Metric	What it is	What if does	Weighting	Presence in UK Legislation, Policy and Standards	Links to effects on annoyance and other health issues
	that in the way it is described.				
N65	This is Nx with X = 65 dB(A)	Provides an indication of the number of events likely to cause disturbance.	Yes, insofar as the 65 dB is expressed in terms of the $L_{Amax,S}$.	None	Some limited evidence linking to annoyance
N60	This is Nx with X = 60 dB(A)		Yes, insofar as the 65 dB is expressed in terms of the $L_{Amax,S}$.	None	Assuming 15 dB(A) sound reduction through a partially open window, it can be related to advice in the WHO Community Noise Guidelines (1999/2000).

13A.6 Derivation of Effect Scales Used

Air Noise – Residential Receptors

13A.6.1 Regulation (EU) No 598/2014 under Annex I requires that air traffic noise impact will be described, at least, in terms of noise indicators L_{den} and L_{night} which are defined and calculated in accordance with Annex I to Directive 2002/49/EC.

13A.6.2 The consideration of effects has involved the determination of the number of people 'highly sleep disturbed' and 'highly annoyed'. The latter has been done in accordance with the approach recommended by the World Health Organisation Environmental Guidelines 2018 (WHO 2018) as endorsed by the European Commission through Directive 2020/367, and has taken into account the noise exposure from 45 dB L_{den} and 40 dB L_{night} as appropriate. It is aircraft noise above these levels that WHO 2018 states are associated with adverse health effects.

13A.6.3 In addition to considering the overall effect, consideration has also been given to the significance of the change under the various options considered from the baseline. This considers both the resulting noise levels and the changes in noise levels. A consequence of this approach is that it puts emphasis on those newly affected, as they will experience the greatest changes, when considering the overall number significantly adversely affected.

13A.6.4 The classification and significance of effects is evaluated with reference to definitive standards, accepted criteria and legislation where available. This is supplemented by professional opinion and professional judgement.

13A.6.5 For the L_{den} and L_{night} noise indicators the significance of effect has been determined by separately rating both the absolute noise levels and the change in noise level as set out below. The individual ratings are then combined to determine the significance of any effects.

13A.6.6 The absolute noise values and associated impact criteria for residential receptors that have been developed are given in Table 13A-7. They commence with a negligible band which applies to noise levels that lie below a low threshold, specifically 45 dB L_{den} and 40 dB L_{night}, as WHO 2018 states that aircraft noise above these levels is associated with adverse health effects. The subsequent bands are defined by values that are required to be reported under Directive 2002/49/EC.

Table 13A-7: 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

Scale Description	Annual dB L_{den}	Annual dB L_{night}
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

13A.6.7 Taking L_{den}, the value of 55 dB is where WHO 2018 reports evidence of an effect on reading skills and oral comprehension in children. This value is also comparable to the level of 54 dB $L_{Aeq,16h}$ which is now used in the UK as marking the approximate onset of significant community annoyance. The value of 55 dB L_{den} has therefore been assigned to medium impact, as it relates to the start of these effects.

13A.6.8 Taking the value of 65 dB L_{den}, this is where WHO 2018 reports an association between those exposed and those considering themselves highly annoyed of 45.5%. Such a noise level is also comparable with the level of 63 dB $L_{Aeq,16h}$ widely used in the UK for eligibility for acoustic insulation, following Government guidance, and is also used for eligibility at Dublin under the North Runway Permission. The value of 65 dB L_{den} has therefore been assigned to the start of a high impact.

13A.6.9 For the night period the value of 45 dB L_{night} has been assigned to low impact. This follows from the approach in the UK where the Government proposed the value as the Lowest Observed Adverse Effect Level, and this received broad support.

13A.6.10 The level of 50 dB L_{night} is described as the desirable level in the Noise Action Plan for Dublin Airport 2019 – 2023[22]. This value has therefore been assigned to the level above which medium impact arises.

13A.6.11 The higher level of 55 dB L_{night} has been assigned to the level above which high impact arises. This follows from the WHO Night Noise Guidelines 2009 (NNG 2009)[23] which describe it as the threshold at which "Adverse health effects occur frequently, a sizeable proportion of the population is highly annoyed and sleep-disturbed". The noise level is also comparable with the level of 55 dB $L_{Aeq,8h}$ commonly used at airports in the UK for eligibility for sound insulation schemes.

13A.6.12 The scale to be used to assess the change in noise level is given in Table 13A-8. The thresholds are derived from the difference contour bands recommended in CAP1616a. A semantic scale of this type, following the format of examples given in the Institute of Environmental Management and Assessment 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 Runway at Dublin Airport. The same approach was followed in the Heathrow 3rd Runway Preliminary Environmental Impact Report (PEIR).

Table 13A-8: 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

13A.6.13 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

[22] Fingal County Council Noise Action Plan for Dublin Airport 2019 - 2023 - December 2018 https://www.fingal.ie/sites/default/files/2019-04/NAP%20Final.pdf

[23] World Health Organisation Europe NIGHT NOISE GUIDELINES FOR EUROPE - 2009 https://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf

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}.

13A.6.14 The EPA Draft Guidelines advises that adherence to a systematic method of description can be of considerable assistance and includes in a Table 3.3 relevant terms that can be used to consistently describe specific effects. In terms of describing the significance of effects the terms range from imperceptible to profound, and they have been used here.

13A.6.15 There is no clearly accepted method of how to rate the magnitude of the effect of a change in the absolute air noise level and the associated change in noise level. Some guidance however has been provided in the UK's National Planning Practice Guidance (NPPG) 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."

13A.6.16 The magnitude of an effect from changing between one scenario and another (e.g. baseline to future with the Relevant Action) 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.

13A.6.17 Table 13A-9 shows how the absolute and relative impacts are interpreted into magnitude of effect. This considers the criteria presented above, other guidance and professional judgement. The effect rating scale is taken from the EPA Draft EIAR Guidelines.

Table 13A-9: Summary of magnitude of effect – 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

13A.6.18 A potential significant effect (adverse or beneficial) would be considered to arise if in Table 13A-9 the magnitude of the effect was rated as significant or higher.

Air Noise – Non-Residential Receptors

13A.6.19 For non-residential receptors a similar, although simplified, approach has been used. Absolute levels rated as medium have been derived from the relevant guidance documents. These are given in Table 13-10. 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 at least 3 dB(A), i.e. it is rated medium or higher.

13A.6.20 For schools the medium threshold has been based on the guidance in Building Bulletin 93, specifically that the internal noise levels for classrooms and teaching spaces that it contains can be achieved with natural ventilation if the external noise level does not exceed 55 dB $L_{Aeq,30min}$. Reviewing the distribution of flights at Dublin Airport it has been estimated that this criterion corresponds to approximately 55 dB L_{den}, which is the level where WHO 2018 reports evidence of an effect on reading skills and oral comprehension in children.

13A.6.21 For residential healthcare facilities, the medium thresholds have based on the guidance in Health Technical Memorandum 08-01, specifically that the internal noise levels for hospital wards that it contains

can be achieved with natural ventilation if the external noise level does not exceed 55 dB $L_{Aeq,1h}$ and 50 dB $L_{Aeq,1h}$ during the day and night respectively. Reviewing the distribution of flights at Dublin Airport it has been estimated that these criteria correspond to approximately 55 dB L_{den} and 45 dB L_{night} respectively.

13A.6.22 For places of worship the medium threshold is the same as that for residential dwelling has on the basis that the British Standard BS8233:2014 recommends comparable internal noise levels for both types of spaces.

Table 13-10: Air 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}

13B. Air noise modelling methodology

13B.1 Introduction

13B.1.1 This appendix of the Environmental Impact Assessment Report (EIAR), prepared by Bickerdike Allen Partners LLP, describes the modelling methodology for the air noise predictions.

- Section 13B.2 details the scenarios that have been assessed and presents summaries of the aircraft movements.
- Section 13B.3 sets out the methodology and the assumptions used in the prediction of airborne aircraft noise levels and the production of noise contours.
- Section 13B.4 sets out the methodology used to assess the number of people and dwellings within the contours, as well as noise sensitive community buildings such as schools and hospitals.

13B.2 Assessment Scenarios

Scenarios to be Assessed

13B.2.1 Seven key scenarios have been included in the air noise assessment, these are:

- 2018 Baseline
- 2019 Baseline
- 2022 Baseline
- 2022 Relevant Action
- 2025 Baseline
- 2025 Consented
- 2025 Relevant Action

13B.2.2 The 2018 Baseline scenario is based on the aircraft movements which occurred during 2018. The 2019 Baseline scenario is based on the aircraft movements which occurred during 2019. The future Baseline scenarios are based on the forecast aircraft movements with the conditions attached to the North Runway Permission, i.e. with no use of the North Runway at night and movements limited to 65/night.

13B.2.3 At the time of the North Runway planning process in 2004-2007, future forecasts were made of the night-time situation that would likely arise in 2025 in a 'constrained' scenario which was defined at that time as the scenario predicted to occur without North Runway being developed. This scenario equated to 65 flights per night in the 92-day summer period using the existing (south) runway in 2025 and no use of the North Runway. In terms of noise exposure, this 'constrained' scenario can be seen as equivalent to a consented night-time scenario with Condition 3(d) and 5 in place, where there is a 65 movement cap at the airport and no use of the North Runway or the crosswind runway at night.

13B.2.4 This scenario, referred to in this assessment as "2025 Consented", has been modelled using the same modelling methodology as that for the other scenarios given in this chapter. The movements by aircraft type, runway, route and stage length have been taken from the 2004-2007 North Runway planning process. Specifically, these were given in the document *"Response to Information Request by An Bord Pleanala of 9th January 2007"*, pages 25-32. The forecast annual ATMs presented in the 2004-2007 planning process were around 348,000, and the daytime assessments were all based on this total. However no consideration was given to the potential impact on ATMs of Conditions 3(d) and 5. Applying these conditions reduces the forecasted annual ATMs from around 348,000 to around 307,000 in this scenario. For the purposes of this assessment, the previously modelled flights have therefore been scaled down to this figure.

13B.2.5 The Relevant Action scenarios are based on the latest forecast aircraft movements with the North Runway conditions removed. Due to the profound impact on the aviation industry worldwide of the Covid-19 pandemic, activity is now forecast to reach 32 mppa by 2025, so the presence of Condition 3 of the Terminal 2 Permission (which limits Dublin Airport to 32 mppa) has no effect.

13B.2.6 The annual day, evening and night movements and summer day and night movements are given in the tables below by aircraft type for each of these scenarios. Aircraft types with a small number of movements have been grouped under "Other".

Table 13B-1: 2018 Actual Movements

Aircraft Type	2018 Actual Movements				
	Annual			92-Day Summer	
	Day 07h-19h	Evening 19h-23h	Night 23h-07h	Day 07h-23h	Night 23h-07h
Airbus A306	214	337	487	130	127
Airbus A319	2,991	924	160	1,061	12
Airbus A320	41,542	10,156	6,015	14,270	2,293
Airbus A320neo	30	4	8	0	0
Airbus A321	5,596	537	948	2,023	377
Airbus A321neo	0	0	0	0	0
Airbus A330	9,519	396	2,059	3,098	584
Airbus A330neo	0	0	0	0	0
Airbus A350	135	2	105	60	45
ATR 42	2,327	272	1	672	1
ATR 72	14,142	2,432	1,098	4,626	322
BAe 146/Avro RJ	4,314	963	354	1,472	126
Boeing 737-400	254	567	611	268	151
Boeing 737-700	1,420	289	286	468	63
Boeing 737-800	55,616	17,096	10,838	19,517	3,250
Boeing 737 MAX	1,625	77	392	508	140
Boeing 757	2,702	35	879	1,084	236
Boeing 767	1,088	472	491	457	137
Boeing 777	1,508	591	973	570	285
Boeing 777X	0	0	0	0	0
Boeing 787	1,554	160	898	597	194
Bombardier CS300	484	2	0	144	0
Bombardier Dash 8	2,858	1,321	15	1,147	3
Embraer E190/195	4,737	1,669	182	1,534	95
Other	9,423	2,061	1,096	3,408	314
Total	**164,079**	**40,363**	**27,896**	**57,114**	**8,755**

Table 13B-2: 2019 Actual Movements

Aircraft Type	2019 Actual Movements				
	Annual			92-Day Summer	
	Day 07h-19h	Evening 19h-23h	Night 23h-07h	Day/ 07h-23h	Night 23h-07h
Airbus A306	162	301	377	463	377
Airbus A319	3,159	911	370	4,070	370
Airbus A320	41,840	10,109	6,796	51,949	6,796
Airbus A320neo	1,000	119	13	1,119	13
Airbus A321	5,461	907	1,086	6,368	1,086
Airbus A321neo	619	87	158	706	158
Airbus A330	8,905	40	2,031	8,945	2,031
Airbus A330neo	0	0	0	0	0
Airbus A350	214	0	220	214	220
ATR 42	14,398	2,481	1,089	16,879	1,089
ATR 72	4,280	767	207	5,047	207
BAe 146/Avro RJ	196	547	527	743	527
Boeing 737-400	1,001	298	104	1,299	104
Boeing 737-700	58,447	18,855	12,136	77,302	12,136
Boeing 737-800	251	6	103	257	103
Boeing 737 MAX	2,939	23	528	2,962	528
Boeing 757	1,845	541	693	2,386	693
Boeing 767	1,536	587	1,121	2,123	1,121
Boeing 777	0	0	0	0	0
Boeing 777X	2,576	63	947	2,639	947
Boeing 787	1,030	5	3	1,035	3
Bombardier CS300	2,355	921	6	3,276	6
Bombardier Dash 8	4,323	940	275	5,263	275
Embraer E190/195	10	0	0	10	0
Other	11,384	2,243	530	13,627	530
Total	**167,931**	**40,751**	**29,320**	**208,682**	**29,320**

Table 13B-3: 2022 Baseline Forecast Movements

Aircraft Type	2022 Baseline Forecast Movements				
	Annual			92-Day Summer	
	Day 07h-19h	Evening 19h-23h	Night 23h-07h	Day 07h-23h	Night 23h-07h
Airbus A306	325	325	650	180	180
Airbus A319	3,249	975	650	1,172	180
Airbus A320	41,266	10,723	6,824	14,426	1,893
Airbus A320neo	1,625	975	0	721	0
Airbus A321	5,849	0	650	1,623	180
Airbus A321neo	650	0	0	180	0
Airbus A330	11,373	0	975	3,156	270
Airbus A330neo	0	0	0	0	0
Airbus A350	0	0	0	0	0
ATR 42	2,275	325	0	721	0
ATR 72	15,272	2,275	650	4,869	180
BAe 146/Avro RJ	0	0	0	0	0
Boeing 737-400	0	1,625	975	451	270
Boeing 737-700	975	325	325	361	90
Boeing 737-800	55,563	19,496	8,123	20,827	2,254
Boeing 737 MAX	650	0	0	180	0
Boeing 757	1,300	0	0	361	0
Boeing 767	0	325	325	90	90
Boeing 777	325	650	325	270	90
Boeing 777X	0	0	0	0	0
Boeing 787	3,249	0	650	902	180
Bombardier CS300	1,950	0	0	541	0
Bombardier Dash 8	1,950	650	0	721	0
Embraer E190/195	7,473	1,950	0	2,615	0
Other	4,224	1,625	0	1,623	0
Total	**159,540**	**42,241**	**21,120**	**55,989**	**5,860**

Table 13B-4: 2022 Relevant Action Forecast Movements

Aircraft Type	2022 Relevant Action Forecast Movements				
	Annual			92-Day Summer	
	Day 07h-19h	Evening 19h-23h	Night 23h-07h	Day 07h-23h	Night 23h-07h
Airbus A306	325	0	975	90	270
Airbus A319	3,249	650	975	1,082	270
Airbus A320	41,591	11,048	9,423	14,606	2,615
Airbus A320neo	1,625	975	0	721	0
Airbus A321	5,849	0	650	1,623	180
Airbus A321neo	1,300	0	650	361	180
Airbus A330	11,697	0	1,950	3,246	541
Airbus A330neo	0	0	0	0	0
Airbus A350	0	0	0	0	0
ATR 42	2,275	325	0	721	0
ATR 72	15,272	2,275	650	4,869	180
BAe 146/Avro RJ	0	0	0	0	0
Boeing 737-400	0	1,625	975	451	270
Boeing 737-700	975	325	325	361	90
Boeing 737-800	53,613	19,171	10,398	20,196	2,885
Boeing 737 MAX	650	0	0	180	0
Boeing 757	1,300	0	0	361	0
Boeing 767	0	325	325	90	90
Boeing 777	0	650	650	180	180
Boeing 777X	0	0	0	0	0
Boeing 787	2,599	0	1,300	721	361
Bombardier CS300	1,950	0	0	541	0
Bombardier Dash 8	1,950	650	0	721	0
Embraer E190/195	7,148	1,950	325	2,524	90
Other	4,224	1,625	0	1,623	0
Total	**157,591**	**41,591**	**29,569**	**55,268**	**8,205**

Table 13B-5: 2025 Baseline Forecast Movements

Aircraft Type	2025 Baseline Forecast Movements				
	Annual			92-Day Summer	
	Day 07h-19h	Evening 19h-23h	Night 23h-07h	Day 07h-23h	Night 23h-07h
Airbus A306	325	325	651	180	180
Airbus A319	1,952	976	651	811	180
Airbus A320	40,023	9,762	6,508	13,794	1,803
Airbus A320neo	7,484	1,952	976	2,615	270
Airbus A321	3,254	0	0	902	0
Airbus A321neo	2,278	0	325	631	90
Airbus A330	11,063	0	651	3,065	180
Airbus A330neo	0	0	0	0	0
Airbus A350	651	0	0	180	0
ATR 42	2,278	325	0	721	0
ATR 72	15,293	2,278	651	4,869	180
BAe 146/Avro RJ	0	0	0	0	0
Boeing 737-400	0	1,627	976	451	270
Boeing 737-700	2,929	1,302	325	1,172	90
Boeing 737-800	51,737	15,619	8,135	18,663	2,254
Boeing 737 MAX	7,809	4,555	0	3,426	0
Boeing 757	0	0	0	0	0
Boeing 767	0	325	325	90	90
Boeing 777	976	0	325	270	90
Boeing 777X	0	651	0	180	0
Boeing 787	6,508	0	651	1,803	180
Bombardier CS300	1,952	0	0	541	0
Bombardier Dash 8	1,952	651	0	721	0
Embraer E190/195	6,182	976	0	1,984	0
Other	4,230	1,627	0	1,623	0
Total	**168,878**	**42,952**	**21,150**	**58,694**	**5,860**

Table 13B-6: 2025 Consented Forecast Movements

Aircraft Type	2025 Consented Forecast Movements				
	Annual			92-Day Summer	
	Day 07h-19h	Evening 19h-23h	Night 23h-07h	Day 07h-23h	Night 23h-07h
Airbus A300	0	0	1,563	0	450
Airbus A306	1,217	280	358	431	103
Airbus A319	5,021	1,156	0	1,779	0
Airbus A320	65,650	15,117	866	23,256	249
Airbus A320neo	0	0	0	0	0
Airbus A321	17,439	4,015	2,014	6,177	580
Airbus A321neo	0	0	0	0	0
Airbus A330	11,834	2,725	867	4,192	250
Airbus A330neo	0	0	0	0	0
Airbus A350	2,701	622	0	957	0
ATR 42	12,753	2,936	1,220	4,517	351
ATR 72	0	0	0	0	0
BAe 146/Avro RJ	170	39	838	60	241
Boeing 737-400	0	0	786	0	226
Boeing 737-500	3,900	898	819	1,381	236
Boeing 737-700	0	0	0	0	0
Boeing 737-800	75,473	17,379	4,357	26,735	1,255
Boeing 737 MAX	0	0	0	0	0
Boeing 757	912	210	1,065	323	307
Boeing 767	1,936	446	246	686	71
Boeing 777	1,377	317	0	488	0
Boeing 777X	0	0	0	0	0
Boeing 787	3,362	774	0	1,191	0
Bombardier CS300	0	0	0	0	0
Bombardier Dash 8	2,531	583	0	897	0
Convair 580	0	0	526	0	151
Embraer E190/195	8,404	1,935	0	2,977	0
HS748A	7,062	1,626	1,612	2,501	464
Lockheed C130	19	4	436	7	126
Shorts SD330/360	500	115	1,309	177	377
Other	10,363	2,386	1,443	3,671	415
Total	**232,623**	**53,565**	**20,326**	**82,404**	**5,852**

Table 13B-7: 2025 Relevant Action Forecast Movements

Aircraft Type	2025 Relevant Action Forecast Movements				
	Annual			92-Day Summer	
	Day 07h-19h	Evening 19h-23h	Night 23h-07h	Day 07h-23h	Night 23h-07h
Airbus A306	325	0	976	90	270
Airbus A319	1,952	651	976	721	270
Airbus A320	40,349	10,087	9,111	13,975	2,524
Airbus A320neo	7,484	1,952	976	2,615	270
Airbus A321	3,254	0	0	902	0
Airbus A321neo	2,603	0	1,302	721	361
Airbus A330	11,714	0	1,302	3,246	361
Airbus A330neo	0	0	0	0	0
Airbus A350	325	0	325	90	90
ATR 42	2,278	325	0	721	0
ATR 72	15,293	2,278	651	4,869	180
BAe 146/Avro RJ	0	0	0	0	0
Boeing 737-400	0	1,627	976	451	270
Boeing 737-700	2,929	1,302	325	1,172	90
Boeing 737-800	49,785	15,293	10,413	18,032	2,885
Boeing 737 MAX	8,460	4,555	651	3,606	180
Boeing 757	0	0	0	0	0
Boeing 767	0	325	325	90	90
Boeing 777	651	0	651	180	180
Boeing 777X	0	651	0	180	0
Boeing 787	5,857	0	1,302	1,623	361
Bombardier CS300	1,952	0	0	541	0
Bombardier Dash 8	1,952	651	0	721	0
Embraer E190/195	5,857	976	325	1,893	90
Other	4,230	1,627	651	1,623	180
Total	**167,251**	**42,301**	**31,238**	**58,063**	**8,655**

13B.3 Noise Modelling Methodology

Software

13B.3.1 The noise modelling utilises the Federal Aviation Authority Aviation Environmental Design Tool (AEDT) version 2d SP2, which is compliant with *ECAC.CEAC Doc 29 4th Edition Report on Standard Method of Computing Noise Contours around Civil Airports* and with *EU Commission Directive 2015/996 Establishing common noise assessment methods according to Directive 2002/49/EC of the European Parliament and of the Council*. This was the latest version of the software when the assessment work began.

13B.3.2 The AEDT software evaluates aircraft noise in the vicinity of airports using flight track information, aircraft fleet mix, aircraft profiles and terrain. The AEDT software is used to produce noise exposure contours as well as predict noise levels at specific user-defined sites. For Dublin Airport the input data has comprised:

- physical details of the airport, both current and future,
- the topography of the surrounding area,
- the aircraft movements themselves,
- the routes flown by the aircraft movements,
- the procedures used by the aircraft movements,
- dwelling, population and community building data.

Study Area

13B.3.3 The study area is based on the largest extent of likely impacts due to air noise, i.e. encompassing an envelope formed by the lowest value noise contours assessed for each metric. The extents of the study area are contained within area rectangle that extends 53 km to the west, 49 km to the east, 32 km to the north and 25 km to the south of the centre of the existing main runway at Dublin Airport. Figure 13B-1 shows the study area.

AEDT Study

13B.3.4 The AEDT default weather settings for Dublin Airport and all-soft ground lateral attenuation have been used. The directivity effects of aircraft bank angle have been allowed for in accordance with EU Directive 2015/996.

13B.3.5 Terrain data has been acquired for the study area. This was provided by emapsite in the form of a Digital Terrain Model dataset and has been incorporated within the noise model.

Airport Layout

13B.3.6 The current airfield layout including runways and taxiways is shown on the AIP Ireland Aerodrome Chart[1]. This information has been used with a construction drawing for the North Runway supplied by daa to locate the Dublin Airport runways in the model.

[1] EIDW AD 2.24-1, dated 28 March 2019, http://iaip.iaa.ie/iaip/IAIP_Frame_CD.htm

Aircraft Movements

13B.3.7 The AEDT software includes noise information for many common aircraft types, but it does not include every aircraft type. Therefore, the actual and forecast aircraft types need to be mapped to aircraft types in the AEDT software. For most aircraft, substitutions are proposed by the AEDT software or the ANP database[2] where a similar alternative aircraft type is used to model the actual type. For larger aircraft this generally does not involve a change but for the smaller aircraft, and in particular the general aviation aircraft, some substitutions occur. Where the AEDT and ANP databases have no guidance, an aircraft type has been assigned based on the aircraft size and engine details.

13B.3.8 This is in accordance with EU Directive 2015/996 which states that "The ANP database provided in Appendix I covers most existing aircraft types. For aircraft types or variants for which data are not currently listed, they can best be represented by data for other, normally similar, aircraft that are listed."

13B.3.9 Helicopters and military aircraft have been excluded from this assessment as they perform less than 1% of the aircraft movements at Dublin Airport and therefore do not materially contribute to the noise contours. They have historically been excluded from aircraft noise contours produced for Dublin Airport.

13B.3.10 This is in accordance with EU Directive 2015/996 which states "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 auxiliary power-units."

Runway Usage

Current Situation

13B.3.11 The runway usage for 2018 has been obtained from the individual aircraft movement data for the relevant year. A summary of the overall runway split for the 2018 annual period is given in Table 13B-8.

Table 13B-8: 2018 Annual Runway Usage

Runway	Arrivals	Departures
10	23.3%	24.1%
28	72.2%	71.4%
16	3.8%	2.4%
34	0.6%	2.1%

13B.3.12 The runway usage for 2019 has been obtained from the individual aircraft movement data for the relevant year. A summary of the overall runway split for the 2019 annual period is given in Table 13B-9.

Table 13B-9: 2019 Annual Runway Usage

Runway	Arrivals	Departures
10	21.1%	20.8%
28	77.9%	76.7%
16	0.8%	0.3%
34	0.2%	2.2%

[2] Aircraft Noise and Performance Database, https://www.aircraftnoisemodel.org

North Runway Airport Layout

13B.3.13 Once the North Runway is operational the cross runway (16/34) will continue to be used, however only for essential use (e.g. when there are strong crosswinds) as stated in Condition 4 of the North Runway Permission. Specifically, for the purposes of noise modelling the future usage of the cross runway is assumed to be 1% of aircraft movements, with the remaining 99% of movements on the two main runways. 0.75% of aircraft movements are forecast to use Runway 16 with the remaining 0.25% on Runway 34. The modelled future runway usage over a given year is summarised in Table 13B-10 below, based on the average runway usage over the last 10 years and allowing for the expected reduction in cross runway usage.

Table 13B-10: Future Runway Usage

Runway	Arrivals	Departures
10L/10R	29%	29%
28L/28R	70%	70%
16	0.75%	0.75%
34	0.25%	0.25%

13B.3.14 In the 2025 Consented scenario, for the night time period the same modelled runway usage has been used as the modelling undertaken in the 2004-2007 North Runway planning process, which was approximately 25% of aircraft movements using runway 10 and 75% using runway 28. For the day and evening periods the modelled runway was not given in the information available, so the runway usage in Table 13B-10 has been applied.

13B.3.15 Once the North Runway is operational Dublin Airport will operate during the daytime (07:00 – 23:00) in accordance with Conditions 3a-3c per the mode of operation Option 7b, as detailed in the Environmental Impact Statement Addendum, Section 16 as received by the planning authority on the 9th day of August, 2005. This provides that:

a. "the parallel runways (10R-28L and 10L-28R) shall be used in preference to the cross runway, 16-34,

b. when winds are westerly, Runway 28L shall be preferred for arriving aircraft. Either Runway 28L or 28R shall be used for departing aircraft as determined by air traffic control,

c. when winds are easterly, either Runway 10L or 10R as determined by air traffic control shall be preferred for arriving aircraft. Runway 10R shall be preferred for departing aircraft,

except in cases of safety, maintenance considerations, exceptional air traffic conditions, adverse weather, technical faults in air traffic control systems or declared emergencies at other airports."

13B.3.16 In practice it is expected that, unless capacity requires mixed mode, the runways will operate in segregated mode during the daytime with arrivals using either Runway 10L or Runway 28L and departures using either Runway 10R or Runway 28R depending on wind direction.

13B.3.17 Any movements by Code F aircraft are an exception to this, as they will always use the North Runway. It is also proposed that departures by Category A & B aircraft heading south during westerly operations will use the South Runway, and those heading north during easterly operations will use the North Runway.

13B.3.18 A method of determining mixed mode runway usage on the main runways (North and South) for modelling purposes has been developed. The modelled runway usage has been determined on an hourly basis.

13B.3.19 Most of the time the runways will operate in segregated mode, i.e. one runway for all arrivals, the other for all departures. However, there will be occasions during peak hours when runways will need to operate in some degree of mixed mode, i.e. both runways used simultaneously for arrivals and/or departures. The change from segregated to mixed mode and back to segregated mode will be determined by air traffic control (ATC) and once changed to a particular mode the airport is likely to operate in that mode for at least two hours.

13B.3.20 The method assumes activity switches from segregated mode to mixed mode where activity is such that any of the three following single runway capacity limits are exceeded:

i. More than 35 arrivals in one hour.

ii. More than 44 departures in one hour.

iii. More than 48 movements (combined arrivals and departures) on one runway in one hour.

13B.3.21 In mixed mode, where each individual runway handles both arrivals and departures, departures will operate using the compass departure principle. This means that if a departure is using a route that turns to the north then the North Runway will be used, and conversely if it is using a route that turns to the south, the South Runway will be used.

13B.3.22 For westerly operations when in mixed mode as few arrivals as possible will use 28R, while not exceeding the single runway capacity limit of 48 combined arrivals and departures on runway 28L. For easterly operations when in mixed mode as few arrivals as possible will use 10R, while not exceeding the single runway capacity limit of 48 combined arrivals and departures on runway 10L.

13B.3.23 When using the North Runway most aircraft will not use the full length on departure, and instead join the runway from the 1st intermediate taxiway. The exceptions are Code E and Code F aircraft, which will typically use the full runway length. All departures on the existing South Runway are assumed to use the full runway length.

13B.3.24 During the night-time period (23:00 – 07:00) for the future Baseline scenarios the south runway is the preferred runway. For the Relevant Action scenarios the south runway is the preferred runway in the core night period (00:00-06:00). Between 23:00 and 00:00 and between 06:00-07:00 the runway usage follows the same principles as in the daytime, i.e. Option 7b.

13B.3.25 The resulting runway usage by hour on an average annual day for both easterly and westerly operations is shown in Table 13B-11 and Table 13B-12 for the Baseline and Consented scenarios, and in Table 13B-13 and Table 13B-14 for the Relevant Action scenarios.

Table 13B-11: Average Annual Day Runway Usage By Hour – Westerly Operations, Baseline and Consented Scenarios

Hour	2022 Baseline		2025 Baseline		2025 Consented	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	9	0	9	0	9	0
01:00-01:59	4	0	4	0	4	0
02:00-02:59	4	0	4	0	4	0
03:00-03:59	1	0	1	0	1	0
04:00-04:59	4	0	4	0	4	0
05:00-05:59	5	0	5	0	4	0
06:00-06:59	15	0	15	0	17	0
07:00-07:59	33	24	37	24	41	34
08:00-08:59	23	7	24	7	25	21
09:00-09:59	17	14	21	16	29	24
10:00-10:59	20	13	21	17	30	25
11:00-11:59	19	16	20	17	30	25
12:00-12:59	21	20	21	21	31	25
13:00-13:59	13	19	15	20	28	23
14:00-14:59	24	17	24	21	35	29
15:00-15:59	10	14	10	15	25	20
16:00-16:59	21	20	21	21	27	22
17:00-17:59	15	20	15	20	22	18
18:00-18:59	21	14	21	14	26	21
19:00-19:59	16	20	17	21	27	22
20:00-20:59	11	15	11	16	16	13
21:00-21:59	15	9	15	9	16	13
22:00-22:59	23	6	23	6	22	18

23:00-23:59	16	0	16	0	16	0

Note: All values rounded to nearest whole number

Table 13B-12: Average Annual Day Runway Usage By Hour – Easterly Operations, Baseline and Consented Scenarios

Hour	2022 Baseline		2025 Baseline		2025 Consented	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	9	0	9	0	9	0
01:00-01:59	4	0	4	0	4	0
02:00-02:59	4	0	4	0	4	0
03:00-03:59	1	0	1	0	1	0
04:00-04:59	4	0	4	0	4	0
05:00-05:59	5	0	5	0	4	0
06:00-06:59	15	0	15	0	17	0
07:00-07:59	21	36	21	40	32	43
08:00-08:59	5	25	5	26	20	27
09:00-09:59	12	19	14	22	22	30
10:00-10:59	10	24	13	24	23	32
11:00-11:59	18	17	18	19	23	31
12:00-12:59	21	20	22	20	24	32
13:00-13:59	16	16	17	18	22	29
14:00-14:59	17	24	21	25	27	37
15:00-15:59	13	11	14	11	19	26
16:00-16:59	20	21	21	21	21	28
17:00-17:59	20	15	20	15	17	23
18:00-18:59	12	23	12	23	20	27
19:00-19:59	19	18	19	19	21	28
20:00-20:59	15	11	16	11	12	16
21:00-21:59	10	14	10	14	12	17
22:00-22:59	6	23	6	23	17	23
23:00-23:59	16	0	16	0	16	0

Note: All values rounded to nearest whole number

Table 13B-13: Average Annual Day Runway Usage By Hour – Westerly Operations, Relevant Action Scenarios

Hour	2022 Relevant Action		2025 Relevant Action	
	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	11	0	11	0
01:00-01:59	4	0	5	0
02:00-02:59	3	0	4	0
03:00-03:59	1	0	1	0
04:00-04:59	8	0	8	0
05:00-05:59	7	0	7	0
06:00-06:59	3	27	4	27
07:00-07:59	10	34	13	34
08:00-08:59	20	10	21	11
09:00-09:59	16	17	20	19
10:00-10:59	21	13	21	17
11:00-11:59	18	17	19	18
12:00-12:59	20	19	21	20
13:00-13:59	16	20	18	21
14:00-14:59	21	20	21	24
15:00-15:59	12	16	12	18
16:00-16:59	20	20	21	21
17:00-17:59	18	17	18	17
18:00-18:59	20	17	20	17
19:00-19:59	16	22	17	22
20:00-20:59	11	13	11	14
21:00-21:59	15	8	15	8
22:00-22:59	22	6	22	6
23:00-23:59	17	1	18	1

Note: All values rounded to nearest whole number

Table 13B-14: Average Annual Day Runway Usage By Hour – Easterly Operations, Relevant Action Scenarios

Hour	2022 Relevant Action		2025 Relevant Action	
	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	11	0	11	0
01:00-01:59	4	0	5	0
02:00-02:59	3	0	4	0
03:00-03:59	1	0	1	0
04:00-04:59	8	0	8	0
05:00-05:59	7	0	7	0
06:00-06:59	27	3	27	4
07:00-07:59	30	13	30	17
08:00-08:59	11	20	12	21
09:00-09:59	15	18	17	21
10:00-10:59	10	25	13	25
11:00-11:59	19	16	19	18
12:00-12:59	20	19	21	19
13:00-13:59	17	19	18	21
14:00-14:59	20	20	24	21
15:00-15:59	14	13	16	13
16:00-16:59	20	20	21	21
17:00-17:59	17	18	17	18
18:00-18:59	15	21	15	21
19:00-19:59	20	18	21	19
20:00-20:59	13	11	14	11
21:00-21:59	9	14	9	14
22:00-22:59	6	22	6	22
23:00-23:59	1	17	1	18

Note: All values rounded to nearest whole number

Flight Routes

13B.3.26 Flight routes refer to the ground tracks followed by aircraft. In practice every aircraft follows a slightly different route, depending on the weather conditions and aircraft characteristics. For modelling purposes, it is typically considered sufficient to model each distinct route using what is known as a backbone track, as well as a number of sub-tracks either side of the backbone tracks to represent the variation in actual routes flown.

13B.3.27 This approach is in accordance with EU Directive 2015/996 which states that "It is common practice to treat the data for a single route as a sample from a single population; i.e. to be represented by one backbone track and one set of dispersed subtracks."

13B.3.28 This approach has the benefit of reducing the complexity of the noise model without significantly affecting its accuracy, as well as enabling the current and future operations to be modelled on the same basis.

Flight Routes – Current Situation

13B.3.29 For the cross runway straight arrival routes have been used with a set of modelled departure routes for Category A & B and Category C & D aircraft, which have been developed based on the published SIDs.

13B.3.30 For the main runway, based on an analysis of radar data in 2018, approaching aircraft are generally lined up with the extended centreline of the runway at least 17 km from the runway threshold. Consequently, the main runway approach routes have been modelled as straight out to this point. Before this point arrivals are modelled using 7 routes which cover the broad swathe of directions that the arriving aircraft approach from. Flights have been equally distributed between the 7 routes. The modelled current arrival routes are shown in pink on Figure 13B-2.

13B.3.31 For departures on the current main runway (10/28), that will be known as 10R/28L in the future, the current routes used vary with aircraft type and destination.

13B.3.32 Category A & B aircraft, which are predominantly turboprops such as the ATR 72, are not required by the IAA to remain within the existing environmental corridors to the same extent as the larger jet aircraft types. They therefore commonly turn off the extended runway centreline to the north or south shortly after the end of the runway. A review of radar tracks for recent activity has resulted in a set of routes for these aircraft types shown in red on Figure 13B-2.

13B.3.33 Currently the airport has a total of 11 Standard Instrument Departure (SID) routes for westerly operations and 10 for easterly operations, although in both cases a number are initially the same until after they have left the study area. Given this similarity, for noise modelling purposes a set of seven initial departure routes have been created from the western end and four initial departure routes from the eastern end. Table 13B-15 shows which route has been used to model each SID and gives the initial direction of the routes.

Table 13B-15: Departure Routes Used to Model SIDs

SID	Modelled Route		Initial Direction
	Westerly Operations	Easterly Operations	
BAMLI	ROTEV	ROTEV	North
BEPAN	NEPOD	NEPOD	South
DEXEN	DEXEN	DEXEN	East
INKUR	INKUR	ROTEV	West
LIFFY	LIFFY	LIFFY	East
OLONO	NEPOD	NEPOD	South
PELIG[1]	PELIG	-	West
PESIT	NEPOD	NEPOD	South
NEVRI	ROTEV	ROTEV	North
ROTEV	ROTEV	ROTEV	North
SUROX	SUROX	ROTEV	North

[1] Westerly Operations Only

13B.3.34 For Category C & D aircraft, which are jet engined aircraft, these routes have been supplemented for departures to the west by routes that turn earlier, although not as early as Category A & B aircraft routes. This assumption originally arose from a detailed review of 2010 radar data and has been confirmed as remaining appropriate by a review of recent radar data. These reviews found that many of the Category C & D on runway 28 actually performed their initial turn earlier than described by the SIDs. This is because after reaching an altitude of 3000 ft, they are vectored off by ATC. Two additional 'Early Turn' routes were therefore created for each route with initial turns to the north, south, or east, i.e. the ROTEV, NEPOD, LIFFY and DEXEN routes. Traffic has been distributed equally between the three turning points, i.e. the two early turns and the SID, for each route.

13B.3.35 The modelled current Category C & D routes are shown in blue on Figure 13B-2.

Flight Routes – North Runway Airport Layout

13B.3.36 Due to the expected reduction in the use of the cross runway in the future, the areas exposed to the minimum noise levels of interest do not reach the point where aircraft turn off the extended runway centreline. Straight arrival and departure routes have therefore been used for the cross runway in the interests of reducing the complexity of the model.

13B.3.37 Arrival routes for the existing South Runway have been modelled as the same as the current routes. Arrival routes have been created for the North Runway which replicate those for the South Runway. The modelled arrival routes based on the future North Runway airport layout are shown on Figures 13B-3 and 13B-4.

13B.3.38 Once the North Runway is in use Category A & B aircraft will continue to turn off the extended runway centreline shortly after the end of the runway, however they will not be allowed to turn across the other runway, i.e. they cannot turn north off the south runway and vice versa. A new set of departure routes has therefore been developed for Category A & B aircraft. From the southern runway this replicates the current routes, but with no turns to the north. For the North Runway the routes have been designed to replicate the current routes as closely as possible but with no turns to the south as shown in Figures 13B-3 and 13B-4.

13B.3.39 For Category C & D aircraft a number of the modelled routes have been used to represent more than one of the SIDs, so combining the traffic on some of the SIDs onto a single modelled route. The departure routes to the west are supplemented by early turn routes, similar to the current routes.

13B.3.40 In order to achieve a safe minimum separation between departures and arrivals performing a go around and based on public consultation and a subsequent detailed safety assessment by the Air Traffic Service Provider, a course divergence of at least 30° is required. As the runways are parallel this necessitated an early turn by departures from the North Runway.

13B.3.41 An analysis was undertaken to determine the best initial turn angles taking into account the resulting noise, and the local community was consulted on the options. The analysis concluded that that for departures to the west there were limited differences between the various turn angle options, but an initial turn or 15° or 30° to the north was favourable in terms of the overall numbers of sensitive receptors under the flight path. This was supplemented with a 75° initial turn for departures heading to the north or west off North Runway in westerly departures. For departures to the east an initial turn of 15° to the north was the most favourable option. The public consultation resulted in the 15°/75° divergence to the west off North Runway and 15° to the east going forward for further analysis.

13B.3.42 The subsequent detailed airspace design indicated that a course divergence of at least 30° was required for westerly departures in order to allow for safety requirements associated with potential missed approaches or go arounds. The final set of divergence was therefore selected to be 30° and 75° to the west and 15° to the east.

13B.3.43 A set of departure routes from the North Runway was then developed that replicated the current routes as closely as possible, while allowing for these initial turns. The result is routes with an early turn to the north. When heading east all of the routes turn 15° at 1.06nm from the end of the runway. When heading to the west the routes to DEXEN, INKUR, NEPOD, PELIG and SUROX turn 30°, while those to ABBEY and ROTEV turn 75°, all at 1.18nm from the end of the runway.

13B.3.44 The departures on the South Runway continue along the extended runway centreline before turning.

13B.3.45 The modelled current Category C & D routes are shown in blue on Figures 13B-3 and 13B-4.

13B.3.46 This approach is in accordance with EU Directive 2015/996 which states that "In many cases is not possible to model flight paths on the basis of radar data — because the necessary resources are not available or because the scenario is a future one for which there are no relevant radar data. In the absence of radar data, or when its use is inappropriate, it is necessary to estimate the flight paths on the basis of operational guidance material".

Dispersion

13B.3.47 Aircraft on departure are allocated a route to follow. In practice, this route is not followed precisely by all aircraft allocated to this route. The actual pattern of departing aircraft is dispersed about the route's centreline. The degree of dispersion is normally a function of the distance travelled by an aircraft along the route after take-off and also on the form of the route.

13B.3.48 When considering many departures, it is commonly found that the spread of aircraft approximates to a "normal distribution" pattern, the shape or spread of which will vary with distance along the route. A simplified mathematical model can be adopted to represent a normal distribution of events, based on standard deviations. EU Directive 2015/996 advises the use of seven "dispersed" tracks associated with each departure route, these comprise the Centreline of each route and the three Sub Tracks either side.

13B.3.49 The allocation of movements to each track for this assessment was as follows:

- 28.2% of departures along the Centreline;
- 22.2% of departures along each of the two inner Sub Tracks either side of the Centreline and offset by a distance of 0.71 standard deviation;
- 10.6% of departures along each of the 2nd pair of Sub Tracks either side of the Centreline and offset by a distance of 1.43 standard deviation;
- 3.1% of departures along each of the two outer Sub Tracks either side of the Centreline and offset by a distance of 2.14 standard deviations.

13B.3.50 This dispersion model has been applied with a departure offset profile, which comprises the standard deviations of the magnitude of the dispersion for lengths of straight and curved track. These have been determined from a detailed analysis of radar tracks for operations in 2016 at Dublin. Operations in 2018 have been reviewed and found to follow a similar distribution.

Route Usage

13B.3.51 The actual aircraft movement logs for years that have already occurred provide destination airports for each departure movement. This has been combined with an assessment that has been carried out of which departure route is used for each destination which utilise the direction it is from Dublin.

13B.3.52 The forecasts for future years generally include departure route information for each movement, which has been used. Where departure route information is not available, a departure route has been assigned based on the destination airport.

13B.3.53 In the 2025 Consented scenario, for the night time period the modelling undertaken in the 2004-2007 North Runway planning process has been reviewed and the route has been mapped on to the equivalent route in the latest model. For the day and evening periods, the route was not given so it has been assumed that the distribution between routes is the same as the latest future forecasts.

Flight Profiles

Arrival Profiles

13B.3.54 The standard arrival profiles for many of the aircraft in the AEDT database include level sections. An analysis of radar data found these do not occur at Dublin, therefore 3 degree continuous descent approach profiles have been created and used for all aircraft types.

Departure Profiles

13B.3.55 For the most common aircraft, based on confidential information provided by airlines, custom "USER" profiles have been created that more closely replicate the procedures used by aircraft departing from Dublin Airport. These profiles broadly replicate NADP2 procedures with a lower initial thrust than maximum on take-off.

13B.3.56 The AEDT departure profiles for many of the aircraft in the AEDT database finish at 10,000 ft. To allow predictions over the whole of the study area these profiles have been extended to 30,000 ft or for certain aircraft the maximum altitude AEDT calculates to be achievable for the particular aircraft type. These user-defined profiles have been denoted "30KFT".

13B.3.57 This approach is in line with EU Directive 2015/996 which advises that "Caution must be exercised before adopting default procedural steps provided in the ANP database (customarily assumed when actual procedures are not known). These are standardised procedures that are widely followed but which may or may not be used by operators in particular cases".

Stage Lengths

13B.3.58 For departure movements the AEDT software offers a number of flight profiles for most aircraft types, and in particular for the larger aircraft types. These relate to different departure weights which are greatly affected by the length of the flight, and consequently the fuel load. In the AEDT software this is referred to as the stage length and is in increments of 500 nm up to 1,500 nm and then in increments of 1,000 nm. The AEDT software assumes all aircraft take off with a full passenger load irrespective of stage length. As the stage length increases the aircraft has to depart with greater fuel and so its flight profile is slightly lower than when a shorter stage length is flown.

13B.3.59 For some of the aircraft types, in particular the smaller aircraft, only one stage length is available in the AEDT software. For the remainder a stage length was chosen based on the distance to the destination airport.

13B.3.60 This approach complies with EU Directive 2015/996 which states that "Vertical dispersion is usually represented satisfactorily by accounting for the effects of varying aircraft weights on the vertical profiles."

AEDT Validation

13B.3.61 For the 2025 Consented scenario, the default noise levels of aircraft in the model have been used, in order to replicate the approach followed in the 2004-2007 North Runway planning process. For the other scenarios, results from the Dublin Airport Noise and Track Keeping (NTK) system have been used for noise validation purposes. Specifically, the results from Noise Monitoring Terminals (NMTs) 1, 2 and 20 between January and December 2018 have been used.

13B.3.62 The noise levels from the monitors are automatically correlated with aircraft movements using the radar track keeping system and the average determined by aircraft type and operation. A number of parameters are measured by the system, for this validation the Sound Exposure Level (SEL) of the individual aircraft movements has been used.

13B.3.63 To take into account the measured levels the AEDT software has been used to predict the level at the NMT locations using the recommended AEDT aircraft type. This has been compared to the measured averages for the aircraft types when separately arriving and departing. Where the differences between the measured and predicted results were found to be significant then adjustments were made to the modelling to minimise differences. This was done by adjusting the AEDT NPD data for the modelled aircraft types so that the movement-weighted average modelled noise levels at the NMTs matched the measured level noise level.

13B.3.64 Seventeen aircraft have had modifications made to their arrival and departure noise assumptions. The modifications are detailed in Table 13B-16 below.

Table 13B-16: Modifications to AEDT Default Assumptions

Aircraft Type	Arrivals		Departures		
	AEDT Type	Adjustment (dB)	AEDT Type	Profile	Adjustment (dB)
A306	A300-622R	-3.1	A300-622R	30KFT	+0.6
A319	A319-131	-1.4	A319-131	30KFT	+0.9
A320	A320-211	-0.7	A320-211	USER	-1.3
A320neo	A320-211	-2.0	A320-211	USER	-3.2
A321	A321-232	-0.4	A321-232	USER	-0.5
A332	A330-301	-1.3	A330-301	30KFT	-1.1
A333	A330-301	-1.1	A330-301	30KFT	-0.8
ATR72	SD330	+1.5	SD330	30KFT [2]	+0.1[3]
B734	737400	+0.4	737400	30KFT	-0.1
B738	737800	-2.7	737800	USER	-1.2
B738MAX	7878max	-3.0	7378max	USER	-1.5
B752	757RR	-0.4	757RR	30KFT	-2.3
B772	777200	+0.2	777200	30KFT	+1.5
B773	777300	-0.8	777300	30KFT	-2.4
B787	7878R	-0.3	7878R	30KFT	+0.1
E190	EMB190	-0.8	EMB190	30KFT	+0.5
RJ85	BAE146	-3.3	BAE146	30KFT [2]	-1.6
DH4[1]	SD330	0	DHC6	30KFT [2]	0

[1] The DH4 type was not validated due to insufficient results. The modelled AEDT types are based on BAP's experience of this aircraft at other airports where it operates more frequently, as the default AEDT suggested type of DHC830 typically leads to significant under-prediction of noise levels.

[2] Maximum altitude limited to AEDT calculated max for the AEDT type.

[3] This aircraft does not routinely depart over NMT20 as it turns before reaching it, validation has therefore been based solely on measured results from NMTs 1 & 2.

13B.3.65 These modifications achieve a better correlation between predicted and measured noise at the airport, resulting in differences between predicted and measured levels of less than 1 dB at each of the three NMTs. The exception is the RJ85 which has a difference between modelled noise levels and measured noise levels at NMT20 of more than 2 dB. For this aircraft NMT20 correlates fewer departures than NMT2. It is possible that NMT20 is only recording the loudest departures by this aircraft, resulting in an average measured level that is not representative.

13B.3.66 This is in line with EU Directive 2015/996, which requires that "All input values affecting the emission level of a source, including the position of the source, shall be determined with at least the accuracy corresponding to an uncertainty of ± 2dB(A) in the emission level of the source".

Performance of Modernised Aircraft Types

13B.3.67 The degree of expected improvement in noise levels for the recently introduced and future aircraft types in the forecasts which are not contained within the AEDT model are given below in Table 13B-17 for arrivals and departures. The expected improvement in noise levels is based on a comparison with either the current generation aircraft that is being directly replaced, or the most similar aircraft type available in AEDT.

13B.3.68 The expected changes in noise levels are based on the differences in average certification noise levels between the current and modernised aircraft types from the *EASA Approved Noise Levels database*[3] where available. For aircraft whose certification noise levels were not available the assumptions have been based on the assumptions used by the ERCD for the Airports Commission (2014)[4].

[3] https://www.easa.europa.eu/easa-and-you/environment/easa-certification-noise-levels
[4] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/389579/noise_methodology_addendum.pdf

Table 13B-17: Expected Change in Noise Levels between Current and Modernised Aircraft Types

Current Aircraft Type	Modernised Aircraft Type	Expected Change in Noise Levels between Current and Modernised Aircraft Types (dB)	
		Arrival	Departure
737700	Bombardier CS300	-3.4	-4.3
Airbus A321	Airbus A321neo	-2.4	-5.4
Airbus A321	Airbus A321LR[1]	-2.4	-5.4
Airbus A330-300	Airbus A330-900neo	-1.1	-4.8
Airbus A330-300	Airbus A350-900	-3.0	-7.5
Boeing 777-300	Boeing 777X[2]	-0.8	-3.8
Embraer E190	Embraer E190-E2	-1.9	-6.2

[1] Based on A321neo certification noise levels

[2] Based on ERCD assumptions

13B.4 Population and Demographics Assessment Methodology

Dwelling and Population Data

13B.4.1 Dwelling data has been acquired from GeoDirectory for 2019 Q2, which was the latest available dataset when the assessment work began. The same dataset has been used for all assessment scenarios in order to aid comparison between scenarios.

13B.4.2 An assessment of not yet built dwellings, which have already been granted planning permission, has been carried out. This has utilised information on permitted developments provided by Tom Phillips and Associates (TPA) which has been compared to the data from GeoDirectory, as a number of the developments are progressing on site. This resulted in a separate permitted dwellings database.

13B.4.3 Population data has been estimated using the average dwelling occupancy by small area. This has been obtained for 2016 based on Census data from the Central Statistics Office[5]. It has then been determined into which of the small areas each of the dwellings falls, based upon which they have been assigned the average dwelling occupancy for the area. This approach is in line with that used for the last round of Noise Mapping.

13B.4.4 An assessment of zoned land has also been undertaken. This identified a number of areas which are designated for residential use. Some of these already contain existing or permitted dwellings and so are included in those datasets. The remaining areas have been assumed to have future developments with an average density of 35 dwellings per hectare and 3 people per dwelling. The dwelling density is based on a recent planning history search for the various sites and relevant local area plans. 3 people per dwelling is a conservative estimate based on the 2016 Census data, which found an average occupancy of a little under 3 people per dwelling for the study area.

Community Buildings

13B.4.5 Noise sensitive community buildings have been identified through a review of the GeoDirectory data. For the purposes of this assessment noise sensitive education buildings include nurseries, schools, colleges and universities, but not day-care or creches. Noise sensitive healthcare buildings include healthcare facilities where people may have an overnight stay such as hospitals or nursing homes, but not GP surgeries or dentists.

[5] http://www.cso.ie/px/pxeirestat/Statire/SelectVarVal/Define.asp?maintable=EP008

Noise prediction

13B.4.6 Each dwelling and community building has been included in the AEDT model as a receptor. A representative set of receptors has been created for each permitted development and zoned land area based on site plans and other publicly available information. Noise levels have been predicted at each of these receptor locations.

13C. Air noise modelling results and figures

13C.1 Introduction

13C.1.1 This appendix of the Environmental Impact Assessment Report (EIAR), prepared by Bickerdike Allen Partners LLP, presents the results of the air noise modelling. The modelling methodology, including the derivation of the dwelling and population counts, is described in Appendix 13B.

13C.2 Assessment Scenarios

13C.2.1 The following scenarios have been modelled as part of the air noise assessment:

- 2018 Baseline
- 2019 Baseline
- 2022 Baseline
- 2022 Relevant Action
- 2025 Baseline
- 2025 Consented
- 2025 Relevant Action

13C.3 Assessment Metrics

13C.3.1 For each assessment scenario, the following metrics have been assessed:

- L_{den}, the average annual 24-hour noise level with a 5 dB penalty applied during the evening (19:00-23:00) and a 10 dB penalty applied during the night (23:00-07:00)
- L_{night}, the average annual noise level at night (23:00-07:00)
- $L_{Aeq,16h}$, the average summer noise level during the 16-hour day (07:00-23:00)
- $L_{Aeq,8h}$, the average summer noise level during the night (23:00-07:00)
- N65, the number of aircraft exceeding 65 dB L_{Amax} during the average summer day (07:00-23:00)
- N60, the number of aircraft exceeding 60 dB L_{Amax} during the average summer night (23:00-07:00)
- L_{day}, the average annual noise level during the 12-hour day (07:00-19:00)
- $L_{evening}$, the average annual noise level during the evening (19:00-23:00)

13C.3.2 "Summer" in the above list refers to the 92-day period between 16 June and 15 September inclusive. This typically corresponds to the busiest period of the year.

13C.4 Assessment Results

Figures

13C.4.1 For each assessment scenario and metric, the results are first presented in a series of figures, showing contours on an Ordnance Survey base map. Table 13C-1 provides a reference to aid finding a specific figure.

Table 13C-1: Contour Figure References

Scenario	Metric and Figure Reference							
	L_{den}	L_{night}	$L_{Aeq,16h}$	$L_{Aeq,8h}$	N65	N60	L_{day}	$L_{evening}$
2018 Baseline	13C-1	13C-2	13C-3	13C-4	13C-5	13C-6	13C-7	13C-8
2019 Baseline	13C-41	13C-42	13C-43	13C-44	13C-45	13C-46	13C-47	13C-48
2022 Baseline	13C-9	13C-10	13C-11	13C-12	13C-13	13C-14	13C-15	13C-16
2022 Relevant Action	13C-17	13C-18	13C-19	13C-20	13C-21	13C-22	13C-23	13C-24
2025 Baseline	13C-25	13C-26	13C-27	13C-28	13C-29	13C-30	13C-31	13C-32
2025 Consented	13C-49	13C-50	13C-51	13C-52	13C-53	13C-54	13C-55	13C-56
2025 Relevant Action	13C-33	13C-34	13C-35	13C-36	13C-37	13C-38	13C-39	13C-40

Contour Areas, Dwelling and Population Counts

13C.4.2 For each assessment scenario and metric, the tables below present the area of each contour, as well as the number of dwellings and people with it. The dwelling and population counts are presented in three categories:

- Existing dwellings
- Permitted dwellings, i.e. those with planning permission that are not yet built
- Zoned dwellings, i.e. those that are expected to be built in areas zoned for residential development.

13C.4.3 All of the areas and counts below are cumulative, i.e. the people within a 60 dB contour would also be counted as within the corresponding 50 dB contour. Table 13C-2 provides a reference to aid finding a specific result.

Table 13C-2: Contour Area, Dwelling and Population Count Table References

Metric	Result Item and Table Reference						
	Contour Areas	Existing Dwelling Counts	Permitted Dwelling Counts	Zoned Dwelling Counts	Existing Population Counts	Permitted Population Counts	Zoned Population Counts
L_{den}	Table 13C-3	Table 13C-11	Table 13C-19	Table 13C-27	Table 13C-35	Table 13C-43	Table 13C-51
L_{night}	Table 13C-4	Table 13C-12	Table 13C-20	Table 13C-28	Table 13C-36	Table 13C-44	Table 13C-52
$L_{Aeq,16h}$	Table 13C-5	Table 13C-13	Table 13C-21	Table 13C-29	Table 13C-37	Table 13C-45	Table 13C-53
$L_{Aeq,8h}$	Table 13C-6	Table 13C-14	Table 13C-22	Table 13C-30	Table 13C-38	Table 13C-46	Table 13C-54
N65	Table 13C-7	Table 13C-15	Table 13C-23	Table 13C-31	Table 13C-39	Table 13C-47	Table 13C-55

N60	Table 13C-8	Table 13C-16	Table 13C-24	Table 13C-32	Table 13C-40	Table 13C-48	Table 13C-56
L_{day}	Table 13C-9	Table 13C-17	Table 13C-25	Table 13C-33	Table 13C-41	Table 13C-49	Table 13C-57
$L_{evening}$	Table 13C-10	Table 13C-18	Table 13C-26	Table 13C-34	Table 13C-42	Table 13C-50	Table 13C-58

Table 13C-3: Contour Areas, L_{den} Metric

Metric Value, dB L_{den}	Scenario and Contour Area, km²						
	2018 Baseline	*2019 Baseline*	*2022 Baseline*	*2022 Relevant Action*	*2025 Baseline*	*2025 Consented*	*2025 Relevant Action*
≥ 45	703.2	745.7	645.4	742.4	627.4	1110.9	737.5
≥ 50	209.3	218.7	196.1	221.3	193.5	321.3	220.3
≥ 55	85.9	88.3	83.7	93.2	82.6	127.3	92.8
≥ 60	33.5	35.6	32.4	36.5	32.0	50.7	36.3
≥ 65	11.6	12.2	11.5	13.7	11.2	21.0	13.5
≥ 70	4.1	4.4	4.1	4.9	4.0	7.5	4.9
≥ 75	1.7	1.7	1.6	1.9	1.6	2.7	1.8

Table 13C-4: Contour Areas, L_{night} Metric

Metric Value, dB L_{night}	Scenario and Contour Area, km²						
	2018 Baseline	*2019 Baseline*	*2022 Baseline*	*2022 Relevant Action*	*2025 Baseline*	*2025 Consented*	*2025 Relevant Action*
≥ 40	304.4	328.4	191.6	300.9	189.3	299.8	302.0
≥ 45	118.2	122.2	86.4	135.3	85.3	109.0	135.6
≥ 50	48.4	52.3	35.0	52.8	34.3	45.2	52.7
≥ 55	16.8	18.6	11.8	20.3	11.5	16.3	20.3
≥ 60	5.8	6.4	4.0	7.0	3.9	6.0	7.0
≥ 65	2.3	2.5	1.5	2.6	1.5	2.1	2.6
≥ 70	1.0	1.0	0.6	1.1	0.6	0.8	1.0

Table 13C-5: Contour Areas, $L_{Aeq,16h}$ Metric

Metric Value, dB $L_{Aeq,16h}$	Scenario and Contour Area, km²						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 51	111.7	114.3	120.4	117.2	121.1	211.1	118.0
≥ 54	68.2	69.9	70.1	68.1	70.4	125.7	68.4
≥ 57	38.7	39.8	39.7	38.8	39.8	74.3	38.9
≥ 60	20.7	21.3	22.9	22.6	22.8	43.0	22.6
≥ 63	11.1	11.4	12.6	12.6	12.6	24.9	12.5
≥ 66	6.0	6.1	6.9	6.9	6.9	13.9	6.9
≥ 69	3.2	3.3	3.9	3.8	3.8	7.9	3.8

Table 13C-6: Contour Areas, $L_{Aeq,8h}$ Metric

Metric Value, dB $L_{Aeq,8h}$	Scenario and Contour Area, km²						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	132.1	140.1	92.3	144.5	91.1	119.9	144.7
≥ 48	79.3	84.8	55.8	83.8	54.9	72.6	84.2
≥ 51	45.9	50.8	31.0	47.4	30.4	41.6	47.3
≥ 54	24.5	27.8	16.1	27.0	15.7	22.4	26.9
≥ 57	12.7	14.4	8.3	14.4	8.1	12.3	14.4
≥ 60	6.7	7.6	4.3	7.6	4.2	6.8	7.6
≥ 63	3.7	4.1	2.3	4.2	2.3	3.6	4.2

Table 13C-7: Contour Areas, N65 Metric

Metric Value, N65	Scenario and Contour Area, km²						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 10	161.7	168.5	187.6	165.4	187.6	293.0	165.8
≥ 25	105.3	109.2	123.7	124.1	123.0	191.9	123.6
≥ 50	73.9	76.0	91.3	91.5	90.0	128.2	89.9
≥ 100	60.3	61.4	56.6	57.0	58.3	90.8	58.0
≥ 200	40.7	41.0	30.4	31.5	31.1	50.3	33.3
≥ 500	1.8	1.8	0.0	0.0	0.0	1.5	0.0

Table 13C-8: Contour Areas, N60 Metric

Metric Value, N60	Scenario and Contour Area, km²						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 10	147.9	140.1	104.6	161.0	103.8	134.8	160.7
≥ 25	76.3	93.7	52.2	60.8	51.6	47.7	61.4
≥ 50	7.2	30.8	2.9	5.4	2.7	2.9	8.0
≥ 100	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 13C-9: Contour Areas, L_{day} Metric

Metric Value, dB L_{day}	Scenario and Contour Area, km²						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	376.1	356.1	381.2	352.2	387.0	838.5	359.6
≥ 50	130.4	131.2	140.0	135.9	142.5	245.5	138.9
≥ 55	55.9	56.9	56.3	54.7	57.3	102.6	55.7
≥ 60	20.3	20.8	22.3	22.1	22.5	41.4	22.4
≥ 65	7.2	7.4	8.2	8.3	8.3	16.4	8.4
≥ 70	2.7	2.7	3.1	3.1	3.1	6.2	3.1
≥ 75	1.1	1.1	1.3	1.2	1.3	2.3	1.2

Table 13C-10: Contour Areas, $L_{evening}$ Metric

Metric Value, dB $L_{evening}$	Scenario and Contour Area, km²						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	276.5	251.5	297.6	287.5	273.8	526.3	264.1
≥ 50	99.5	98.3	112.8	110.2	107.5	174.8	104.8
≥ 55	40.4	41.0	44.3	43.3	42.4	74.2	41.3
≥ 60	14.1	14.3	17.7	17.2	16.8	30.0	16.2
≥ 65	5.0	5.0	6.4	6.1	5.9	12.1	5.7
≥ 70	1.9	1.9	2.3	2.2	2.2	4.6	2.1
≥ 75	0.8	0.8	0.9	0.8	0.8	1.6	0.8

Table 13C-11: Existing Dwelling Counts, L_{den} Metric

Metric Value, dB L_{den}	Scenario and Existing Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	245,806	261,053	144,617	154,877	140,973	286,358	151,229
≥ 50	61,726	57,115	32,637	36,196	31,566	65,222	35,276
≥ 55	11,887	11,493	7,128	8,360	6,783	16,646	8,125
≥ 60	1,639	2,115	896	1,172	881	2,048	1,193
≥ 65	92	104	44	78	42	173	75
≥ 70	8	10	8	10	7	29	10
≥ 75	0	2	0	0	0	0	0

Table 13C-12: Existing Dwelling Counts, L_{night} Metric

Metric Value, dB L_{night}	Scenario and Existing Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 40	102,538	113,699	47,071	58,236	46,552	82,730	58,554
≥ 45	18,815	19,717	10,566	15,204	10,370	17,294	15,161
≥ 50	4,131	4,522	2,195	2,441	2,132	3,414	2,433
≥ 55	276	558	102	359	101	244	360
≥ 60	19	41	11	20	10	59	20
≥ 65	3	4	0	0	0	4	0
≥ 70	0	0	0	0	0	0	0

Table 13C-13: Existing Dwelling Counts, $L_{Aeq,16h}$ Metric

Metric Value, dB $L_{Aeq,16h}$	Scenario and Existing Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 51	16,457	17,789	13,359	13,286	13,122	37,699	13,042
≥ 54	7,896	8,235	5,129	5,009	4,955	14,945	4,883
≥ 57	2,942	3,115	1,321	1,283	1,319	5,441	1,330
≥ 60	692	741	268	276	302	1,418	315
≥ 63	94	97	68	71	66	315	68
≥ 66	51	54	27	27	26	80	27
≥ 69	7	7	4	3	4	35	3
≥ 72	0	0	0	0	0	6	0

Table 13C-14: Existing Dwelling Counts, $L_{Aeq,8h}$ Metric

Metric Value, dB $L_{Aeq,8h}$	Scenario and Existing Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	22,730	28,086	11,622	16,998	11,404	20,677	16,924
≥ 48	8,927	9,523	4,936	6,643	4,780	8,419	6,635
≥ 51	3,308	3,941	1,714	2,064	1,594	3,006	2,039
≥ 54	878	1,166	563	529	519	781	527
≥ 57	103	191	69	80	63	118	77
≥ 60	40	54	14	24	9	65	26
≥ 63	8	6	4	9	4	10	9
≥ 66	0	0	0	0	0	2	0

Table 13C-15: Existing Dwelling Counts, N65 Metric

Metric Value, N65	Scenario and Existing Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 10	34,035	34,504	22,391	16,941	22,399	54,470	17,137
≥ 25	22,375	25,175	13,849	13,816	13,787	27,668	13,794
≥ 50	8,476	8,678	7,900	8,065	7,723	13,684	7,655
≥ 100	5,915	6,630	3,445	3,463	3,242	7,910	3,027
≥ 200	3,546	3,699	1,326	1,344	1,345	2,638	1,361
≥ 500	0	7	0	0	0	3	0

Table 13C-16: Existing Dwelling Counts, N60 Metric

Metric Value, N60	Scenario and Existing Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 10	22,727	24,679	14,407	20,161	14,386	22,116	20,641
≥ 25	8,037	8,926	4,968	4,110	4,854	2,864	4,061
≥ 50	30	2,594	12	23	11	10	63
≥ 100	0	0	0	0	0	0	0

Table 13C-17: Existing Dwelling Counts, L_{day} Metric

Metric Value, dB L_{day}	Scenario and Existing Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	122,813	112,910	85,386	67,945	82,330	158,057	66,665
≥ 50	25,177	25,440	17,623	16,198	17,710	46,022	16,287
≥ 55	5,757	5,731	3,155	3,129	3,188	10,030	3,178
≥ 60	530	633	201	217	239	1,217	268
≥ 65	64	66	36	36	37	99	37
≥ 70	6	6	3	3	2	25	3
≥ 75	0	0	0	0	0	0	0

Table 13C-18: Existing Dwelling Counts, $L_{evening}$ Metric

Metric Value, dB $L_{evening}$	Scenario and Existing Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	81,266	67,956	49,378	47,559	44,660	111,780	42,710
≥ 50	15,746	14,174	12,730	12,198	11,298	26,041	10,561
≥ 55	2,873	2,997	1,907	1,769	1,668	6,084	1,600
≥ 60	117	126	129	116	111	523	103
≥ 65	10	12	22	21	21	66	19
≥ 70	2	2	0	0	0	13	0
≥ 75	0	0	0	0	0	0	0

Table 13C-19: Permitted Dwelling Counts, L_{den} Metric

Metric Value, dB L_{den}	Scenario and Permitted Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	7,079	7,079	6,798	6,992	6,778	7,115	6,972
≥ 50	5,406	5,392	3,460	3,460	3,459	4,201	3,451
≥ 55	2,013	2,195	1,771	1,848	1,771	2,571	1,802
≥ 60	814	843	300	329	300	455	329
≥ 65	0	0	0	0	0	0	0
≥ 70	0	0	0	0	0	0	0
≥ 75	0	0	0	0	0	0	0

Table 13C-20: Permitted Dwelling Counts, L_{night} Metric

Metric Value, dB L_{night}	Scenario and Permitted Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 40	5,484	5,603	3,795	5,074	3,857	4,337	4,996
≥ 45	2,983	3,022	2,347	2,724	2,347	2,810	2,724
≥ 50	877	996	843	1,000	843	877	912
≥ 55	52	218	0	156	0	32	156
≥ 60	0	0	0	0	0	0	0
≥ 65	0	0	0	0	0	0	0
≥ 70	0	0	0	0	0	0	0

Table 13C-21: Permitted Dwelling Counts, $L_{Aeq,16h}$ Metric

Metric Value, dB $L_{Aeq,16h}$	Scenario and Permitted Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 51	2,909	2,909	2,147	2,147	2,147	3,763	2,147
≥ 54	1,617	1,651	1,118	1,181	1,197	2,411	1,171
≥ 57	843	843	329	329	329	1,141	329
≥ 60	502	532	52	52	104	329	104
≥ 63	0	0	0	0	0	52	0
≥ 66	0	0	0	0	0	0	0
≥ 69	0	0	0	0	0	0	0

Table 13C-22: Permitted Dwelling Counts, $L_{Aeq,8h}$ Metric

Metric Value, dB $L_{Aeq,8h}$	Scenario and Permitted Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	3,001	3,178	2,548	2,785	2,548	3,056	2,785
≥ 48	1,817	1,919	1,555	1,853	1,521	1,818	1,853
≥ 51	843	996	843	425	843	843	425
≥ 54	468	814	188	270	188	533	270
≥ 57	0	52	0	0	0	0	0
≥ 60	0	0	0	0	0	0	0
≥ 63	0	0	0	0	0	0	0

Table 13C-23: Permitted Dwelling Counts, N65 Metric

Metric Value, N65	Scenario and Permitted Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 10	4,659	4,659	3,125	2,408	3,125	5,324	2,408
≥ 25	2,604	3,377	2,130	2,130	2,130	3,441	2,130
≥ 50	1,588	1,626	1,326	1,458	1,311	1,913	1,326
≥ 100	939	939	365	365	359	1,250	546
≥ 200	843	843	329	329	329	831	329
≥ 500	0	0	0	0	0	0	0

Table 13C-24: Permitted Dwelling Counts, N60 Metric

Metric Value, N60	Scenario and Permitted Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 10	3,615	4,036	2,482	2,835	2,447	3,048	2,835
≥ 25	1,803	1,852	1,676	1,247	1,676	1,273	1,247
≥ 50	0	1,156	0	0	0	0	0
≥ 100	0	0	0	0	0	0	0

Table 13C-25: Permitted Dwelling Counts, L_{day} Metric

Metric Value, dB L_{day}	Scenario and Permitted Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	6,115	6,057	6,349	4,251	6,349	6,906	4,312
≥ 50	3,078	3,065	2,835	2,321	2,788	4,019	2,225
≥ 55	1,290	1,325	763	789	776	1,596	802
≥ 60	190	404	0	0	52	300	52
≥ 65	0	0	0	0	0	0	0
≥ 70	0	0	0	0	0	0	0
≥ 75	0	0	0	0	0	0	0

Table 13C-26: Permitted Dwelling Counts, $L_{evening}$ Metric

Metric Value, dB $L_{evening}$	Scenario and Permitted Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	5,509	5,351	3,717	3,386	3,373	6,645	3,329
≥ 50	2,839	2,801	2,147	2,008	1,958	2,836	1,958
≥ 55	843	843	363	329	329	1,262	329
≥ 60	0	0	0	0	0	270	0
≥ 65	0	0	0	0	0	0	0
≥ 70	0	0	0	0	0	0	0
≥ 75	0	0	0	0	0	0	0

Table 13C-27: Zoned Dwelling Counts, L_{den} Metric

Metric Value, dB L_{den}	Scenario and Zoned Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	4,500	4,500	4,500	4,500	4,500	4,500	4,500
≥ 50	4,200	4,200	4,300	4,300	4,300	4,500	4,400
≥ 55	4,200	4,200	4,200	4,100	4,200	4,200	4,100
≥ 60	2,500	2,600	1,300	1,500	1,300	2,300	1,500
≥ 65	0	0	0	0	0	0	0
≥ 70	0	0	0	0	0	0	0
≥ 75	0	0	0	0	0	0	0

Table 13C-28: Zoned Dwelling Counts, L_{night} Metric

Metric Value, dB L_{night}	Scenario and Zoned Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 40	4,400	4,500	4,400	4,500	4,400	4,500	4,500
≥ 45	4,200	4,200	4,200	4,200	4,200	4,200	4,200
≥ 50	2,800	3,000	2,700	2,900	2,700	3,000	2,900
≥ 55	0	600	0	300	0	0	400
≥ 60	0	0	0	0	0	0	0
≥ 65	0	0	0	0	0	0	0
≥ 70	0	0	0	0	0	0	0

Table 13C-29: Zoned Dwelling Counts, $L_{Aeq,16h}$ Metric

Metric Value, dB $L_{Aeq,16h}$	Scenario and Zoned Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 51	4,200	4,200	3,000	3,000	3,000	4,500	3,000
≥ 54	3,500	3,500	2,500	2,600	2,500	4,200	2,600
≥ 57	2,700	2,700	1,500	1,500	1,500	2,600	1,500
≥ 60	1,200	1,400	0	0	0	1,500	0
≥ 63	0	0	0	0	0	0	0
≥ 66	0	0	0	0	0	0	0
≥ 69	0	0	0	0	0	0	0

Table 13C-30: Zoned Dwelling Counts, $L_{Aeq,8h}$ Metric

Metric Value, dB $L_{Aeq,8h}$	Scenario and Zoned Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	4,200	4,200	4,200	4,200	4,200	4,200	4,200
≥ 48	3,600	4,100	3,500	4,200	3,500	4,200	4,200
≥ 51	2,700	3,000	2,700	2,800	2,700	2,800	2,600
≥ 54	1,700	2,500	900	1,300	600	2,100	1,300
≥ 57	0	0	0	0	0	0	0
≥ 60	0	0	0	0	0	0	0
≥ 63	0	0	0	0	0	0	0

Table 13C-31: Zoned Dwelling Counts, N65 Metric

Metric Value, N65	Scenario and Zoned Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 10	4,200	4,200	4,200	3,000	4,200	4,500	3,000
≥ 25	4,200	4,200	3,000	3,000	3,000	4,500	3,000
≥ 50	3,500	3,600	3,000	3,000	3,000	3,000	3,000
≥ 100	2,700	2,700	1,500	1,500	1,500	3,000	1,800
≥ 200	2,700	2,700	1,500	1,500	1,500	1,800	1,500
≥ 500	0	0	0	0	0	0	0

Table 13C-32: Zoned Dwelling Counts, N60 Metric

Metric Value, N60	Scenario and Zoned Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 10	4,200	4,200	4,200	4,200	4,200	4,200	4,200
≥ 25	3,600	3,600	3,600	2,400	3,600	3,400	2,400
≥ 50	0	2,400	0	0	0	0	0
≥ 100	0	0	0	0	0	0	0

Table 13C-33: Zoned Dwelling Counts, L_{day} Metric

Metric Value, dB L_{day}	Scenario and Zoned Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	4,500	4,500	4,500	4,200	4,500	4,500	4,200
≥ 50	4,200	4,200	4,100	3,000	4,000	4,500	3,000
≥ 55	3,100	3,000	1,800	2,000	1,800	3,400	2,000
≥ 60	800	900	0	0	0	1,500	0
≥ 65	0	0	0	0	0	0	0
≥ 70	0	0	0	0	0	0	0
≥ 75	0	0	0	0	0	0	0

Table 13C-34: Zoned Dwelling Counts, $L_{evening}$ Metric

Metric Value, dB $L_{evening}$	Scenario and Zoned Dwelling Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	4,500	4,400	3,500	3,500	3,400	4,500	3,400
≥ 50	4,200	4,200	3,000	3,000	3,000	3,000	3,000
≥ 55	2,700	2,700	1,800	1,700	1,600	3,000	1,600
≥ 60	0	0	0	0	0	1,200	0
≥ 65	0	0	0	0	0	0	0
≥ 70	0	0	0	0	0	0	0
≥ 75	0	0	0	0	0	0	0

Table 13C-35: Existing Population Counts, L_{den} Metric

Metric Value, dB L_{den}	Scenario and Existing Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	716,719	754,135	430,569	458,833	419,838	806,461	448,076
≥ 50	184,770	174,146	97,385	107,643	94,122	193,793	104,907
≥ 55	35,476	34,097	20,811	23,830	19,771	49,135	23,171
≥ 60	4,710	6,279	2,410	3,207	2,389	5,548	3,247
≥ 65	251	285	133	227	128	472	218
≥ 70	25	31	26	32	23	89	32
≥ 75	0	6	0	0	0	0	0

Table 13C-36: Existing Population Counts, L_{night} Metric

Metric Value, dB L_{night}	Scenario and Existing Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 40	307,457	344,912	143,248	173,582	141,767	243,163	174,473
≥ 45	55,492	59,307	31,447	44,013	30,882	51,486	43,855
≥ 50	12,316	13,838	6,247	6,761	6,032	10,511	6,729
≥ 55	753	1,533	284	1,152	281	495	1,157
≥ 60	56	110	34	62	31	156	62
≥ 65	10	13	0	0	0	13	0
≥ 70	0	0	0	0	0	0	0

Table 13C-37: Existing Population Counts, $L_{Aeq,16h}$ Metric

Metric Value, dB $L_{Aeq,16h}$	Scenario and Existing Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 51	49,104	53,272	38,246	37,887	37,590	111,499	37,149
≥ 54	23,678	24,616	14,867	14,563	14,405	43,155	14,209
≥ 57	9,172	9,700	3,653	3,551	3,627	15,730	3,664
≥ 60	1,992	2,152	854	883	965	3,938	1,005
≥ 63	251	260	196	205	190	988	196
≥ 66	132	140	82	82	79	228	82
≥ 69	22	22	13	10	13	106	10
≥ 69	0	0	0	0	0	19	0

Table 13C-38: Existing Population Counts, $L_{Aeq,8h}$ Metric

Metric Value, dB $L_{Aeq,8h}$	Scenario and Existing Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	68,920	86,009	34,418	49,497	33,792	61,116	49,226
≥ 48	26,956	28,282	15,290	19,164	14,808	25,115	19,090
≥ 51	10,135	12,282	4,734	5,614	4,412	9,132	5,532
≥ 54	2,471	3,211	1,554	1,623	1,424	2,235	1,616
≥ 57	286	606	186	233	167	323	224
≥ 60	106	140	44	74	28	172	80
≥ 63	25	18	13	29	13	31	29
≥ 69	0	0	0	0	0	6	0

Table 13C-39: Existing Population Counts, N65 Metric

Metric Value, N65	Scenario and Existing Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 10	106,013	107,454	65,928	48,969	65,975	165,480	49,565
≥ 25	69,275	77,952	39,250	39,170	39,050	81,880	39,099
≥ 50	25,560	26,157	22,636	23,239	22,110	39,425	22,029
≥ 100	17,985	20,013	9,877	9,935	9,289	22,784	8,752
≥ 200	11,062	11,594	3,554	3,606	3,603	7,509	3,656
≥ 500	0	23	0	0	0	6	0

Table 13C-40: Existing Population Counts, N60 Metric

Metric Value, N60	Scenario and Existing Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 10	69,613	75,967	42,926	59,891	42,864	65,906	61,018
≥ 25	24,638	26,835	15,370	11,879	15,020	7,958	11,739
≥ 50	80	7,402	35	67	32	29	191
≥ 100	0	0	0	0	0	0	0

Table 13C-41: Existing Population Counts, L_{day} Metric

Metric Value, dB L_{day}	Scenario and Existing Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	365,466	341,837	253,509	197,869	243,835	469,236	193,702
≥ 50	74,812	77,201	50,820	46,809	51,053	135,767	47,080
≥ 55	17,388	17,462	9,107	9,041	9,186	28,862	9,181
≥ 60	1,446	1,806	595	651	742	3,388	854
≥ 65	169	174	109	109	112	281	112
≥ 70	19	19	10	10	6	76	10
≥ 75	0	0	0	0	0	0	0

Table 13C-42: Existing Population Counts, $L_{evening}$ Metric

Metric Value, dB $L_{evening}$	Scenario and Existing Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	240,109	205,471	144,009	139,147	130,643	331,734	125,041
≥ 50	46,556	42,005	36,271	34,739	32,213	76,211	30,171
≥ 55	8,522	9,080	5,358	4,933	4,615	17,433	4,400
≥ 60	323	346	370	333	320	1,627	297
≥ 65	31	36	67	64	64	193	59
≥ 70	6	6	0	0	0	39	0
≥ 75	0	0	0	0	0	0	0

Table 13C-43: Permitted Population Counts, L_{den} Metric

Metric Value, dB L_{den}	Scenario and Permitted Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	22,852	22,852	22,008	22,608	21,955	22,944	22,555
≥ 50	17,791	17,749	10,955	10,955	10,952	13,154	10,922
≥ 55	6,486	7,060	5,808	5,836	5,808	8,012	5,662
≥ 60	3,038	3,103	1,098	1,163	1,098	1,617	1,163
≥ 65	0	0	0	0	0	0	0
≥ 70	0	0	0	0	0	0	0
≥ 75	0	0	0	0	0	0	0

Table 13C-44: Permitted Population Counts, L_{night} Metric

Metric Value, dB L_{night}	Scenario and Permitted Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 40	18,014	18,348	12,011	16,268	12,233	13,605	16,004
≥ 45	9,385	9,532	7,397	8,492	7,397	8,768	8,492
≥ 50	3,210	3,531	3,103	3,261	3,103	3,210	2,929
≥ 55	197	825	0	591	0	121	591
≥ 60	0	0	0	0	0	0	0
≥ 65	0	0	0	0	0	0	0
≥ 70	0	0	0	0	0	0	0

Table 13C-45: Permitted Population Counts, $L_{Aeq,16h}$ Metric

Metric Value, dB $L_{Aeq,16h}$	Scenario and Permitted Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 51	9,114	9,114	6,439	6,439	6,439	11,850	6,439
≥ 54	5,320	5,426	3,453	3,635	3,691	7,532	3,603
≥ 57	3,103	3,103	1,163	1,163	1,163	3,531	1,163
≥ 60	1,897	2,010	197	197	394	1,163	394
≥ 63	0	0	0	0	0	197	0
≥ 66	0	0	0	0	0	0	0
≥ 69	0	0	0	0	0	0	0

Table 13C-46: Permitted Population Counts, $L_{Aeq,8h}$ Metric

Metric Value, dB $L_{Aeq,8h}$	Scenario and Permitted Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	9,453	9,971	7,947	8,671	7,947	9,520	8,671
≥ 48	5,958	6,207	5,160	6,036	5,054	5,930	6,036
≥ 51	3,103	3,531	3,103	1,504	3,103	3,103	1,504
≥ 54	1,732	3,038	712	1,030	712	2,018	1,030
≥ 57	0	197	0	0	0	0	0
≥ 60	0	0	0	0	0	0	0
≥ 63	0	0	0	0	0	0	0

Table 13C-47: Permitted Population Counts, N65 Metric

Metric Value, N65	Scenario and Permitted Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 10	15,341	15,341	9,648	7,187	9,648	17,415	7,187
≥ 25	8,189	10,872	6,291	6,291	6,291	10,755	6,291
≥ 50	5,243	5,361	4,082	4,457	4,033	5,673	4,082
≥ 100	3,369	3,369	1,278	1,278	1,259	3,853	1,794
≥ 200	3,103	3,103	1,163	1,163	1,163	2,578	1,163
≥ 500	0	0	0	0	0	0	0

Table 13C-48: Permitted Population Counts, N60 Metric

Metric Value, N60	Scenario and Permitted Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 10	12,078	13,335	7,930	8,865	7,832	9,512	8,865
≥ 25	5,884	6,028	5,518	3,837	5,518	4,140	3,837
≥ 50	0	3,560	0	0	0	0	0
≥ 100	0	0	0	0	0	0	0

Table 13C-49: Permitted Population Counts, L_{day} Metric

Metric Value, dB L_{day}	Scenario and Permitted Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	19,894	19,712	20,553	13,053	20,553	22,281	13,257
≥ 50	9,599	9,553	8,865	6,925	8,688	12,626	6,659
≥ 55	4,356	4,448	2,375	2,457	2,416	4,978	2,498
≥ 60	718	1,526	0	0	197	1,098	197
≥ 65	0	0	0	0	0	0	0
≥ 70	0	0	0	0	0	0	0
≥ 75	0	0	0	0	0	0	0

Table 13C-50: Permitted Population Counts, $L_{evening}$ Metric

Metric Value, dB $L_{evening}$	Scenario and Permitted Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	18,089	17,586	11,267	10,299	10,270	21,530	10,124
≥ 50	8,864	8,792	6,439	6,041	5,847	8,632	5,847
≥ 55	3,103	3,103	1,270	1,163	1,163	3,889	1,163
≥ 60	0	0	0	0	0	1,030	0
≥ 65	0	0	0	0	0	0	0
≥ 70	0	0	0	0	0	0	0
≥ 75	0	0	0	0	0	0	0

Table 13C-51: Zoned Population Counts, L_{den} Metric

Metric Value, dB L_{den}	Scenario and Zoned Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	13,500	13,500	13,500	13,500	13,500	13,500	13,500
≥ 50	12,600	12,600	12,900	12,900	12,900	13,500	13,200
≥ 55	12,600	12,600	12,600	12,300	12,600	12,600	12,300
≥ 60	7,500	7,800	3,900	4,500	3,900	6,900	4,500
≥ 65	0	0	0	0	0	0	0
≥ 70	0	0	0	0	0	0	0
≥ 75	0	0	0	0	0	0	0

Table 13C-52: Zoned Population Counts, L_{night} Metric

Metric Value, dB L_{night}	Scenario and Zoned Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 40	13,200	13,500	13,200	13,500	13,200	13,500	13,500
≥ 45	12,600	12,600	12,600	12,600	12,600	12,600	12,600
≥ 50	8,400	9,000	8,100	8,700	8,100	9,000	8,700
≥ 55	0	1,800	0	900	0	0	1,200
≥ 60	0	0	0	0	0	0	0
≥ 65	0	0	0	0	0	0	0
≥ 70	0	0	0	0	0	0	0

Table 13C-53: Zoned Population Counts, $L_{Aeq,16h}$ Metric

Metric Value, dB $L_{Aeq,16h}$	Scenario and Zoned Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 51	12,600	12,600	9,000	9,000	9,000	13,500	9,000
≥ 54	10,500	10,500	7,500	7,800	7,500	12,600	7,800
≥ 57	8,100	8,100	4,500	4,500	4,500	7,800	4,500
≥ 60	3,600	4,200	0	0	0	4,500	0
≥ 63	0	0	0	0	0	0	0
≥ 66	0	0	0	0	0	0	0
≥ 69	0	0	0	0	0	0	0

Table 13C-54: Zoned Population Counts, $L_{Aeq,8h}$ Metric

Metric Value, dB $L_{Aeq,8h}$	Scenario and Zoned Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 45	12,600	12,600	12,600	12,600	12,600	12,600	12,600
≥ 48	10,800	12,300	10,500	12,600	10,500	12,600	12,600
≥ 51	8,100	9,000	8,100	8,400	8,100	8,400	7,800
≥ 54	5,100	7,500	2,700	3,900	1,800	6,300	3,900
≥ 57	0	0	0	0	0	0	0
≥ 60	0	0	0	0	0	0	0
≥ 63	0	0	0	0	0	0	0

Table 13C-55: Zoned Population Counts, N65 Metric

Metric Value, N65	Scenario and Zoned Population Count						
	2018 Baseline	2019 Baseline	2022 Baseline	2022 Relevant Action	2025 Baseline	2025 Consented	2025 Relevant Action
≥ 10	12,600	12,600	12,600	9,000	12,600	13,500	9,000
≥ 25	12,600	12,600	9,000	9,000	9,000	13,500	9,000
≥ 50	10,500	10,800	9,000	9,000	9,000	9,000	9,000
≥ 100	8,100	8,100	4,500	4,500	4,500	9,000	5,400
≥ 200	8,100	8,100	4,500	4,500	4,500	5,400	4,500
≥ 500	0	0	0	0	0	0	0