficial	Significant Adverse	Not Significant	Significant Beneficial	Significant Adverse	Not Significant
2025	0	0	1,523	0	6	92
2035	0	0	1,565	0	6	92

14.9.10 Taking the L_{den} metric, there are no significant effects either beneficial or adverse under the Proposed Scenario.

14.9.11 Taking the L_{night} metric, under the Proposed Scenario there are 6 people exposed to significant adverse effects in 2025 and 2035.

14.9.12 Using a similar method, the residual noise levels assessed as high or very high can be calculated. These are presented in Table 14-61.

Table 14-61: Summary of People Exposed to High Residual Aircraft Ground Noise Levels

Scenario	No. People Exposed to High or Very High Residual L_{den} Noise Level	No. People Exposed to High or Very High Residual L_{night} Noise Level
2025 Permitted	0	0
2035 Permitted	0	0
2025 Proposed	0	0
2035 Proposed	0	0

14.9.13 Considering both the L_{den} and L_{night} results, there are no people exposed to a high residual noise level in any of the assessed scenarios.

14.10 Cumulative Noise Effects

14.10.1 In addition to the ground noise from aircraft and road traffic considered by this chapter the Relevant Action will have an effect on the air noise generated by aircraft operations at the airport, as considered in replacement *Chapter 13 : Aircraft Noise and Vibration*. This relates to the noise from the aircraft as they use the runway and the airspace around the airport.

14.10.2 Aircraft ground noise (i.e. the noise from aircraft on the ground) and air noise (i.e. the noise from aircraft in the air) have different characteristics. Aircraft ground noise consists of periods of relatively steady noise from APUs or taxiing aircraft which will last for at least a few minutes, whereas air noise consists of isolated events that will rise to a peak before falling again, generally lasting for less than a minute in total. Consequently, it is standard practice to consider the noise from each separately. This is consistent with the statement in the European Commission through Directive 2020/367 that:

"The exposure of the population shall be assessed independently for each noise source and harmful effect. Where the same people are simultaneously exposed to different noise sources, the harmful effects may -in general- not be cumulated. However, those effects may be compared to assess the relative importance of each noise."

14.10.3 Furthermore, the Dublin Airport Noise Action Plan 2019-2023 states that:

"Noise from aircraft is produced both on the ground and in the air. In general, these sources are considered separately and are typically described as:

o Air noise; and

o Ground noise"

14.10.4 Consequently, the Residual effects for the Relevant Action are those described in Section 14.9 above and those given in Section 13.9 of replacement *Chapter 13: Aircraft Noise and Vibration*.

14.10.5 Combining the noise levels can be undertaken, although there are no current standards or guidance available specific to the consideration of in-combination noise effects associated with the Relevant Action.

14.10.6 When considering combined noise levels, a number of factors also need to be considered. While the resulting noise level will be higher than for the individual sources unless one source is much louder than the others (in which case the combined noise level will be the same as that of the loudest individual source), the change in noise level will be no higher than the largest change for any of the individual sources, often being lower than this in situations where more than one source is relevant to the combined noise level or the largest change is not by the loudest source. Consequently, the significance of a source that experiences the largest change in noise level might be under-represented if a louder source shows a smaller change.

14.10.7 Despite these limitations, to provide information on the relative contribution of the air noise and total ground noise the L_{den} and L_{night} noise metrics have been used to represent the relative contributions in isolation and cumulatively under the Permitted Scenario and the Proposed Scenario. This has been undertaken for representative locations, with the L_{den} noise levels for the assessment years 2025 and 2035 given in Table 14-62 to Table 14-63.

14.10.8 The representative locations are those used for the ground noise assessment. Additional locations were also used for the air noise assessment but they are further from the airport where aircraft ground noise levels would be very low.

Table 14-62: 2025 Total Ground Noise and Air Noise Levels at Representative Locations (L_{den})

Representative Location	Reference No.	Noise Level, dB (L_{den})						
		Permitted Scenario			*Proposed Scenario*			*Change*
		Total Ground	*Air*	*Total*	*Total Ground*	*Air*	*Total*	*Total*
Ridgewood	GR01	54	55	58	54	57	59	+1
The Baskins	GR02	60	58	62	60	59	63	+0
Mayeston Hall	GR03	73	51	73	73	51	73	+0
St Margret's	GR04	58	63	64	58	64	65	+1

Note – values rounded to nearest whole number. Differences based on unrounded values.

Table 14-63: 2035 Total Ground Noise and Air Noise Levels at Representative Locations (L_{den})

Representative Location	Reference No.	Noise Level, dB (L_{den})

		Permitted Scenario			*Proposed Scenario*			*Change*
		Total Ground	*Air*	*Total*	*Total Ground*	*Air*	*Total*	*Total*
Ridgewood	GR01	54	53	57	55	55	58	+1
The Baskins	GR02	60	56	62	60	58	62	+1
Mayeston Hall	GR03	73	48	73	73	49	73	0
St Margret's	GR04	58	60	62	58	62	63	+1

Note – values rounded to nearest whole number. Differences based on unrounded values.

14.10.9 The relative contribution from the noise sources is similar by scenario but varies by location. For Mayeston Hall (GR03) the total ground noise is considerably higher than the air noise from aircraft. This results in the total noise being the same as the total ground noise, when rounded to the nearest whole number.

14.10.10 For the other locations the total ground noise and air noise are closer together, particularly for Ridgewood (GR01). For The Baskins (GR02) the total ground noise is higher with the difference increasing from 2 dB(A) in 2025 to 4 dB(A) in 2035 under the Permitted Scenario. For St Margret's (GR04) the air noise is higher with the difference reducing from 5 dB(A) in 2025 to 2 dB(A) in 2035 under the Permitted Scenario.

14.10.11 Considering the total noise, the increase from the Permitted Scenario to the Proposed Scenario for the locations of Ridgewood (GR01) and St Margret's (GR04) is 1 dB(A) in 2025 and 2035. For Mayeston Hall (GR03) in each assessment year no change in the total noise is found. For The Baskins (GR02) no change is found in 2025 but an increase of 1 dB(A) in 2035.

14.10.12 The relative contribution of the air noise and total ground noise in terms of the L_{night} noise metric under the Permitted Scenario and the Proposed Scenario for the assessment years 2025 and 2035 is given in Table 14-64 to Table 14-65.

Table 14-64: 2025 Total Ground Noise and Air Noise Levels at Representative Locations (L_{night})

Representative Location	Reference No.	Noise Level, dB (L_{night})						
		Permitted Scenario			*Proposed Scenario*			*Change*
		Total Ground	*Air*	*Total*	*Total Ground*	*Air*	*Total*	*Total*
Ridgewood	GR01	46	40	47	46	48	50	+4
The Baskins	GR02	52	49	54	52	51	55	+1
Mayeston Hall	GR03	64	45	64	64	44	64	+0
St Margret's	GR04	50	53	54	50	55	56	+2

Note – values rounded to nearest whole number. Differences based on unrounded values.

Table 14-65: 2035 Total Ground Noise and Air Noise Levels at Representative Locations (L_{night})

Representative Location	Reference No.	Noise Level, dB (L_{night})

		Permitted Scenario			*Proposed Scenario*			*Change*
		Total Ground	*Air*	*Total*	*Total Ground*	*Air*	*Total*	*Total*
Ridgewood	GR01	46	36	47	47	47	50	+3
The Baskins	GR02	52	47	53	52	50	54	+1
Mayeston Hall	GR03	65	41	65	65	42	65	+0
St Margret's	GR04	50	50	53	50	53	55	+2

Note – values rounded to nearest whole number. Differences based on unrounded values.

14.10.13 With the exception of Ridgewood (GR01) and St Margaret's (GR04) the relative contribution from the noise sources is similar by scenario but varies by location. For The Baskins (GR02) the total ground noise is higher with the difference highest in 2035. For Mayeston Hall (GR03) the total ground noise is considerably higher than the air noise due to the dominant effect of road traffic noise. This results in the total noise being the same as the total ground noise, when rounded to the nearest whole number.

14.10.14 For Ridgewood (GR01) under the Permitted Scenario the total ground noise is considerably higher, and the amount increases from 2025 to 2035. Under the Proposed Scenario the air noise is 2 dB(A) higher than the total ground noise in 2025 and equal to it in 2035.

14.10.15 For St Margaret's (GR04) under the Permitted Scenario the total ground noise is lower than the air noise in 2025 but equal to it in 2035.

14.10.16 Considering the total noise, the increase from the Permitted Scenario to the Proposed Scenario for the location in Ridgewood (GR01) is 4 dB(A) in 2025 and reduces to 3 dB(A) in 2035. In both assessment years for The Baskins (GR02) the increase is 1 dB(A), for Mayeston Hall (GR03) no change in the total noise is found, and for St Margaret's (GR04) an increase of 2 dB(A).

14.10.17 If similar criteria were used to assess the significance of the cumulative noise level as those which were used for the individual air noise and ground noise assessments presented in *Chapter 13: Aircraft Noise and Vibration* and in this chapter, none of the changes in L_{den} noise levels would be considered significant. The change in L_{night} noise levels would be considered significant for the Ridgewood location only. These conclusions are consistent with those of the assessments of individual noise sources.

14.11 Summary

14.11.1 This chapter has assessed the likely significant effects from aircraft ground noise and road traffic noise as a result of the proposed Relevant Action.

14.11.2 This chapter has considered future forecast scenarios for the Assessment Years of 2025 and 2035 and has compared the situation in the Permitted and Proposed Scenarios. The current noise environment (2018) has also been described.

14.11.3 The chapter separately considers both the ground noise from aircraft ground operations, specifically taxiing and the use of auxiliary power units, and road traffic noise. Consideration is also given to the combined noise from these two sources, and also to the cumulative effects of the total ground noise (aircraft ground noise and road traffic noise) and the air noise considered in *Chapter 13: Aircraft Noise and Vibration*.

14.11.4 Two primary assessment metrics have been considered, one relating to the overall situation (L_{den}) and one just the situation at night (L_{night}). For each of these metrics the number of people exposed to various noise levels has been determined for each assessment scenario and an assessment of significant effects has been carried out.

14.11.5 Considering first the road traffic noise, due to the limited changes in the predicted noise levels no significant effects either beneficial or adverse are predicted with the Relevant Action.

14.11.6 For the aircraft ground noise, looking at the predicted number of people with significant residual effects, firstly considering the overall situation (L_{den} metric), in 2025 or 2035 with the Relevant Action there are no forecast significant effects when compared with the corresponding Permitted Scenario.

14.11.7 Considering the night situation (L_{night} metric), looking at the predicted number of people with significant residual effects, there are no forecast significant beneficial effects with the Relevant Action. In 2025 and 2035 under both scenarios there are 6 people exposed to significant adverse effects in 2025 and 2035.

14.11.8 In accordance with standard industry practice it is generally not considered appropriate to combine the noise levels from the different noise sources for assessment purposes as they have different characteristics, and as such there are no current standards or guidance available to assess the effects of the in-combination noise levels. However, information is provided on their relative contributions to the overall noise environment at representative locations in accordance with the request from FCC.

What has changed since the revised EIAR was submitted in September 2021?

Since the revised EIAR chapter was submitted in September 2021 there have been has been several changes as described in Section 13.1. These include updated forecasts of future activity and the correction to the earlier predictions.

This replacement EIAR chapter has been updated to account for these changes and all modelling and assessments have been revised accordingly. The above does not change the description of the Relevant Action.

In terms of the assessment conclusions the update has the same conclusion on road traffic noise, that no significant effects either beneficial or adverse are predicted with the Relevant Action.

For the aircraft ground noise, looking at the predicted number of people with significant residual effects, firstly considering the overall situation (L_{den} metric), there remain no forecast significant effects.

Considering the night situation (L_{night} metric), the predicted number of people with significant residual adverse effects in 2025 and 2035 is 6, down from 9 in the 2021 EIAR.