Appendix 8-1: Non-Aircraft Noise Appendix

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1. Sound Terminology

Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascals, Pa). Because of this wide range, a sound level scale based on logarithms is used in sound measurement called the decibel (dB) scale. Audibility of sound covers a range of approximately 0 to 140 dB. The human ear system does not respond uniformly to sound across the detectable frequency range and consequently, instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is annotated as dB(A). Table 1 lists the sound pressure level in dB(A) for common situations.

Table 1: Sound Terminology

Approximate Sound Pressure Level dB(A)	Example
0	**Threshold of hearing**
30	Rural area at night, still air
40	Public library. Refrigerator humming at 2m
50	Quiet office, no machinery. Boiling kettle at 0.5m
60	Normal conversation
70	Telephone ringing at 2m. Vacuum cleaner at 3m
80	General factory noise level
90	Heavy goods vehicle from pavement. Powered lawnmower, operator's ear
100	Pneumatic drill at 5m
120	Discotheque - 1m in front of loudspeaker
140	Threshold of pain

The sound level at a measurement point is rarely steady, even in rural areas, and varies over a range dependent upon the effects of local sound sources. Close to a busy motorway, the sound level may vary over a range of 5 dB(A), whereas in a suburban area, this variation may be up to 40 dB(A) and more due to the multitude of sound sources in such areas (cars, dogs, aircraft, etc.) and their variable operation. Furthermore, the range of night-time sound levels will often be smaller, and the levels significantly reduced compared to daytime levels. When considering environmental sound, it is necessary to consider how to quantify the existing sound (the ambient sound) to account for these second-to-second variations.

A parameter that is widely accepted as reflecting human perception of ambient sound is the background sound level, L_{A90}. This is the sound level exceeded for 90% of the measurement period and generally reflects the sound level in the lulls between individual sound events. Over a one-hour period, the L_{A90} will be the sound level exceeded for 54 minutes.

The L_{A10} is the sound level exceeded 10% of the time and is the parameter widely used in the assessment of road traffic noise. Over a one-hour period, the L_{A10} will be the sound level exceeded for six minutes.

The equivalent continuous A-weighted sound pressure level, L_{Aeq} is the single number that represents the total sound energy measured over that period. L_{Aeq} is the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period. It is commonly used to express the energy level from individual sources that vary in level over their operational cycle.

Human subjects are generally only capable of noticing changes in steady levels of no less than 3 dB(A). It is generally accepted that a change of 10 dB(A) in an overall, steady sound level is perceived by the human ear as a doubling (or halving) of the sound level. These findings do not necessarily apply to transient or non-steady sound sources such as changes in sound due to changes in road traffic flow, or intermittent sound sources.

2. Baseline Noise Survey

Sound Monitoring Approach

Ambient sound levels were monitored at 12 locations for 24 hours each from 4th June 2024 to 7th June 2024. The location of each monitor was selected to provide representative baseline sound data at sensitive receptors. Unattended and attended monitoring procedures followed guidance from International Organization for Standardization (ISO) 1996-2:2017: Description, measurement and assessment of environmental noise – Part 2: Determination of Sound Pressure Levels (ISO 1966-2). The sound level meter was set to log various noise parameters including the L_{Aeq}, L_{A90}, and L_{AFMAX} on 15-minute time frames.

Sound Monitoring Locations

The monitoring locations are illustrated in Figure 1 and details are set out in Table 2.

Table 2: Sound Monitoring Locations

ID	Measurement Dates	Location	Approx. coordinates (Lat/Long)	Description	Represented Receptors
ST1	06/06/2024 – 07/06/2024	St. Margaret's, Co. Dublin	53°25'53.89"N, 6°18'3.24"W	Civil Parish and townland 750m to north-west of the Site.	Residents, school, place of worship, and cemetery
ST2	04/06/2024 – 05/06/2024	Old Airport Road, Swords, Co. Dublin	53°25'5.56"N, 6°15'48.07"W	Coultry Cottages and small industrial estate adjacent to the south perimeter of the Site.	Residents and offices.
ST3	05/06/2024 – 06/06/2024	Swords Rd, Corballis, Swords, Co. Dublin	53°25'25.56"N, 6°13'48.82"W	Mixed use estate located 500m to the east of the Site.	Residents, B&B, public house and offices.
ST4	04/06/2024 – 05/06/2024	Harristown Lane, Harristown, Swords, Co. Dublin	53°25'9.10"N, 6°17'43.46"W	Hamlet located 200m to the south-west of the Site.	Residents.
ST5	05/06/2024 – 06/06/2024	The Hill, Stockhole, Cloghran, Swords, Co. Dublin	53°25'56.90"N, 6°13'33.95"W	Hamlet located 400m to the north-east of the Site.	Residents, cemetery, B&B, public house and offices.
ST6	05/06/2024 – 06/06/2024	Our Lady Queen of Heaven, Corballis Road North, Dublin Airport, Co. Dublin	53°25'42.01"N, 6°14'28.47"W	Our Lady Queen of Heaven located within the Site.	Place of worship.
ST7	06/06/2024 – 07/06/2024	Forrest Road, Forrest Little, Swords, Co. Dublin	53°26'16.22"N, 6°14'58.63"W	Hamlet located 80m to the north of the Site.	Residents, commercial premises, and golf club.
ST8	04/06/2024 – 05/06/2024	Turnapin Cottages, Dublin 17	53°24'35.18"N. 6°13'56.43"W	Residential area located 1.2km to the south-east of the Site	Residents.
ST9	06/06/2024 – 07/06/2024	Huntstown, Swords, Co. Dublin	53°25'54.64"N, 6°15'52.49"W	Swan Cottage and small industrial park located 150m to the west of the Site.	Resident, public house (unoccupied), and commercial space.
ST10	06/06/2024 – 07/06/2024	Dunbro Lane, Dunbro	53°25'35.65"N, 6°16'42.41"W	Cottage located 300m to the west of the Site.	Resident.
ST11	04/06/2024 – 05/06/2024	Swords Road, Cloghran, Co. Dublin	53°24'55.74"N, 6°14'23.12"W	Mixed use estate located 300m to the south-east of the Site.	Resident, hotels, commercial premises and offices.
ST12	05/06/2024 – 06/06/2024	San Michelle, Kettle Lane, Cloghran, Swords, Co. Dublin	53°26'14.23"N, 6°13'21.06"W	Cottages and commercial premises located 1km to the north-east of the Site.	Residents and offices.

Instrumentation

All measurements were taken at a height of 1.5m above local ground. The measurement position of ST12 was located approximately 1m away from the façade of the resident's perimeter wall. All remaining measurement locations were free-field. The calibration of the sound level meter was checked immediately before and after the survey period. No significant changes in the calibration level (±0.5 dB) were noted.

Sound level meters with Class 1 specification were used as set out in BS EN 61672-1:2013 'Electroacoustics. Sound level meters. Specifications'. The sound level meters are calibrated every two years by a UKAS Accredited Calibration Laboratory to BS EN 61672-3:2013 'Electroacoustics. Sound level meters. Periodic tests'. UKAS calibration certificates are available on request.

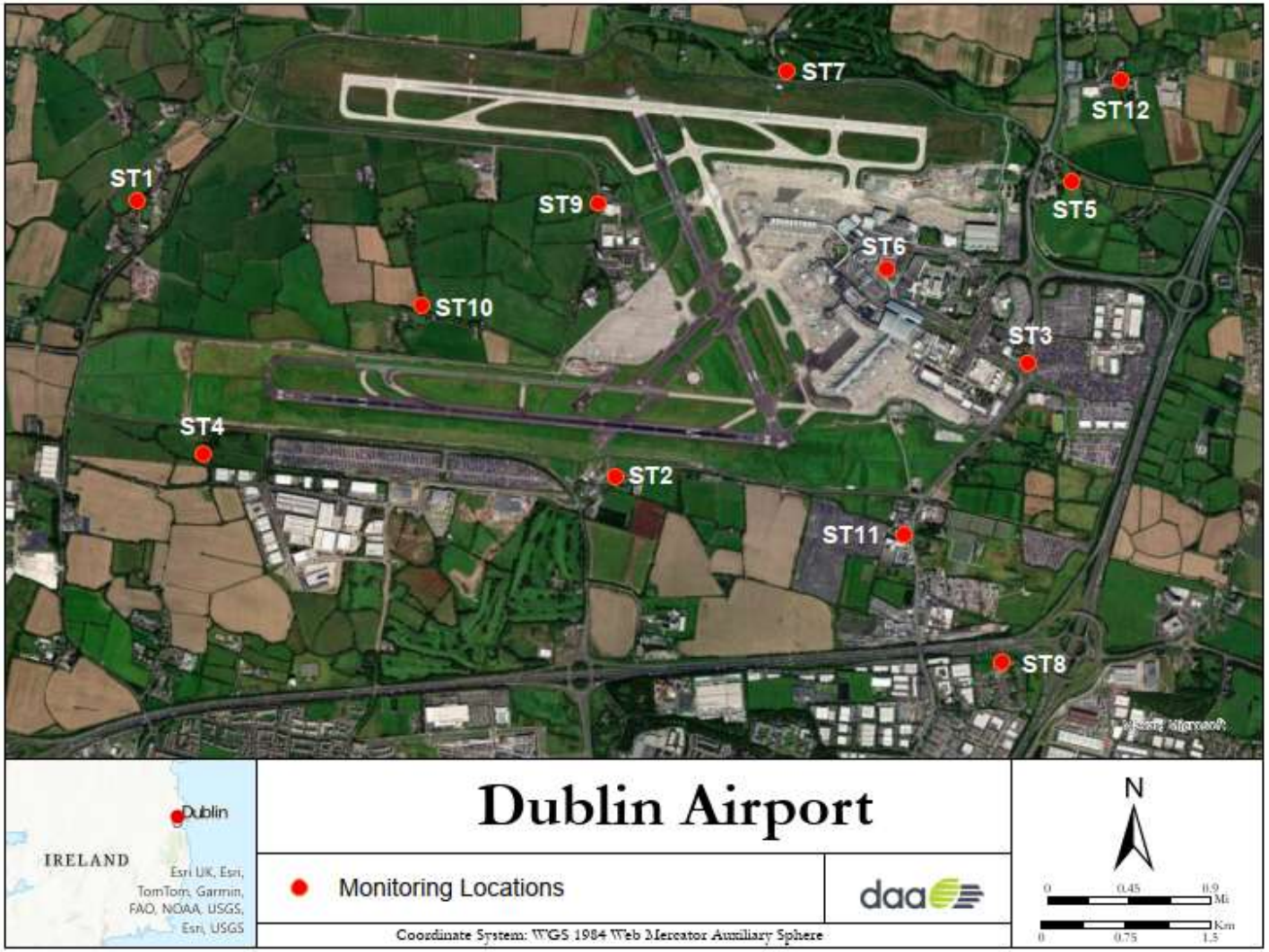
Table 3: Survey Equipment Details

Equipment	Model	Serial number	Laboratory calibration date	Monitoring Locations
Type 1 Sound level meter	NL-52	420763	24/01/2023	ST1, ST5, ST11
Type 1 Sound level meter	NL-52	420765	05/09/2022	ST2, ST6, ST9
Type 1 Sound level meter	NL-52	743082	05/01/2023	ST3, ST4 and ST7
Type 1 Sound level meter	NL-52	809413	06/03/2023	ST8, ST10 and ST12
Sound level meter calibrator	NC-74	34304647	14/11/2023	All locations

Weather

ISO 1996-2 states that samples of sound data should only be selected during a period within which the sound level may be considered approximately steady with windspeeds below 5m/s and no 'heavy precipitation' (for which less than 1mm per day has been assumed). All meteorological conditions (observed using an anemometer) during the beginning and end of each measurement were deemed suitable during the attended short-term monitoring periods. No weather data was excluded.

Figure 1: Noise Monitoring Locations



Noise Survey Results

Monitoring Location ST1

Unattended sound level measurements were taken at St. Margaret's, Co. Dublin approximately 750m to the north-west of the Site. The sound level measurements started at 14:44 on 06/06/2024 and finished at 14:29 on 07/06/2024. The microphone was placed at a height of approximately 1.5m from the ground, which was located on an embankment raised approximately 1m from the road.

During the setup and collection, the sound environment at this location was characterised by (from most dominant to least dominant):

- Intermittent air traffic, (approximately 1km)
- Intermittent light road traffic, (approximately 2.5m)
- Intermittent wind rustling foliage

The noise monitoring results are presented in Table 4.

Table 4: Summary of results for ST1

Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB			$L_{A10,T}$ dB	L_{AFmax} dB
	Logarithmic	Mode	Min	Max	Arithmetic	10th Percentile
Daytime (07:00-19:00)	64	49	44	51	-	85
Evening (19:00-23:00)	62	44	34	44	-	84
Night (23:00 - 07:00)	55	35	32	50	-	78
18 hr (06:00 - 00:00)	-	-	-	-	64	-

Monitoring Location ST2

Unattended sound level measurements were taken at Old Airport Road, Swords, Co. Dublin to the south of the Site. The sound level measurements started at 14:44 on 04/06/2024 and finished at 14:29 on 05/06/2024. The microphone was placed at a height of approximately 1.5m from the ground.

During the setup and collection, the sound environment at this location was characterised by (from most dominant to least dominant):

- Continuous road traffic, (approximately 2.5m)
- Continuous air traffic (approximately 250m)
- Intermittent wind rustling foliage

The noise monitoring results are presented in Table 5.

Table 5: Summary of results for ST2

Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB			$L_{A10,T}$ dB	L_{AFmax} dB
	Logarithmic	Mode	Min	Max	Arithmetic	10th Percentile
Daytime (07:00-19:00)	76	63	55	64	-	90
Evening (19:00-23:00)	74	53	50	58	-	88
Night (23:00 - 07:00)	73	46	43	60	-	89
18 hr (06:00 - 00:00)	-	-	-	-	79	-

Monitoring Location ST3

Unattended sound level measurements were taken at Swords Rd, Corballis, Swords, Co. Dublin to the east of the Site. The sound level measurements started at 10:16 on 05/06/2024 and finished at 10:01 on 06/06/2024. The microphone was placed at a height of approximately 1.5m from the ground.

During the setup and collection, the sound environment at this location was characterised by (from most dominant to least dominant):

- Continuous road traffic, (approximately 3.5m)
- Intermittent air traffic (approximately 650m)
- Intermittent bird song

The noise monitoring results are presented in Table 6.

Table 6: Summary of results for ST3

Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB			$L_{A10,T}$ dB	L_{AFmax} dB
	Logarithmic	Mode	Min	Max	Arithmetic	10th Percentile
Daytime (07:00-19:00)	69	59	57	61	-	86
Evening (19:00-23:00)	67	56	54	57	-	85
Night (23:00 - 07:00)	65	53	49	59	-	87
18 hr (06:00 - 00:00)	-	-	-	-	73	-

Monitoring Location ST4

Unattended sound level measurements were taken at Harristown Lane, Harristown, Swords, Co. Dublin located 200m to the south-west of the Site. The sound level measurements started at 09:15 on 04/06/2024 and finished at 09:00 on 05/06/2024. The microphone was placed at a height of approximately 1.5m from the ground.

During the setup and collection, the sound environment at this location was characterised by (from most dominant to least dominant):

- Intermittent wind rustling foliage
- Intermittent light road traffic, (approximately 2m)
- Intermittent air traffic (approximately 450m)

The noise monitoring results are presented in Table 7.

Table 7: Summary of results for ST4

Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB			$L_{A10,T}$ dB	L_{AFmax} dB
	Logarithmic	Mode	Min	Max	Arithmetic	10th Percentile
Daytime (07:00-19:00)	57	48	45	52	-	80
Evening (19:00-23:00)	56	43	39	50	-	82
Night (23:00 - 07:00)	54	37	36	45	-	78
18 hr (06:00 - 00:00)	-	-	-	-	58	-

Monitoring Location ST5

Unattended sound level measurements were taken at The Hill, Stockhole, Cloghran, Swords, Co. Dublin located 400m to the north-east of the Site. The sound level measurements started at 12:08 on 05/06/2024 and finished at 11:53 on 06/06/2024. The microphone was placed at a height of approximately 1.5m from the ground.

During the setup and collection, the sound environment at this location was characterised by (from most dominant to least dominant):

- Intermittent Air traffic (approximately 1km)
- Continuous birdsong, (approximately 4 m)
- Continuous road traffic (approximately 70m)

The noise monitoring results are presented in Table 8.

Table 8: Summary of results for ST5

Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB			$L_{A10,T}$ dB	L_{AFmax} dB
	Logarithmic	Mode	Min	Max	Arithmetic	10th Percentile
Daytime (07:00-19:00)	57	53	51	57	-	74
Evening (19:00-23:00)	54	51	48	52	-	69
Night (23:00 - 07:00)	51*	46*	44*	53*	-	70*
18 hr (06:00 - 00:00)	-	-	-	-	57*	-

*Data excluded due to disturbance likely caused by livestock.

Monitoring Location ST6

Unattended sound level measurements were taken at Our Lady Queen of Heaven, Corballis Road North, Dublin Airport, located within the Site. The sound level measurements started at 12:58 on 05/06/2024 and finished at 12:43 on 06/06/2024. The microphone was placed at a height of approximately 1.5m from the ground.

During the setup and collection, the sound environment at this location was characterised by (from most dominant to least dominant):

- Continuous Air traffic (approximately 400m)
- Continuous road traffic (approximately 50m)
- Instantaneous church bell, (approximately 35m)

The noise monitoring results are presented in Table 9.

Table 9: Summary of results for ST6

Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB			$L_{A10,T}$ dB	L_{AFmax} dB
	Logarithmic	Mode	Min	Max	Arithmetic	10th Percentile
Daytime (07:00-19:00)	60	57	53	58	-	82
Evening (19:00-23:00)	59	53	51	55	-	82
Night (23:00 - 07:00)	57	51	48	58	-	74
18 hr (06:00 - 00:00)	-	-	-	-	61	-

Monitoring Location ST7

Unattended sound level measurements were taken at Forrest Road, Forrest Little, Swords, Co. Dublin, located 80m to the south of the Site. The sound level measurements started at 11:38 on 06/06/2024 and finished at 11:23 on 07/06/2024. The microphone was placed at a height of approximately 1.5m from the ground, which was located on an embankment raised approximately 1m from the road.

During the setup and collection, the sound environment at this location was characterised by (from most dominant to least dominant):

- Continuous air traffic (approximately 240m)
- Intermittent road traffic (approximately 4 m)
- Continuous wind rustling foliage, (approximately 0.5 m)

The noise monitoring results are presented in Table 10.

Table 10: Summary of results for ST7

Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB			$L_{A10,T}$ dB	L_{AFmax} dB
	Logarithmic	Mode	Min	Max	Arithmetic	10th Percentile
Daytime (07:00-19:00)	69	59	54	65	-	90
Evening (19:00-23:00)	65	56	41	56	-	87
Night (23:00 - 07:00)	60	45	41	58	-	78
18 hr (06:00 - 00:00)	-	-	-	-	70	-

Monitoring Location ST8

Unattended sound level measurements were taken at Turnapin Cottages, Dublin 17, located 1.2km to the south-east of the Site. The sound level measurements started at 11:15 on 04/06/2024 and finished at 11:00 on 05/06/2024. The microphone was placed at a height of approximately 1.5m from the ground.

During the setup and collection, the sound environment at this location was characterised by (from most dominant to least dominant):

- Continuous road traffic, (approximately 60m
- Continuous bird song (approximately 2m)
- Intermittent traffic (approximately 1.5km)

The noise monitoring results are presented in Table 11.

Table 11: Summary of results for ST8

Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB			$L_{A10,T}$ dB	L_{AFmax} dB
	Logarithmic	Mode	Min	Max	Arithmetic	10th Percentile
Daytime (07:00-19:00)	63	59	55	63	-	78
Evening (19:00-23:00)	59	60	52	60	-	78
Night (23:00 - 07:00)	57	52	45	61	-	75
18 hr (06:00 - 00:00)	-	-	-	--	63	-

Monitoring Location ST9

Unattended sound level measurements were taken at Huntstown, Swords, Co. Dublin located 150 m to the west of the Site. The sound level measurements started at 13:43 on 06/06/2024 and finished at 13:28 on 07/06/2024. The microphone was placed at a height of approximately 1.5 m from the ground.

During the setup and collection, the sound environment at this location was characterised by (from most dominant to least dominant):

- Continuous Air traffic, (approximately 350m)
- Continuous bird song (approximately 10m)
- Instantaneous bangs (approximately 100m)

The noise monitoring results are presented in Table 12.

Table 12: Summary of results for ST9

Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB			$L_{A10,T}$ dB	L_{AFmax} dB
	Logarithmic	Mode	Min	Max	Arithmetic	10th Percentile
Daytime (07:00-19:00)	63	43	42	51	-	85
Evening (19:00-23:00)	62	43	37	69	-	87
Night (23:00 - 07:00)	59	40	31	68	-	85

Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB			$L_{A10,T}$ dB	L_{AFmax} dB
	Logarithmic	Mode	Min	Max	Arithmetic	10th Percentile
18 hr (06:00 - 00:00)	-	-	-	-	63	-

Monitoring Location ST10

Unattended sound level measurements were taken at Dunbro Lane, Dunbro located 300m to the west of the Site. The sound level measurements started at 14:10 on 06/06/2024 and finished at 13:55 on 07/06/2024. The microphone was placed at a height of approximately 1.5m from the ground.

During the setup and collection, the sound environment at this location was characterised by (from most dominant to least dominant):

- Continuous air traffic, (approximately 320m)
- Intermittent bird song (approximately 2m)
- Intermittent wind rustling foliage (approximately 0.5m)

The noise monitoring results are presented in Table 13.

Table 13: Summary of results for ST10

Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB			$L_{A10,T}$ dB	L_{AFmax} dB
	Logarithmic	Mode	Min	Max	Arithmetic	10th Percentile
Daytime (07:00-19:00)	57	47	41	49	-	79
Evening (19:00-23:00)	53	42	33	38	-	75
Night (23:00 - 07:00)	53	34	30	37	-	79*
18 hr (06:00 - 00:00)	-	-	-	-	59	-

Monitoring Location ST11

Unattended sound level measurements were taken at Swords Road, Cloghran, Co. Dublin located 300m to the south-east of the Site. The sound level measurements started at 10:45 on 04/06/2024 and finished at 10:30 on 05/06/2024. The microphone was placed at a height of approximately 1.5m from the ground.

During the setup and collection, the sound environment at this location was characterised by (from most dominant to least dominant):

- Continuous road traffic, (approximately 20m)
- Intermittent air traffic (approximately 800m)
- Intermittent wind rustling foliage (approximately 0.5m)

The noise monitoring results are presented in Table 14.

Table 14: Summary of results for ST11

Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB			$L_{A10,T}$ dB	L_{AFmax} dB
	Logarithmic	Mode	Min	Max	Arithmetic	10th Percentile
Daytime (07:00-19:00)	66	60	43	62	-	86
Evening (19:00-23:00)	63	54	49	56	-	86
Night (23:00 - 07:00)	61	46	42	60	-	83
18 hr (06:00 - 00:00)	-	-	-	-	68	-

Monitoring Location ST12

Unattended sound level measurements were taken at San Michelle, Kettle Lane, Cloghran, Swords, Co. Dublin located 1 km to the north-east of the Site. The sound level measurements started at 11:58 on 05/06/2024 and finished at 11:43 on 06/06/2024. The microphone was placed at a height of approximately 1.5m from the ground and 0.7m from the nearest façade.

During the setup and collection, the sound environment at this location was characterised by (from most dominant to least dominant):

- Intermittent road traffic, (approximately 1.5m)
- Continuous Bird song (approximately 10m)
- Intermittent wind rustling foliage (approximately 10m)

A -3 dB façade correction has been applied to account for the proximity of the sound level meter to the perimeter wall. The noise monitoring results are presented in Table 15.

Table 15: Summary of results for ST12

Period	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB			$L_{A10,T}$ dB	L_{AFmax} dB
	Logarithmic	Mode	Min	Max	Arithmetic	10th Percentile
Daytime (07:00-19:00)	67	46	45	57	-	88
Evening (19:00-23:00)	64	46	41	47	-	89
Night (23:00 - 07:00)	61	41	39	54	-	86
18 hr (06:00 - 00:00)	-	-	-	-	66	-

3. Operational Road Traffic

Airport related road traffic data for daytime (07:00-23:00) and night-time (23:00-07:00) periods are presented in Table 16 and the distribution of this data on the road network is presented in Table 17.

Table 16: Airport Related Road Traffic Data

Operational Condition	Daytime Airport Related Road Traffic Movements	Night-time Airport Related Road Traffic Movements
2029 Permitted Operation (32.0 mppa)/ 2023 Baseline Operation (32.0 mppa)	55,761	13,414
Proposed Operation (2029, 40.0 mppa)	67,990	16,374
Current Operation (2025, 36.4 mppa)	61,814	14,562

Table 17: Distribution of Traffic

ID	Road Link	Percentage of Airport Related Road Traffic per Road Link
1	M1	49.3%
2	R132 / Swords Rd	7.2%
3	R108 / Naul Rd (off M50 - south of airport)	19.3%
4	R108 / South Parallel Rd	5.3%
5	R122 / Main Rd	1.5%
6	Kilreesk Rd	0.1%
7	R108 / Naul Rd (north of airport)	2.9%
8	Forrest Rd	1.5%
9	Swords Rd	9.4%
10	L2753 / Stockhole Ln	3.4%

Figure 2: Traffic Road Links

