REPORT

Attachment-7-1-3-2 Noise Impact Assessment

Vantage Data Centres DUB 11 Ltd

CLIENT	DOCUMENT REFERENCE	DATE
Vantage Data Centers DUB11 Limited	257501.5465NR1	20 August 2025

AWN Consulting Ltd, The Tecpro Building, IDA Business & Technology Park, Clonshaugh, Dublin 17, D17 XD90

DOCUMENT CONTROL SHEET

Document Control Sheet	
Our Reference	257501.5465NR1
Original Issue Date	20 August 2025
Client:	Vantage Data Centers DUB11 Limited

Revision	Revision Date	Description

Details	Written by	Approved by
Signature		
Name	Filippo Ciarla	Jennifer Harmon
Title	Senior Acoustic Consultant	Director (Acoustics)
Date	20 August 2025	

Disclaimer
This report considers the specific instructions and requirements of our client. It is not intended for third-party use or reliance, and no responsibility is accepted for any third party. The provisions in this report apply solely to this project and should not be assumed applicable to other developments without review and modification.

ENVIRONMENT I.S. EN ISO 14001:2015 NSAI Certified | HEALTH & SAFETY I.S. ISO 45001:2018 NSAI Certified | QUALITY I.S. EN ISO 9001:2015 NSAI Certified

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1 Overview

Vantage Data Centers DUB11 Limited ("VDC" or "the Operator") are applying to the Environmental Protection Agency (EPA) for an Industrial Emissions (IE) Licence to operate a Data Centre and Multi-Fuel Generation Plant (MFGP) development, located within Profile Park Industrial Estate, , Kilbride, Dublin 22. The facility will operate 24 hours a day.

This Noise Emissions Impact Assessment relates to the activity under this licence application and updates the previous assessments contained within the Environmental Impact Assessment Reports (EIAR) submitted to South Dublin County Council (SDCC) (Reg. Ref. SD21A-024). The previous assessment prepared by Ramboll UK Ltd that accompanied the application for IE Licence made on 26 July 2023 (EPA Reg. Ref. P1203-01) was based on information available at that time. AWN Consulting has since prepared this new assessment for the purpose of the IE Licence application based on plant procurement and detailed design. The findings presented here, included as Attachment-7-1-3-2 Noise Emissions Impact Assessment, supersede the earlier EIAR and should form part of the Environmental Impact Assessment that the Agency will undertake as part of the EPA licence application.

It is further noted that the EIAR (March 2022) considered phased and partial operations, as well as worst-case scenarios. However, this Noise Emissions Impact Assessment considers only the worst-case operational scenarios. This approach is justified as worst-case modelling ensures that the maximum potential noise impacts are captured, providing a precautionary basis for assessment. This approach aligns with best practice guidance.

Section 6 of the EPA's *Guidance Note for Noise – Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (NG4), 2012 document outlines the following assessment stages for the noise impact assessment for licence applications.

- Stage 1 – Baseline Noise Survey / Monitoring Locations;
- Stage 2 – Derivation of Noise Criteria;
- Stage 3 – Assessment of Noise Impact; and,
- Stage 4 – Reporting / Licence Application Form.

Appendix A to this report presents a glossary of the acoustic terminology referred to in this document.

1.2 Site Description

The proposed licenced Installation will comprise the following main elements (see further details in report: Attachment-4-8-1 Operational Report):

- 2 no. Multi-Fuel Generation Plants (MFGP), referred to as MFGP North and MFGP South, or collectively as the MFGP, containing dual-fuel engines and associated Selective Catalytic Reduction (SCR) abatement systems, together with associated basement fuel storage, urea storage (for SCR abatement), and lubricating oil storage tanks.
- 3 no. data halls, referred to as DUB11.1, DUB11.2 and DUB12, with two data halls (DUB11.1 and DUB11.2) within a single data centre building (referred to herein as DUB11) and the third (DUB12) in a separate data centre building, DUB11 and DUB12 include emergency generators located in an adjacent generator yard.
- 1 no. Battery Energy Storage System (BESS) building.
- Ancillary elements of the development, including data centre switch, step up transformers, sprinkler tanks, pump house, fire sprinkler pumps, security and utility spaces, underground foul and stormwater drainage networks, attenuation systems, an internal road network, and site landscaping.

2. RECEIVING ENVIRONMENT – STAGE 1

2.1 Site Location and Surrounding Environment

The development is located on a site within Profile Park Industrial Estate, Clondalkin, Dublin 22. The north, the west and the south of the site is bound by other data centre and industrial developments. The east of the site is bound by the Grange Castle Golf club, with the closest Noise Sensitive Location (NSL1) at approximately 350 metres to the east of the site boundary at a residential property on New Nangor Road.

Other NSLs in the vicinity of the site include several residential properties situated along Bandonnel Road to the south and southwest. These properties are located at varying distances from the site: approximately 500 meters away (NSL2 to NSL8), 650 meters away (NSL9 to NSL14), and 750 meters away (NSL15 to NSL17). Additionally, residential properties on Aylmer Road are positioned roughly 1 kilometre to the west of the site (NSL18 and NSL19). The site location is shown in Figure 2-1 with the location of the closest NSLs marked.

Figure 2-1 Site location and closest NSLs

2.1.1 Ecologically Sensitive Areas or European Sites

The lands in which the installation is located have no formal ecological designations. The nearest ecologically sensitive area to the Installation (linear distance) is the Grand Canal Proposed Natural Heritage Area (002104) which is over 1.3 km north of the Installation. The nearest European site to the Installation (linear distance) is the Rye Water Valley/Carton Special Area of Conservation (SAC) (Site Code 001398) this European site is over 5 km to the north-west of the Installation.

Given the separation distances between the Installation and these sites, noise from the Installation is expected to be inaudible (and therefore imperceptible) at both the Grand Canal pNHA and the Rye Water Valley/Carton SAC. Accordingly, no noise impacts are anticipated at these locations or at any other designated or European Sites located further away.

2.2 Baseline Noise Survey

A baseline noise survey has been previously conducted by Ramboll UK Ltd (Ramboll) in order to quantify the prevailing noise levels in the surrounding environment. Details of the environmental noise survey are described in the Ramboll Emissions Impact Assessment - Attachment 7-1-3-4-Noise Impact Assessment report (ref: RUK2022N00315-RAM-YA-RP-00001).

Baseline noise surveys were undertaken at the site by Ramboll prior to the commencement of construction activities, ensuring they accurately reflect the pre-development baseline noise environment. The results of these surveys are presented in Chapter 9 of "*Attachment-6-3-6-EIAR-Planning-Jul-2022.p1-3"* and summarised in the sections below. Excerpt from the baseline noise survey from the Ramboll report are presented in Appendix E.

The survey was conducted in general accordance with ISO1996-2:2017 Acoustics - *Description, Measurement and Assessment of Environmental Noise - Determination of Sound Pressure Levels* and the EPAs *NG4* 2016 document.

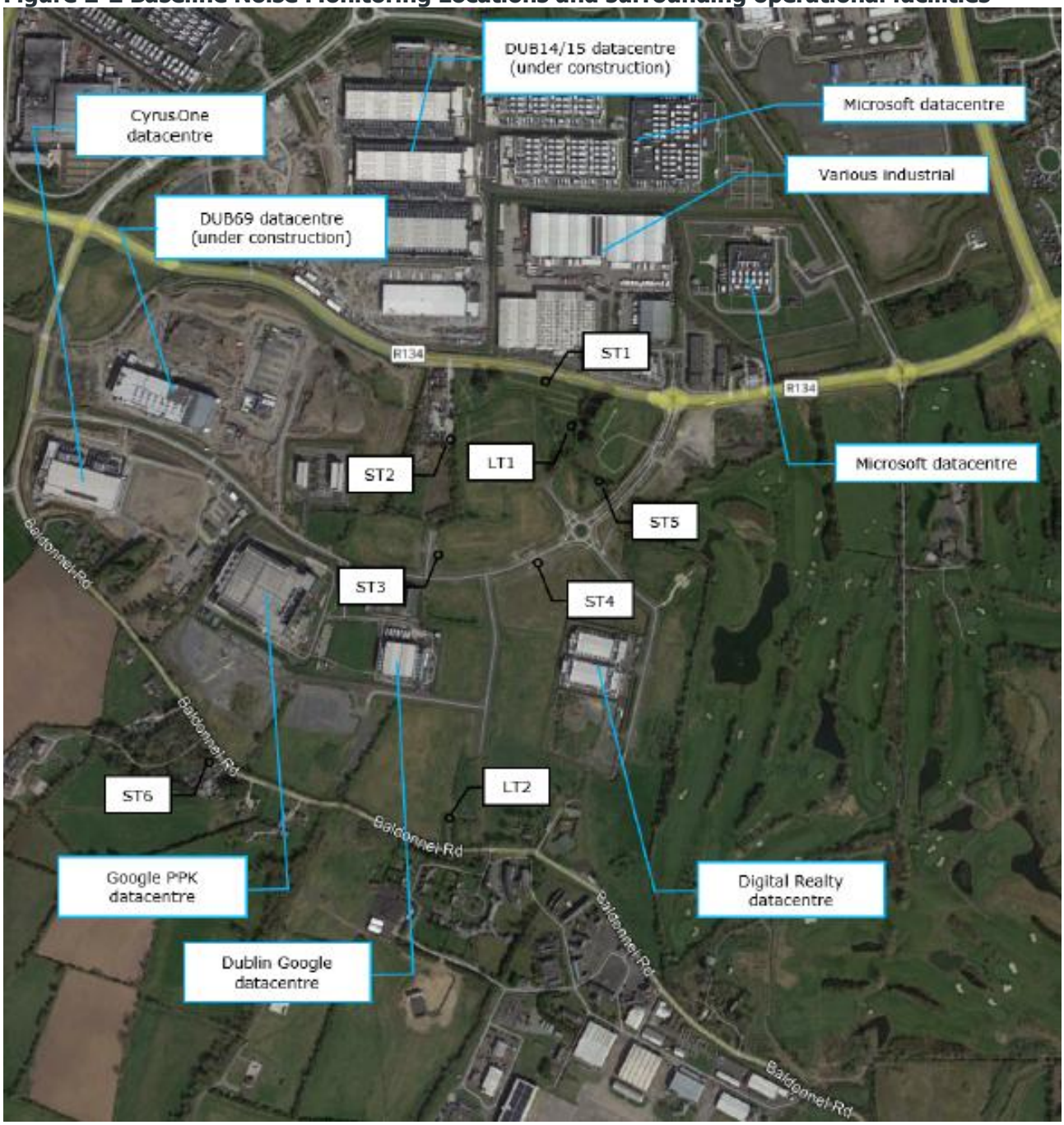
Noise measurements were carried out using a combination of unattended monitoring over an eight-day period and attended surveys conducted across three separate days. The unattended monitoring captured typical daytime, evening, and night-time conditions, while the attended measurements focused on establishing existing background noise levels during both daytime and night-time periods. The night-time measurements are particularly significant, as they reflect ambient noise levels during hours when individuals are likely to be sleeping or preparing to sleep. Given that the proposed development has the potential to operate continuously, including during night-time hours, assessing its impact during these quieter periods is a critical aspect of the evaluation.

2.2.1 Survey Locations and Periods

A combination of attended short-term (ST) and unattended long-term (LT) noise measurements has been conducted to identify the primary noise sources surrounding the proposed site. Monitoring locations were selected based on both accessibility and their suitability for capturing representative data.

The monitoring locations are illustrated in Figure 2-2, excerpted from Ramboll report (ref: REH2024N02943-RAM-RP-00007). Figure 2-2 also shows the buildings in the area surrounding the site at the time of the survey in 2021 which formed part of the measured baseline noise environment.

Figure 2-2 Baseline Noise Monitoring Locations and surrounding operational facilities



The following noise measurements were undertaken that form the baseline noise survey:

- Attended 15 minutes measurement on 23/06/2021, 24/06/2021 and 02/07/2021 during daytime and night-time periods.
- Unattended measurements between 25/06/2021 and 02/07/2021.

2.2.2 Survey Equipment and Personnel

The baseline noise survey were undertaken by Ramboll. Integrating-averaging sound level meter conforming to Class 1 of BS EN 61672-1 was used for all noise measurements.

2.2.3 Noise monitoring results

A summary of the measured baseline noise levels is presented below. The noise survey results are presented in terms of the following parameters:

L_{Aeq} This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T).

L_{A90} Refers to the noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.

The "A" suffix for the noise parameters denotes the fact that the sound levels have been "A-weighted" to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

2.2.3.1 LT1

The noise survey results measured at LT1 are summarised in Table 2.1.

Table 2.1. LT1 Noise Survey Results

Location	Period (hours)	Measured Noise Levels (dB re.2x10-5 Pa)	
		$L_{Aeq,T}$	L_{A90}
LT1	Daytime (07:00-19:00)	53	46
	Evening (19:00-23:00)	50	44
	Night (23:0-07:00)	47	42

At LT1 the dominant noise sources were road traffic noise, aeroplanes, helicopters and distant noise from other industrial land uses.

2.2.3.2 LT2

The survey results for the noise monitoring at LT2 are summarised in Table 2.2

Table 2.2. LT2 Noise Survey Results

Location	Period (hours)	Measured Noise Levels (dB re.2x10-5 Pa)	
		$L_{Aeq,T}$	L_{A90}
LT2	Daytime (07:00-19:00)	47	42
	Evening (19:00-23:00)	45	40
	Night (23:0-07:00)	42	38

The noise climate at LT2 during the survey was dominated by road traffic noise and aircraft movements from the department of defence/Casement Aerodrome. Distant plant noise from the Google Data Centre Campus was also audible at this position.

2.2.3.3 ST1

The survey results for the noise monitoring at ST1 are summarised in Table 2.3.

Table 2.3. ST1 Noise Survey Results

Location	Date	Start Time	Measured Noise Levels (dB re.2x10-5Pa)	
			$L_{Aeq,\ 15min}$	$L_{A90,\ 15min}$
ST1	23/06/2021	23:17	54	40
	24/06/2021	00:28	48	39
		01:33	45	37

Location	Date	Start Time	Measured Noise Levels (dB re.2x10-5Pa)	
			$L_{Aeq, 15min}$	$L_{A90, 15min}$
	02/07/2021	11:14	67	46
		13:31	69	49
		16:58	69	51

The noise climate at STI was dominated by road traffic noise during the daytime, with occasional planes and helicopters. Other sources included cyclists in the cycle lane along New Nangor Road and birdsong. During the night-time, road traffic noise was reduced with only one car approximately every 30mins. Operational plant noise from nearby industrial units was noted to be more clearly audible during the night-time measurements. The noise from adjacent developments to the north was also audible at this position.

2.2.3.4 ST2

The survey results for the noise monitoring at ST2 are summarised in Table 2.4.

Table 2.4. ST2 Noise Survey Results

Location	Date	Start Time	Measured Noise Levels (dB re.2x10-5Pa)	
			$L_{Aeq, 15min}$	$L_{A90, 15min}$
ST2	23/06/2021	23:39	38	33
	24/06/2021	00:48	38	34
		01:54	36	34
	02/07/2021	11:35	45	39
		13:52	49	43
		17:19	44	40

During the daytime the noise climate at ST2 was dominated by distant road traffic noise and the nearby car garage workshop (hammering, banging, and cars idling). During the night-time, the noise climate was dominated by distant road traffic noise.

2.2.3.5 ST3

The survey results for the noise monitoring at ST3 are summarised in Table 2.5.

Table 2.5. ST3 Noise Survey Results

Location	Date	Start Time	Measured Noise Levels (dB re.2x10-5Pa)	
			$L_{Aeq, 15min}$	$L_{A90, 15min}$
ST3	24/06/2021	00:05	39	35
		01:13	40	37
		02:11	39	36
	02/07/2021	13:11	46	44
		15:41	44	41
		16:38	45	40

During the daytime the noise climate at ST3 was dominated by distant road traffic noise and the occasional aircraft noise as noted for ST1 above. Some nearby construction noise was also noted. During the night-time, Operational plant other data centres was more audible.

2.2.3.6 ST4

The survey results for the noise monitoring at ST4 are summarised in Table 2.6.

Table 2.6. ST4 Noise Survey Results

Location	Date	Start Time	Measured Noise Levels (dB re.2x10-5Pa)	
			$L_{Aeq, 15min}$	$L_{A90, 15min}$
ST4	24/06/2021	00:52	41	39
		01:53	41	39
		23:43	41	38
	02/07/2021	12:52	46	43
		15:22	44	42
		16:20	50	42

During the daytime the noise climate at ST4 was dominated by road traffic noise and overheard aircraft movements. Other distant sources included a lorry reversing, a car alarm and fan exhaust noise from the Google Data Centre. During the night, road traffic noise was more distant with operational plant noise from Google Data Centre audible.

2.2.3.7 ST5

The survey results for the noise monitoring at ST5 are summarised in Table 2.7.

Table 2.7. ST5 Noise Survey Results

Location	Date	Start Time	Measured Noise Levels (dB re.2x10-5Pa)	
			$L_{Aeq, 15min}$	$L_{A90, 15min}$
ST5	23/06/2021	23:22	49	39
	24/06/2021	00:31	39	37
		01:35	39	36
	02/07/2021	12:32	41	39
		15:01	41	37
		16:01	46	41

The noise climate at ST5 was similar to that at ST4, with the loudest industrial noise contributions from buildings located to the north of New Nangor Road. During the night-time, it was noted that contributions from Digital Realty's Data Centre were more audible.

2.2.3.8 ST6

The survey results for the noise monitoring at ST6 are summarised in Table 2.8.

Table 2.8. ST6 Noise Survey Results

Location	Date	Start Time	Measured Noise Levels (dB re.2x10-5Pa)	
			$L_{Aeq, 15min}$	$L_{A90, 15min}$
ST6	24/06/2021	00:06	34	33
		01:13	50	32
		02:15	36	33
	02/07/2021	11:59	64	43
		14:38	64	39
		17:44	65	39

The noise climate at ST6 in the daytime was dominated by road traffic noise, vehicles accessing the 'Junior Genius' creche, and children playing in the nearby gardens. During the night-time, no local vehicle movements were noted except for the measurement at 01:13 when an articulated lorry passed the measurement position. Otherwise, plant noise from the Google Data Centre dominated the noise climate during the night-time.

3. REVIEW OF RELEVANT GUIDANCE – STAGE 2

This section deals with 'Stage 2' of the noise impact assessment as outlined in the EPA's NG4 2016 Guidance.

The derivation of appropriate emission limit values (ELV) for the proposed facility will be conducted in accordance with the NG4 document. This approach is summarised below in accordance with guidance detailed in Section 4 of the NG4 document.

3.1 Quiet Area Screening

The proposed development is not considered a 'quiet area' in this instance. As detailed in the Table 3.1 below, the site fails to meet all the criteria outlined in EPA's Guidance, confirming that the site does not qualify as a 'quiet area' as per the Agency definition.

Table 3.1 Assessment of site against Quiet Area criteria

Quiet Area Test Criteria	Yes/ No	Comment
Is the site at least 3 km from urban areas with a population >1,000 people	No	Facility is located within 3km of Clondalkin with a population of >1,000 people
Is the site at least 10 km from any urban areas with a population >5,000 people	No	Facility is located within 10km of various suburban areas of Dubin City with populations of >5k people
Is the site at least 15 km from any urban areas with a population >10,000 people	No	Facility is located within 15km of various suburban areas of Dubin City with populations of >10k people
Is the site at least 3 km from any local industry[1]	No	Facility is surrounded by various industrial facilities within Profile Park Industrial Estate
Is the site at least 10 km from any major industry centre	No	Facility is within 10km of various industrial facilities within Profile Park Industrial Estate, Greenogue Business Park, Baldonnell Business Park, Roadstone Quarry amongst others
Is the site at least 5 km from any National Primary Route	No	N7 is <4km from the facility
Is the site at least 7.5 km from any Motorway or Dual Carriageway	No	Facility is located approximately 4.5km west of the M50 Motorway.
Quiet Area?	No	

3.2 Low Background Noise Area Screening

In order to establish whether the noise sensitive locations in the vicinity of the site would be considered an area of 'low background noise' (LBN), the noise levels measured during the environmental noise survey need to satisfy all three of the following criteria:

- Arithmetic Average of L_{A90} During Daytime Period ≤40 dB L_{A90}, and;
- Arithmetic Average of L_{A90} During Evening Period ≤35 dB L_{A90}, and;
- Arithmetic Average of L_{A90} During Night-time Period ≤30 dB L_{A90}.

The Arithmetic Average L_{A90} results at each monitoring location are compared against the criteria in Table 3.2. As outlined in Table 3.2 none of the locations would be considered 'Areas of Low Background Noise' as the measured noise levels do not satisfy the criteria. As all three periods (day, evening and night) need to meet the criteria to be designated an area of LBN, the criteria have not been established.

[1] Local industry is taken to include all sources of noise that may be considered industrial in nature, for example: grain drying facilities, creameries and small factories.

Table 3.2. Comparison of Measurement Results with NG4 Low Background Noise Area Criteria

Location	Period (hours)	$L_{A90,T}$ (dB)	NG4 Screening (dB L_{A90})	Satisfies Criteria for Low Background Noise Area?
LT1	Daytime (07:00-19:00)	46	≤40	No
	Evening (19:00-23:00)	44	≤35	
	Night (23:0-07:00)	42	≤30	
LT2	Daytime (07:00-19:00)	42	≤40	No
	Evening (19:00-23:00)	40	≤35	
	Night (23:0-07:00)	38	≤30	
ST1	Daytime (07:00-19:00)	49	≤40	No
	Night (23:0-07:00)	39	≤30	
ST2	Daytime (07:00-19:00)	41	≤40	No
	Night (23:0-07:00)	34	≤30	
ST3	Daytime (07:00-19:00)	42	≤40	No
	Night (23:0-07:00)	36	≤30	
ST4	Daytime (07:00-19:00)	42	≤40	No
	Night (23:0-07:00)	39	≤30	
ST5	Daytime (07:00-19:00)	39	≤40	No
	Night (23:0-07:00)	37	≤30	
ST6	Daytime (07:00-19:00)	40	≤40	No
	Night (23:0-07:00)	33	≤30	

3.3 Determining Appropriate Noise Criteria

Based on the EPA NG4 guidance the following noise criteria are appropriate at the nearest NSLs to the facility:

Day-to-day operation:

- Daytime (07:00 to 19:00hrs) 55dB $L_{Ar,15min}$
- Evening (19:00 to 23:00hrs) 50dB $L_{Ar,15min}$
- Night-time (23:00 to 07:00hrs) 45dB $L_{Aeq,15min}$

Testing of emergency equipment [2]

- Daytime (07:00 to 19:00hrs) 55dB $L_{Ar,15min}$

In respect of generator testing, it is confirmed that this will occur during weekday daytime periods only, therefore the standard daytime limit is applied to generator testing.

During the night period, no tonal or impulsive noise from the facility should be clearly audible or measurable at any NSL. The applicable noise criteria identified are in line with the typical limit values for noise from licensed sites.

There are some plant items proposed for the development site that are designed to be used in emergency situations, for example, when grid power supplies fail. It is common practice to allow a relaxation of noise

[2] Testing of emergency equipment will be limited to daytime hours (07:00-19:00)

limits associated with emergency plant operations. Section 4.4.1 of EPA NG4 contains the following comments in relation to emergency plant items:

"In some instances, licensed sites will have certain items of emergency equipment (e.g. standby generators) that will only operate in urgent situations (e.g. grid power failure). Depending upon the context, it may be deemed permissible for such items of equipment to give rise to exceedances in the noise criteria/limits during limited testing and emergency operation only. If such equipment is in regular use for any purposes other than intermittent testing, it is subject to the standard limit values for the site".

Reference is made to the UK NHS document Health Technical Memorandum 08-01: Acoustics (HMSO, 2013) where the following is stated in respect of plant used only for emergency circumstances:

"Emergency plant

2.30 An increase in internal and external noise levels of up to 10 dB(A) over the noise criteria is normally considered acceptable, provided regular testing only takes place during the daytime on a weekday."

It is therefore considered that appropriate noise criteria for emergency scenarios are as per below in line with multiple other licensed facilities:

Emergency operations

- Daytime (07:00 to 19:00hrs) 55dB $L_{Ar,15min}$
- Evening (19:00 to 23:00hrs) 55dB $L_{Ar,15min}$
- Night-time (23:00 to 07:00hrs) 55dB $L_{Aeq,15min}$

Although no exceedances of these criteria are predicted under emergency scenarios, the operation of generators during such events will be managed through a Noise Management Plan (NMP), as required by the EPA. This ensures that noise emissions remain controlled and compliant with the applicable day, evening, and night-time emergency limits.

3.4 Compliance Noise Monitoring

Section 5.1 of this report presents the proposed locations for annual compliance noise monitoring. Attachment 7.5 of the Licence application provide further details on the proposed monitoring locations.

4. NOISE ASSESSMENT – STAGE 3

4.1 Noise Impact Assessment Methodology

This section deals with 'Stage 3' of the noise impact assessment as outlined in the EPA's NG4 Guidance.

The noise levels expected at nearest NSLs, due to the operation of the facility, must be considered and presented as part of the licence application.

The following sections presents the assessment and the findings. Specific information in relation to the noise prediction model, DGMR iNoise, calculation settings and assessment assumptions are provided in Appendix B to this report.

It should be noted that noise impact assessment has been completed using information obtained from the design team for significant items of plant which was supplied by vendors.

4.1.1 Noise Sensitive Locations

Free-field noise emission levels have been predicted at the nearest noise sensitive locations (NSLs) surrounding the site as illustrated in Figure 2-1, at 4 metres above ground, representing the typical height of a first-floor window.

4.1.2 Source Noise Data

The noise modelling was undertaken using the sound power noise emissions levels which are listed in full in Table C 1 of Appendix C. Plant items were selected in order to not exceed the stated noise levels and /or appropriate attenuation was incorporated into the design of the plant units/buildings in order that the plant noise emission levels are achieved on site (including any system regenerated noise).

4.1.2.1 Noise Mitigation Measures

To manage and reduce noise emissions, a series of mitigation measures have been implemented and incorporated into the three-dimensional noise modelling. The list of mitigation strategies presented below is based on information provided by the design team.

Table C 2 in Appendix C provides the insertion loss data across frequency bands for each mitigation measure, as specified by the respective manufacturers. These insertion loss values have been applied within the noise model to attenuate the noise sources where the corresponding mitigation measures have been implemented.

- **Emergency Generators**: Each generator is enclosed within an acoustic container designed to effectively dampen the noise produced during operation.
- **MFGP Engine Cells**: Constructed using specialised sound-absorbing materials to ensure internal noise levels remain within acceptable limits.
- **Air Intake and Exhaust Attenuators**: All air intake and exhaust points are fitted with atmosphere-side attenuators to reduce noise emissions and ensure compliance with the adopted noise criteria.
- **Gas Flue Silencers**: Silencers are installed on gas flues to mitigate exhaust noise. Attenuation from the flue length has also been calculated and incorporated into the model for MFGP.
- **Chillers**: Chillers serving the data halls are enclosed in bespoke Allaway AA303S acoustic enclosures to minimise noise emissions.
- **Weather Louvres**: Installed on the MFGP and DUB rooftops (buildings 11.1, 11.2, and 12), as well as around the BESS first floor. These structures allow airflow while providing a minimum noise transmission reduction to the surrounding environment.

4.1.3 Assessed Operational Scenarios

This section presents the predicted noise levels at the nearest NSLs, based on all plant operating at maximum load and assessed against the adopted EPAs noise criteria for the relevant periods. The results assume continuous 24-hour site operation with no variation in noise emissions between these periods, providing a conservative worst-case assessment that captures the maximum potential noise impact.

The assessment considers the following operational scenarios:

- **Day-to-day Operations:** Normal continuous operation of all plant under typical conditions.
- **Testing of Emergency Equipment:** Intermittent operation of emergency plant for testing purposes during daytime hours, with five generators assumed to be tested simultaneously.
- **Emergency Operations:** Full-load operation of emergency plant during power outage events.

Table 4.1 outlines the operational status of plant components under the various assessed scenarios, including day-to-day operations, emergency equipment testing, and emergency conditions.

Table 4.1 Plant operating in each assessed operational scenario

Scenario	MFGP North	MFGP South	DUB11	DUB12	BESS	Step up Transformer Compound
Day-to-day Operations	6 dual fuel engines and associated building services plant running at full load	5 dual fuel engines and associated building services plant running at full load	Building services plant running at full load	Building services plant running at full load	All units running at full load	All units running at full load
Testing of Emergency Equipment	6 dual fuel engines and associated building services plant running at full load	5 dual fuel engines and associated building services plant running at full load	Building services plant running at full load and 5 generators operating at full load [Note a]	Building services plant running at full load	All units running at full load	All units running at full load
Emergency Operations	6 dual fuel engines and associated building services plant running at full load	5 dual fuel engines and associated building services plant running at full load	Building services plant running at full load and all 22 generators operating at full load	Building services plant running at full load and all 13 generators operating at full load	All units running at full load	All units running at full load

[Note a] The generators included in the noise model for testing of emergency plant represent a worst-case scenario due to their proximity to the nearest noise-sensitive receiver (NLS 1)

In addition to the above, in Section 4.2.4 is presented a separate **cumulative assessment** undertaken to estimate combined noise levels from the proposed development's plant together with noise contributions from nearby licensed sites. The cumulative scenario assumes full-load emergency operations occurring simultaneously across all sites, which is highly unlikely in practice. Consequently, the cumulative

results are provided for indicative purposes only, to illustrate potential combined noise impacts under worst-case conditions. Further discussion is set out in Section 4.2.4.

4.2 Noise Impact Assessment Results

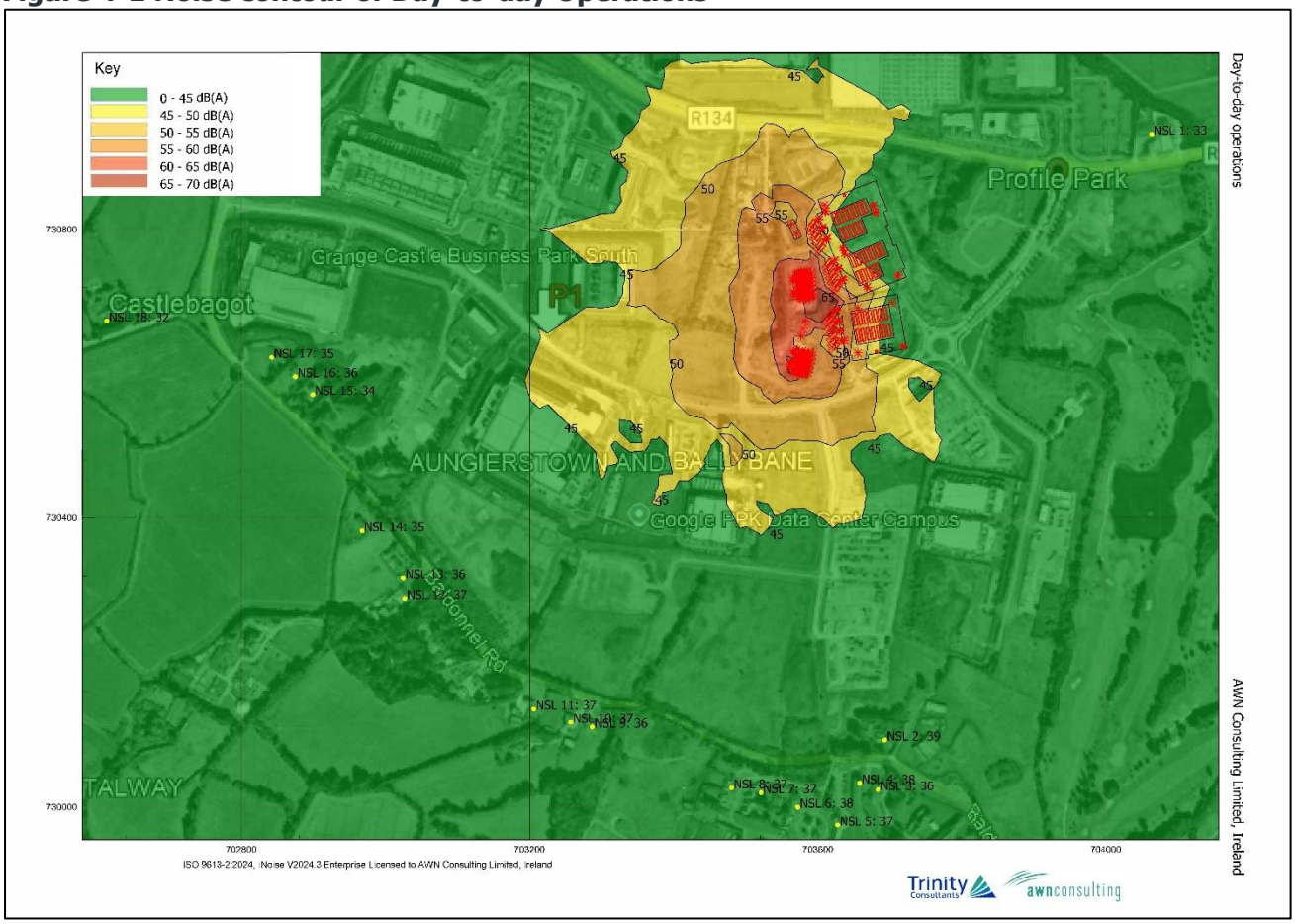
4.2.1 Day-to-day Operations

Table 4.2 presents the results of the assessment for day-to-day operations compared against the day, evening and night-time criteria set in Section 3.3.

Table 4.2 Predicted operational noise levels compared against criteria (Day-to-day)

Location	Predicted $L_{Ar,T}$ (dB)	Period					
		Day (07:00 – 19:00 hrs)		Evening (19:00 – 23:00 hrs)		Night (23:00 – 07:00 hrs)	
		Criterion $L_{Ar,T}$ (dB)	Complies ?	Criterion $L_{Ar,T}$ (dB)	Complies ?	Criterion $L_{Ar,T}$ (dB)	Complies ?
NSL 1	33	55	Yes	50	Yes	45	Yes
NSL 2	39	55	Yes	50	Yes	45	Yes
NSL 3	36	55	Yes	50	Yes	45	Yes
NSL 4	38	55	Yes	50	Yes	45	Yes
NSL 5	37	55	Yes	50	Yes	45	Yes
NSL 6	38	55	Yes	50	Yes	45	Yes
NSL 7	38	55	Yes	50	Yes	45	Yes
NSL 8	37	55	Yes	50	Yes	45	Yes
NSL 9	36	55	Yes	50	Yes	45	Yes
NSL 10	37	55	Yes	50	Yes	45	Yes
NSL 11	37	55	Yes	50	Yes	45	Yes
NSL 12	37	55	Yes	50	Yes	45	Yes
NSL 13	36	55	Yes	50	Yes	45	Yes
NSL 14	35	55	Yes	50	Yes	45	Yes
NSL 15	34	55	Yes	50	Yes	45	Yes
NSL 16	36	55	Yes	50	Yes	45	Yes
NSL 17	35	55	Yes	50	Yes	45	Yes
NSL 18	32	55	Yes	50	Yes	45	Yes
NSL 19	32	55	Yes	50	Yes	45	Yes

Figure 4-1 Noise contour of Day-to-day Operations



4.2.2 Testing of Emergency Equipment

Table 4.3 presents the results of the assessment for the testing of emergency generators compared against the daytime criteria set in Section 3.3.

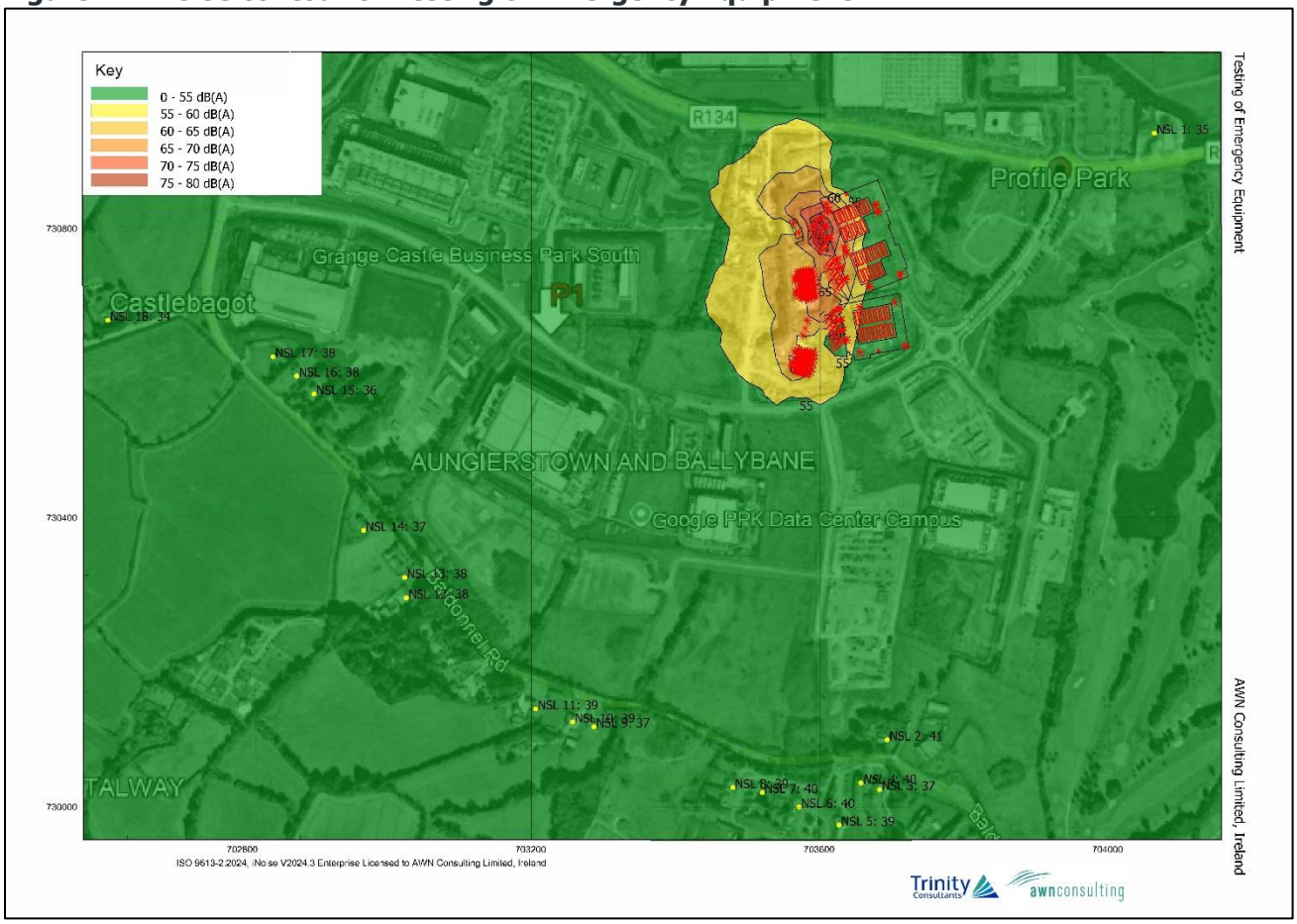
Table 4.3 Predicted operational noise levels compared against criteria (Testing of Emergency Equipment)

Location	Predicted $L_{Ar,T}$ (dB)	Period					
		Day (07:00 – 19:00 hrs)		Evening [a] (19:00 – 23:00 hrs)		Night [a] (23:00 – 07:00 hrs)	
		Criterion $L_{Ar,T}$ (dB)	Complies ?	Criterion $L_{Ar,T}$ (dB)	Complies?	Criterion $L_{Ar,T}$ (dB)	Complies?
NSL 1	35	55	Yes	-	n/a	-	n/a
NSL 2	41	55	Yes	-	n/a	-	n/a
NSL 3	37	55	Yes	-	n/a	-	n/a
NSL 4	40	55	Yes	-	n/a	-	n/a
NSL 5	39	55	Yes	-	n/a	-	n/a
NSL 6	40	55	Yes	-	n/a	-	n/a
NSL 7	40	55	Yes	-	n/a	-	n/a
NSL 8	39	55	Yes	-	n/a	-	n/a
NSL 9	38	55	Yes	-	n/a	-	n/a

Location	Predicted $L_{Ar,T}$ (dB)	Period					
		Day (07:00 – 19:00 hrs)		Evening [a] (19:00 – 23:00 hrs)		Night [a] (23:00 – 07:00 hrs)	
		Criterion $L_{Ar,T}$ (dB)	Complies ?	Criterion $L_{Ar,T}$ (dB)	Complies?	Criterion $L_{Ar,T}$ (dB)	Complies?
NSL 10	39	55	Yes	-	n/a	-	n/a
NSL 11	39	55	Yes	-	n/a	-	n/a
NSL 12	38	55	Yes	-	n/a	-	n/a
NSL 13	38	55	Yes	-	n/a	-	n/a
NSL 14	37	55	Yes	-	n/a	-	n/a
NSL 15	36	55	Yes	-	n/a	-	n/a
NSL 16	38	55	Yes	-	n/a	-	n/a
NSL 17	38	55	Yes	-	n/a	-	n/a
NSL 18	34	55	Yes	-	n/a	-	n/a
NSL 19	34	55	Yes	-	n/a	-	n/a

[a] Testing of emergency equipment will be carried out during daytime hours only (07:00-23:00 hrs). Therefore, the criteria for evening (19:00-23:00 hrs) and night-time (23:00-07:00 hrs) hours do not apply for these periods

Figure 4-2 Noise contour of Testing of Emergency Equipment



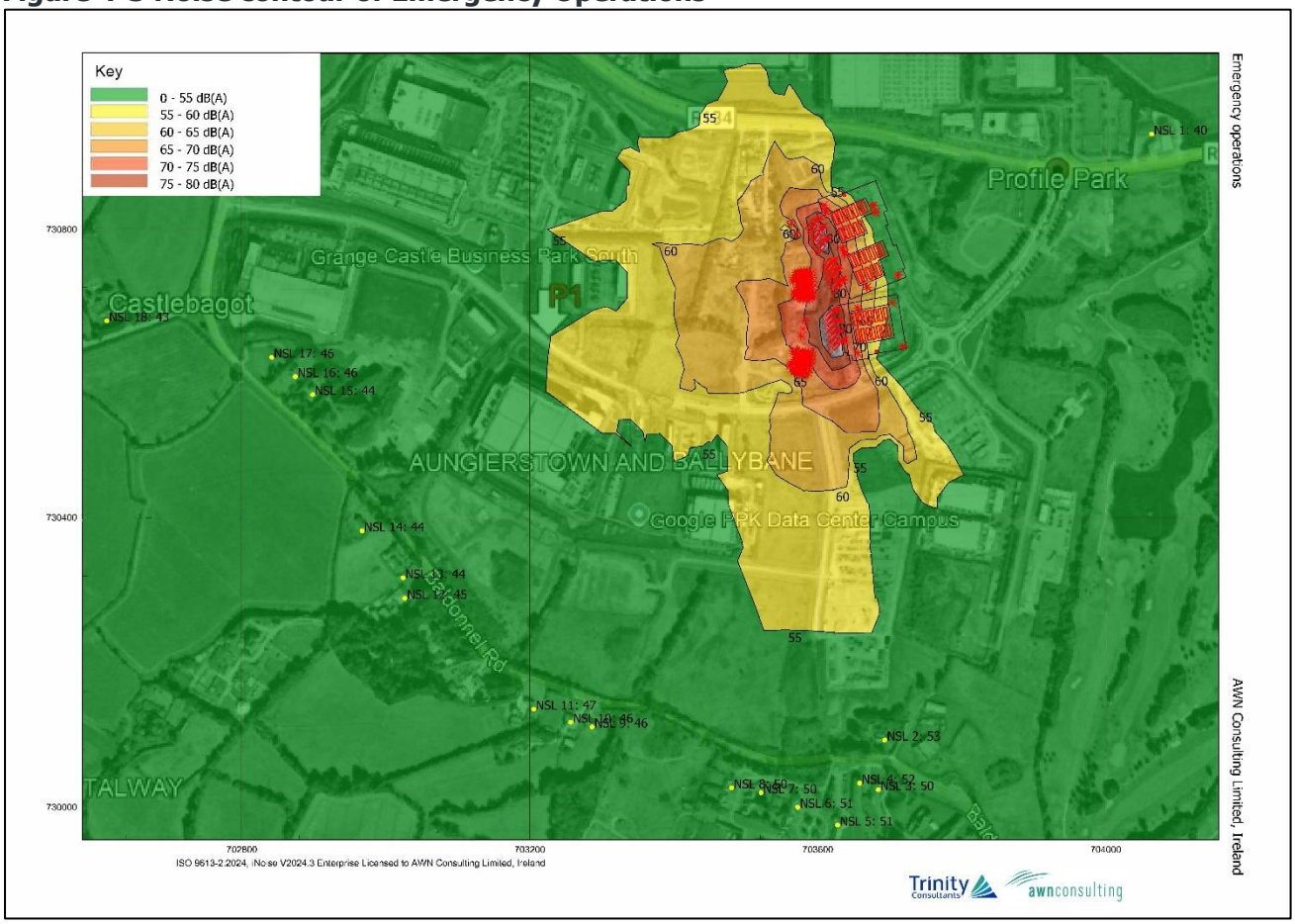
4.2.3 Emergency Operations

Table 4.4 presents the results of the assessment for emergency operations compared against the day, evening and night-time criteria set in Section 3.3.

Table 4.4 Predicted operational noise levels compared against criteria (emergency)

Location	Predicted $L_{Ar,T}$ (dB)	Period					
		Day (07:00 – 19:00 hrs)		Evening (19:00 – 23:00 hrs)		Night (23:00 – 07:00 hrs)	
		Criterion $L_{Ar,T}$ (dB)	Complies ?	Criterion $L_{Ar,T}$ (dB)	Complies ?	Criterion $L_{Ar,T}$ (dB)	Complies ?
NSL 1	40	55	Yes	55	Yes	55	Yes
NSL 2	53	55	Yes	55	Yes	55	Yes
NSL 3	50	55	Yes	55	Yes	55	Yes
NSL 4	52	55	Yes	55	Yes	55	Yes
NSL 5	51	55	Yes	55	Yes	55	Yes
NSL 6	51	55	Yes	55	Yes	55	Yes
NSL 7	50	55	Yes	55	Yes	55	Yes
NSL 8	50	55	Yes	55	Yes	55	Yes
NSL 9	46	55	Yes	55	Yes	55	Yes
NSL 10	46	55	Yes	55	Yes	55	Yes
NSL 11	47	55	Yes	55	Yes	55	Yes
NSL 12	45	55	Yes	55	Yes	55	Yes
NSL 13	44	55	Yes	55	Yes	55	Yes
NSL 14	44	55	Yes	55	Yes	55	Yes
NSL 15	44	55	Yes	55	Yes	55	Yes
NSL 16	46	55	Yes	55	Yes	55	Yes
NSL 17	46	55	Yes	55	Yes	55	Yes
NSL 18	43	55	Yes	55	Yes	55	Yes
NSL 19	42	55	Yes	55	Yes	55	Yes

Figure 4-3 Noise contour of Emergency Operations



4.2.4 Cumulative Noise Assessment

The cumulative noise levels are the noise levels attributable to the application installation, in combination with noise from off-site sources.

In relation to the scope of noise sources to be included in an NG4 assessment, the following paragraphs are noted from the NG4 guidance (*emphasis added)*.

> *When an Agency licence includes conditions relating to noise emissions, this would normally entail specified numerical noise limits which are not to be exceeded. These limits may apply to individual sources of noise on the site itself, at the boundary of the site or at the nearest NSL. The setting of noise limits at any or all of these locations may be required, and the assignment of such limits will be decided during the licensing process for the facility.*
>
> *All reasonably practicable measures should be adopted at licensed facilities to minimise the noise impact of the activity, and BAT should be used in the selection and implementation of appropriate noise mitigation measures and controls. While BAT must be applied on a case-by-case basis,* ***the noise attributable solely to on-site activities, expressed as a free field value at any NSL, should not generally exceed the values given below****.*
>
> | | |
> |---|---|
> | *Daytime (07:00 to 19:00hrs)* | *55dB $L_{Ar,30min}$* |
> | *Evening (19:00 to 23:00hrs)* | *50dB $L_{Ar,30min}$* |
> | *Night-time (23:00 to 07:00hrs)* | *45dB $L_{Aeq,15min}$* |

Thus, the NG4 guidance does not require that the cumulative noise levels meet these criteria.

4.2.4.1 Cumulative Noise from Surrounding Licensed Facilities

As the proposed development is located in an area surrounded by existing operational licensed facilities, they form part of the existing baseline noise environment. In line with any suburban area, however, the baseline environment is also made up from a range of other non-industrial sources, e.g. road traffic, environmental noise sources, aircraft etc. It is often not possible, therefore, to attribute the *specific* noise contribution from one noise source or from individual facilities from a measured noise level.

Similarly, it is often not possible to undertake a cumulative noise model where detailed noise emission source data, layout drawings etc for other developments is not publicly available. In the absence of quantified noise emission data or modelling outputs, it is not feasible to robustly incorporate this facility into a cumulative noise model. However, in general, developments are expected to be designed and operated in accordance with South Dublin County Council standard noise guidance and criteria. Alternatively, where a site is regulated under an IE licence, it is expected to comply with the noise limits set out in the EPA licence.

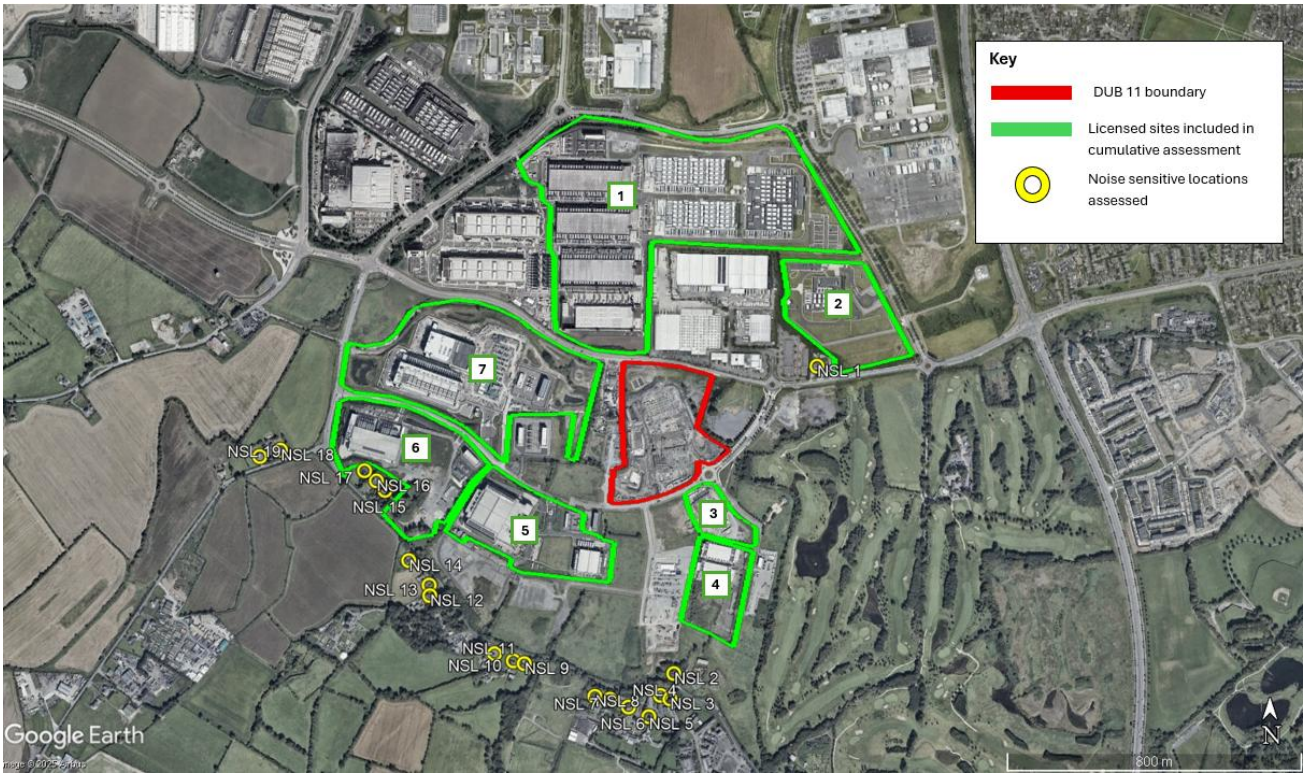
To determine the overall cumulative noise impact associated with operational plant noise emissions only, a comprehensive assessment was conducted to evaluate cumulative plant noise levels in the area. This involved combining the predicted operational noise from the proposed Vantage site with predicted contributions from other existing or permitted developments in the vicinity.

The cumulative noise assessment incorporates predicted noise data from nearby licensed sites obtained from the relevant EIARs published on South Dublin County Council (SDCC) planning website and from published planning documents from the EPA website. This publicly available data has been combined with the predicted noise levels from the proposed development to estimate the overall cumulative plant noise impact at the nearest NSLs. The contribution from each nearby licensed facility (as per their published predicted noise levels) to the overall noise environment is detailed in Table D 1 of Appendix D. These facilities include:

- 1. Microsoft Ireland Operations Limited (Reg. No. P1191-01)
- 2. Microsoft Operations Ireland Ltd. (Reg. No. SD15A/0133)
- 3. Greener Ideas Limited (Reg. No. P1196-01)
- 4. Digital Realty Trust (Reg. No. SD11A/0023)
- 5. Google Ireland Limited (Reg. No. P1189-01)
- 6. CyrusOne and Amazon Data Services Ireland Limited (Reg. No. SD18A/0134 and P1184-01)
- 7. Amazon Data Services Ireland Limited (Reg. Nos. P1170-01)

Figure 4-4 shows the licensed sites included in the cumulative assessment, along with their locations relative to the DUB 11 site and the nearby NSLs.

Figure 4-4 Licensed sites included in the cumulative assessment, DUB 11 site boundary and NSLs



Other more distant sites, such as Microsoft Ireland Operations Limited (Reg. No. P1190-01) and Equinix Planning (Reg. No. SD12A/0150), have not been included due to their separation distances from both the plant and the NSLs or because no noise assessment information was available at the closest NSLs to this development. In this instance, the noise contribution from these two facilities is assumed to be sufficiently below a level that would generate any cumulative noise impact at the closest NSL to this development.

An example calculation for the cumulative assessment for NSL1 is presented in Table D 2 of Appendix D. For all other locations, the cumulative calculations included in Table 4.5 to Table 4.7 follow the same approach.

4.2.4.1.1 Day to Day Operations

Table 4.5 presented the calculated cumulative noise levels for each assessment NSLs for day-to-day operations of the proposed Vantage development.

Table 4.5 Predicted cumulative noise levels at nearest noise sensitive locations from the proposed development combined with nearby licensed sites

Location	Calculated Plant Noise from Surrounding facilities (i.e. calculated baseline $L_{Ar,T}$ (dB)	Predicted noise level from Vantage day-to-day site operations in isolation $L_{Ar,T}$ (dB)	Cumulative noise level from day-to-day operations $L_{Ar,T}$ (dB)
NSL1	40[3]	33	41
NSL2	47	39	47
NSL3	-	36	36
NSL4	35	38	40
NSL5	-	37	37
NSL6	-	38	38
NSL7	-	38	38
NSL8	-	37	37
NSL9	37	36	40
NSL10	35	37	39
NSL11	34	37	39
NSL12	-	37	37
NSL13	31	36	37
NSL14	37	35	39
NSL15	30	34	35
NSL16	29	36	37
NSL17	28	35	36
NSL18	26	32	33
NSL19	24	32	33

The results in Table 4.5 confirm that all assessed locations are below the adopted day, evening and night-time criteria for the proposed development. There is one potential exceedance of the night-time of criterion of 45 dB $L_{Aeq,T}$ at NSL 2, due to calculated contributions from existing operational sites from published data. This location is discussed further in Section 4.2.4.2.

4.2.4.1.2 Emergency Testing

Table 4.6 shows the calculated cumulative noise levels during testing of emergency equipment, representing a controlled scenario with elevated but temporary noise emissions.

Table 4.6 Predicted cumulative noise levels at nearest noise sensitive locations from the proposed development combined with nearby licensed sites

Location	Calculated Plant Noise from Surrounding facilities (i.e. calculated baseline $L_{Ar,T}$ (dB)	Predicted noise level from Vantage emergency testing site operations in isolation $L_{Ar,T}$ (dB)	Cumulative noise level from Testing of Emergency Equipment $L_{Ar,T}$ (dB)
NSL1	40	35	41

[3] Calculation presented in Table D2 of Appendix D for NSL1.

Location	Calculated Plant Noise from Surrounding facilities (i.e. calculated baseline $L_{Ar,T}$ (dB)	Predicted noise level from Vantage emergency testing site operations in isolation $L_{Ar,T}$ (dB)	Cumulative noise level from Testing of Emergency Equipment $L_{Ar,T}$ (dB)
NSL2	47	41	48
NSL3	-	37	37
NSL4	35	40	41
NSL5	-	39	39
NSL6	-	40	40
NSL7	-	40	40
NSL8	-	39	39
NSL9	37	38	40
NSL10	35	39	40
NSL11	34	39	40
NSL12	-	38	38
NSL13	48	38	48
NSL14	48	37	48
NSL15	30	36	37
NSL16	29	38	38
NSL17	28	38	38
NSL18	26	34	34
NSL19	24	34	34

From the results in Table 4.6, it is clear that all assessed locations are below the daytime criterion of 55 dB $L_{Aeq,T}$, with no exceedances predicted under this conservative scenario.

4.2.4.1.3 Emergency Power Operations

Table 4.7 details the cumulative noise levels during emergency operations, representing the worst-case scenario with all generators running at full load for all facilities (where information is available).

Table 4.7 Predicted cumulative noise levels at nearest noise sensitive locations from the proposed development combined with nearby licensed sites

Location	Calculated Plant Noise from Surrounding facilities (i.e. calculated baseline $L_{Ar,T}$ (dB)	Predicted noise level from Vantage emergency power operations in isolation $L_{Ar,T}$ (dB)	Cumulative noise level from Emergency Operations $L_{Ar,T}$ (dB)
NSL1	51	40	52
NSL2	43	53	53
NSL3	-	50	50
NSL4	47	52	53
NSL5	-	51	51
NSL6	-	51	51
NSL7	-	50	50
NSL8	-	50	50
NSL9	50	46	51
NSL10	35	46	47

Location	Calculated Plant Noise from Surrounding facilities (i.e. calculated baseline $L_{Ar,T}$ (dB)	Predicted noise level from Vantage emergency power operations in isolation $L_{Ar,T}$ (dB)	Cumulative noise level from Emergency Operations $L_{Ar,T}$ (dB)
NSL11	34	47	47
NSL12	-	45	45
NSL13	47	44	48
NSL14	56	44	57
NSL15	50	44	51
NSL16	48	46	50
NSL17	48	46	50
NSL18	48	43	49
NSL19	46	42	48

From the results in Table 4.7, it is evident that all assessed locations are below the 55 dB $L_{Aeq,T}$ criteria, except at NSL 14, where the criterion is exceeded due to contributions from existing operational sites under this highly unlikely and highly conservative scenario.

4.2.4.2 Cumulative Noise with Measured Baseline

The baseline noise surveys encompass all the above operational facilities in addition to other surrounding noise sources. In order to determine the potential overall cumulative noise level, the predicted noise level from the NSLs with highest noise emissions from the proposed vantage site (NSL2) has been added to the measured baseline environment at the closest survey location.

In order to categorise the specific effect of the cumulative levels in terms of significance, reference has been made to the 'Guidelines for Environmental Noise Impact Assessment' produced by the Institute of Environmental Management and Assessment (IEMA) (2014).

The methodology set out in the IEMA 2014 document considers the addition of the predicted site noise levels to the measured background noise levels and assesses the potential cumulative impact by evaluating the change in overall noise levels.

The scale adopted in this assessment is shown in Table 4.8 below is based on an example scale within the IEMA guidelines. The corresponding significance of effect from in the EPAs EIA Report Guidelines (2022) is also presented.

Table 4.8 Noise Effect Scale

Difference between Calculated Noise Level and criteria or baseline	Subjective Response	Impact Guidelines for Noise Impact Assessment Significance (Institute of Acoustics)	Effect Guidelines on the Information to be contained in EIARs (EPA)
0	No change	None	Imperceptible
0.1 – 2.9	Barely perceptible	Minor	Not Significant
3.0 – 4.9	Noticeable	Moderate	Slight, Moderate

Difference between Calculated Noise Level and criteria or baseline	Subjective Response	Impact Guidelines for Noise Impact Assessment Significance (Institute of Acoustics)	Effect Guidelines on the Information to be contained in EIARs (EPA)
5.0 – 9.9	Up to a doubling or halving of loudness	Substantial	Significant
10.0 or more	More than a doubling or halving of loudness	Major	Profound

Table 4.9 presents the results of the cumulative noise assessment based on the IEMA (2014) guidelines during day-to-day plant operations at NSL 2. NSL 2 was selected because the baseline noise results at LT2 (described in Section 2.2) are representative of this NSL, and because NSL 2 shows the highest cumulative level during day-to-day operations, as indicated in Table 4.5.

It should be noted that, as shown in Figure 2-2, the background noise level already accounts for noise from most surrounding sites, as these were operational at the time of the noise survey. This exercise is provided for reference purposes only, as no defined criteria are currently required under the IE licence for cumulative noise.

Table 4.9 IEMA (2014) assessment for NSL 2

Location	Predicted $L_{Ar,T}$ (dB)	Measured background level during night-time (23:00 – 07:00 hrs) $L_{A90,T}$	Combined cumulative noise level $L_{Ar,T}$ (dB)	Change in Noise Level dB(A)	EPA Glossary of Impacts
NSL2	38.9	38 (LT2)	41.5	+3.5	Slight, Moderate

The results in Table 4.9 indicate a potential increase in background noise level of 3.5 dB at NSL2 with the day-to-day operations of the proposed Vantage development.

Whilst this increase indicate a *slight to moderate* impact, the combined cumulative noise level of 41.5 dB remains below the night-time criterion of 45 dB $L_{Aeq,T}$.

It is important to highlight the measured background noise level from LT2 (38 dB L_{A90}) is 9 dB below the calculated plant noise contribution from the surrounding facilities used in Table 4.5. This confirms the calculated noise emissions published within the various noise impacts assessments incorporate a range of conservative scenarios. The actual measured levels are significantly lower.

Under both cumulative noise assessments, it is determined the operation of the proposed Vantage development will not result in any significant noise effect to the surrounding noise environment.

5. REPORTING / APPLICATION FORM – STAGE 4

5.1 Annual Noise Monitoring

The following locations are proposed for annual daytime noise monitoring at the facility as set out in Attachment 7-5 – Noise Emissions and in the drawing Attachment 7-5 – Noise Emissions Attachment. These have been determined based on availability of safe access to monitoring positions and the closest NSLs.

Table 5.1. Proposed Annual Noise Monitoring Locations

Location	Location Type	Description	Coordinates (ITM)		Monitoring Frequency
			Easting	Northing	
NSL1	Noise Sensitive Location	Noise Sensitive receptor located to the east of the site	304134	230897	Annual
NSL 2	Noise Sensitive Location	Noise Sensitive receptor located to the south of the site	303763	230059	Annual
N1	Boundary	South-west to south of car park	303036	230420	Annual

Given there may be potential access constraints at some NSLs and the presence of extraneous noise sources in the vicinity, it may be necessary to undertake compliance noise monitoring (if required) at the site boundary or at a suitable proxy location and assess to the nearest NSLs.

6. CONCLUSION

Vantage Data Centres DUB11 Limited ("the Operator") is applying for an IE Licence to operate a Data Centre and Multi-Fuel Generation Plant (MFGP) development within Profile Park Industrial Estate, Clondalkin, Dublin 22. The facility will operate continuously, including night-time hours, with the nearest residential properties approximately 350 to 1,000 meters away.

Baseline noise levels for Noise Sensitive Locations (NSLs) have been derived from attended and unattended noise surveys undertaken during daytime, evening, and night-time periods. In accordance with the relevant EPA NG4 Guidance, appropriate operational noise criteria have been established based on the existing noise environment at the nearest NSLs.

A noise model has been prepared using proprietary DGMR iNoise modelling software in accordance with the calculation method outlined in ISO 9613-2:2024 to determine predicted operational noise levels at the nearest NSLs. The calculated noise levels are based on conservative assumptions reflecting worst-case continuous operation scenarios.

The predicted noise levels at all NSLs are below the relevant day, evening and night-time noise criteria derived to the site operations in line with the EPAs NG4 (2016) document. Confirmation has been obtained from the relevant suppliers at the detailed design stage that the information provided represents final data for all significant noise producing plant items and that these shall not emit tonal or impulsive characteristics to such a degree that these characteristics could be clearly audible at the noise sensitive locations.

Running of the generators during emergencies will be managed through a Noise Management Plan (NMP). The standard noise conditions during normal day to day operations and limit values based on the day, evening, night criteria will continue to apply.

It should be noted that this noise impact assessment has been completed using final vendor data for all plant items currently procured. Therefore, this represents the final noise impact assessment for the development. Where any unforeseen substantial variation in noise emission levels occurs post-installation, additional noise control measures such as attenuator systems will be employed where necessary to ensure ongoing compliance with the required noise criteria set out in this report or defined in the Licence issued to the operator.

APPENDIX A. GLOSSARY OF ACOUTIC TERMINOLOGY

ambient noise The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.

background noise The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).

broadband Sounds that contain energy distributed across a wide range of frequencies.

dB Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 µPa).

dB L_{pA} An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

Hertz (Hz) The unit of sound frequency in cycles per second.

Impulsive noise A noise that is of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.

$L_{Aeq,T}$ This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T).The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.

L_{AFN} The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.

$L_{Ar,T}$ The Rated Noise Level, equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and impulsiveness of the sound.

L_{AF90} Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.

noise Any sound, that has the potential to cause disturbance, discomfort or psychological stress to a person exposed to it, or any sound that could cause actual physiological harm to a person exposed to it, or physical damage to any structure exposed to it, is known as noise.

noise sensitive location NSL – Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or

other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.

octave band A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000Hz octave band contains acoustical energy between 707Hz and 1,414Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards.

rating level See $L_{Ar,T}$.

sound power level The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) per m^2 where:

$$Lw = 10Log\frac{P}{P_0} \text{ dB}$$

Where: p is the rms value of sound power in pascals; and

P_0 is 1 pW.

sound pressure level The sound pressure level at a point is defined as:

$$Lp = 20Log\frac{P}{P_0} \text{ dB}$$

specific noise level A component of the ambient noise which can be specifically identified by acoustical means and may be associated with a specific source. In BS 4142, there is a more precise definition as follows: 'the equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval ($L_{Aeq, T}$)'.

tonal Sounds which cover a range of only a few Hz which contains a clearly audible tone i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being 'tonal'.

$^1/_3$ octave analysis Frequency analysis of sound such that the frequency spectrum is subdivided into bands of one–third of an octave each.

APPENDIX B. NOISE MODELLING PARAMETERS

A 3D computer-based prediction model has been prepared in order to quantify the noise level associated with the development at the identified noise sensitive locations. This section discusses the methodology behind the noise modelling process.

DGMR iNoise

Proprietary noise calculation software has been used for the purposes of this modelling exercise. The selected software, DGMR iNoise, calculates noise levels in accordance with ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 2024.

DGMR iNoise is a proprietary noise calculation package for computing noise levels in the vicinity of noise sources. Predictor calculates noise levels in different ways depending on the selected prediction standard. In general, however, the resultant noise level is calculated taking into account a range of factors affecting the propagation of sound, including:

- the magnitude of the noise source in terms of A weighted sound power levels (L_{WA});
- the distance between the source and receiver;
- the presence of obstacles such as screens or barriers in the propagation path;
- the presence of reflecting surfaces;
- the hardness of the ground between the source and receiver;
- Attenuation due to atmospheric absorption; and
- Meteorological effects such as wind gradient, temperature gradient and humidity (these have significant impact at distances greater than approximately 400m).

Brief Description of ISO9613-2: 2014

ISO9613-2:2024 calculates the noise level based on each of the factors discussed previously. However, the effect of meteorological conditions is significantly simplified by calculating the average downwind sound pressure level, $L_{AT(DW)}$, for the following conditions:

- wind direction at an angle of ±45° to the direction connecting the centre of the dominant sound source and the centre of the specified receiver region with the wind blowing from source to receiver, and;
- wind speed between approximately 1ms-1 and 5ms-1, measured at a height of 3m to 11m above the ground.

The equations and calculations also hold for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear calm nights. The basic formula for calculating $L_{AT(DW)}$ from any point source at any receiver location is given by:

$$L_{fT(DW)} = L_W + D_c - A$$

Where:

$L_{fT(DW)}$	is an octave band centre frequency component of $L_{AT(DW)}$ in dB relative to $2x10^{-5}$ Pa;
L_W	is the octave band sound power of the point source;
D_c	is the directivity correction for the point source;
A	is the octave band attenuation that occurs during propagation, namely attenuation due to geometric divergence, atmospheric absorption, ground effect, barriers and miscellaneous other effects

The estimated accuracy associated with this methodology is shown in Table B.1 below:

Table B.6.1 Estimated Accuracy for Broadband Noise of $L_{AT(DW)}$

Height, h*	Distance, d†	
	0 < d < 100m	100m < d < 1,000m
0<h<5m	±3dB	±3dB
5m<h<30m	±1dB	±3dB

* *h is the mean height of the source and receiver.*

† *d is the mean distance between the source and receiver. N.B. These estimates have been made from situations where there are no effects due to reflections or attenuation due to screening.*

iNoise Data and Assumptions

The noise model has been constructed using data from various source as follows:

Site Layout	The general site layout has been obtained from the drawings forwarded by the project architects.
Local Area	The noise sensitive locations were identified using the original planning documents for the development, supplemented by Google Maps to pinpoint residential properties.
Heights	The heights of the buildings for the development were based on drawings provided by the design team, while the heights of the noise sensitive locations were estimated using Google Earth.
Contours	No land contours have been used in the noise model, due to the compact nature of the assessment area.

The following are the main aspects that have been considered in terms of the noise predictions presented in this instance.

Directivity Factor: The directivity factor (D) allows for an adjustment to be made where the sound radiated in the direction of interest is higher than that for which the sound power level is specified. In this case the sound power level is measures in a down wind direction, corresponding to the worst-case propagation conditions and needs no further adjustment.

Ground Effect: Ground effect is the result of sound reflected by the ground interfering with the sound propagating directly from source to receiver. The prediction of ground effects is inherently complex and depend on source height receiver height propagation height between the source and receiver and the ground conditions. The ground conditions are described according to a variable defined as G, which varies between 0.0 for hard ground (including paving, ice concrete) and 1.0 for soft ground (includes ground covered by grass trees or other vegetation) Our predictions have been carried out using various source height specific to each plant item, a receiver heights of 1.6m for single storey properties and 4m for double. An assumed ground factor of G = 0.5 has been applied off site. Noise contours presented in the assessment have been predicted to a height of 4m in all instances.

Geometrical Divergence This term relates to the spherical spreading in the free-field from a point sound source resulting in attenuation depending on distance according to the following equation:

$$A_{geo} = 20 \times \log(\text{distance from source in meters}) + 11$$

Atmospheric Absorption

Sound propagation through the atmosphere is attenuated by the conversion of the sound energy into heat. This attenuation is dependent on the temperature and relative humidity of the air through which the sound is travelling and is frequency dependent with increasing attenuation towards higher frequencies. In these predictions a temperature of 10°C and a relative humidity of 70% have been used, which give relativity low levels of atmosphere attenuation and corresponding worst case noise predictions.

Table B 1 Atmospheric Attenuation Assumed for Noise Calculations (dB per km)

Temp (°C)	% Humidity	Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
10	70	0.12	0.41	1.04	1.93	3.66	6.66	32.77	116.88

Barrier Attenuation

The effect of any barrier between the noise source and the receiver position is that noise will be reduced according to the relative heights of the source, receiver and barrier and the frequency spectrum of the noise.

APPENDIX C. NOISE SOURCES AND MITIGATION MEASURES

The data centre development consists of three data hall areas. The proposed plant units outlined below represent the selected equipment for all three buildings, i.e., DUB 11.1, DUB 11.2 and DUB 12, that has been included in the noise impact assessment.

Day-to-day operations

- 15 no. Air Handling Units (AHU)
- 38 no. Air-cooled chillers – serving DUB 11.1 and DUB11.2 data halls
- 3 no. Air-cooled chillers – serving the admin areas
- 6 no. Multi-Fuel Generation Plant (MFGP) units at MFGP North
- 5 no. Multi-Fuel Generation Plant (MFGP) units at MFGP South
- 2 no. Battery Energy Storage System (BESS)
- 3 no. Transformers (client owned)

Emergency operations in event of loss of power

- 35 no. Emergency generators

Additional plant items, such as DX, VRF units, emergency fire sprinklers pumps, emergency life-safety generators and transformers on DUB 11.1, DUB 11.2 and DUB 12 rooftops are also proposed. However, their contribution to overall noise levels has been considered negligible either due to their relatively low sound output compared to the primary plant or because they are housed internally, thereby limiting their impact on the external acoustic environment.

The test sound data for the air-cooled chillers serving the data halls has been provided by the manufacturer, with the Allaway acoustic enclosures already installed on the units at the time of testing.

The sound power level data used in the model has been derived from information provided by the applicant, as presented in Table C 1.

Table C 1 Proposed plant selection sound data

Unit	Comp./ Cond.	Sound Power Level L_w (dBA) – Octave Band frequency Centre									Total dBA
		31.5	63	125	250	500	1k	2k	4k	8k	
AHU	Supply suction	-	33	41	57	58	53	50	42	36	62
	Exhaust pumping	-	30	45	49	53	50	50	44	35	57
AHU	Supply suction	-	35	43	65	61	59	60	49	52	68
	Exhaust pumping	-	32	49	54	56	54	54	53	42	62
AHU	Supply suction	-	37	50	65	64	59	54	47	44	68
	Exhaust pumping	-	39	60	64	69	71	68	63	56	75
AHU	Supply suction	-	33	41	57	58	53	50	42	36	62
	Exhaust pumping	-	31	49	53	60	63	57	56	46	66
AHU	Supply suction	-	33	43	42	45	42	38	28	13	50

Unit	Comp./ Cond.	Sound Power Level L_w (dBA) – Octave Band frequency Centre									Total dBA
		31.5	63	125	250	500	1k	2k	4k	8k	
	Exhaust pumping	-	36	48	47	53	58	53	47	33	61
AHU	Supply suction	-	30	45	54	54	50	49	40	30	59
	Exhaust pumping	-	33	46	50	55	59	55	50	38	62
AHU	Supply suction	-	30	39	60	57	55	54	46	43	63
	Exhaust pumping	-	31	51	56	62	67	63	60	49	70
AHU	Supply suction	-	45	52	67	68	66	60	51	52	72
	Exhaust pumping	-	35	51	60	66	70	67	66	58	74
AHU	Supply suction	-	27	44	49	50	48	46	38	27	55
	Exhaust pumping	-	34	46	50	55	59	55	49	38	62
AHU	Supply suction	-	46	53	68	69	67	62	53	52	73
	Exhaust pumping	-	39	51	66	71	75	71	70	67	79
Air chiller data halls DUB 11.1 and 11.2	Normal operation daytime (including AA303S enclosure)	-	66	70	79	78	72	71	68	67	83
Air chiller data halls DUB 12	Normal operations daytime (including AA303S enclosure)	-	66	72	79	75	74	74	77	75	84
Air chiller admin DUB 11.1 and DUB 11.2	-	-	-	76	79	81	81	80	74	67	87
Air chiller admin DUB 12	-	-	-	70	74	79	84	81	71	59	87
MFGP	Engine [a]	81	101	114	115	122	123	119	121	114	128
MFGP	Exhaust gas outlet [b]	96	117	120	119	121	115	110	103	100	126
MFGP	Vent. intake auxiliary side	64	81	96	108	109	107	104	96	84	113
MFGP	Generator ventilation duct	56	71	75	78	85	82	88	92	87	95
MFGP	Vent. outlet fan [c]	70	76	83	89	95	98	99	99	93	105

Unit	Comp./ Cond.	Sound Power Level L_w (dBA) – Octave Band frequency Centre									Total dBA
		31.5	63	125	250	500	1k	2k	4k	8k	
MFGP	3-fan cooling radiator [c]	60	66	77	80	82	83	79	74	64	88
BESS	100%	32	54	69	78	92	92	94	92	83	99
Transformer DUB 11.1 [d]	-	-	-	-	-	67	-	-	-	-	67
Transformer DUB 11.2 [d]	-	-	-	-	-	71	-	-	-	-	71
Transformer DUB 12 [d]	-	-	-	-	-	67	-	-	-	-	67
Generator AVK DS3600	Engine (including acoustic enclosure)	-	69	82	86	78	78	80	78	87	91
	Inlet (including attenuator)	-	75	86	87	78	75	77	83	87	92
	Outlet (including attenuator)	-	84	86	90	83	73	71	75	87	94
	Exhaust gas outlet	-	108	116	121	120	122	124	122	132	134
Generator AVK DS1650	Engine (including acoustic enclosure)	-	69	76	83	76	73	74	71	77	86
	Inlet (including attenuator)	-	74	79	82	74	68	69	74	76	86
	Outlet (including attenuator)	-	79	83	83	77	68	68	73	79	88
	Exhaust gas outlet	-	108	109	116	116	117	117	114	122	126
Generator Caterpillar 3516E	Engine (including acoustic enclosure)	-	0	94	88	84	87	86	86	84	97
	Inlet (including attenuator)	-	77	89	83	75	67	68	77	93	95
	Outlet (including attenuator)	-	0	85	83	72	66	66	76	94	95

Unit	Comp./ Cond.	Sound Power Level L_w (dBA) – Octave Band frequency Centre									Total dBA
		31.5	63	125	250	500	1k	2k	4k	8k	
	Exhaust gas outlet	-	0	117	120	119	119	118	115	122	127
[a] Due to measurement uncertainty no value can be presented for the 31.5 Hz and 63 Hz octave band. Note that it cannot be treated as zero. Therefore, values for these octave bands have been assumed based on existing spectrum.											
[b] Due to measurement uncertainty no value can be presented for the 8000 Hz octave band. Note that it cannot be treated as zero. Therefore, values for these octave bands have been assumed based on existing spectrum.											
[c] Due to measurement uncertainty no value can be presented for the 31.5 Hz octave band. Note that it cannot be treated as zero. Therefore, values for these octave bands have been assumed based on existing spectrum											
[d] Sound spectrum was not available for these items. Noise predictions based on using total value at 500 Hz as per ISO 9613.											

The insertion loss values presented in Table C 2 have been incorporated into the noise model to reflect the mitigation measures applied to specific plant units and locations, based on data provided by the manufacturers and the design team.

Table C 2 Proposed mitigation measures insertion loss data

Unit	Location	Insertion loss R_w (dB) – Octave Band frequency Centre								
		31.5	63	125	250	500	1k	2k	4k	8k
Stack Silencer TL	MFGP – Exhaust gas outlet	15	29	17	31	31	37	42	41	-
20 dBA absorptive silencer TL	MFGP – Exhaust gas outlet	2	4	9	16	18	21	20	22	19
Flue bends and length attenuation	MFGP – Exhaust gas outlet	0	3	4	4	4	4	4	4	4
Silencer L=1200mm	MFGP – Ventilation intake auxiliary side	-	6	14	28	44	54	44	26	18
Silencer L=500mm	MFGP – Generator ventilation duct	0	2	4	8	12	13	11	8	6
Silencer L=2500 mm	MFGP – Ventilation outlet fan	-	3	8	22	36	30	21	14	12
Building façade	MFGP buildings	-	37	48	55	63	64	72	100	60
Silencer	Generator – Exhaust gas outlet	8	18	32	30	43	54	54	45	41
Weather louvre [a]	DUB 11.1, DUB 11.2, DUB 12, MFGP Rooftop and BESS building level 1	0	0	0	1	1	2	2	2	2
[a] Estimated sound insulation based on typical performance										

APPENDIX D. LICENSED SITES NOISE DATA FOR CUMULATIVE ASSESSMENT

The data presented in this appendix has been sourced from publicly available information on the Environmental Protection Agency (EPA) and SDCC planning websites. It was used to undertake the cumulative noise assessment for the proposed development, incorporating noise contributions from nearby licensed sites within the surrounding area. This approach provides an indicative worst-case scenario of combined noise impacts under both day-to-day operations and emergency conditions. The inclusion of this data supports a comprehensive understanding of the overall acoustic environment and ensures that potential cumulative effects are appropriately considered as part of the noise impact assessment.

Table D 1 Noise impact assessment results from nearby sites based on public data available on EPA website

Reg. No.	Site name	Planning report NSL location ref.	Corresponding NSL – Dub 11	Day-to-day $L_{Ar,T}$ (dB)	Testing of emergency equipment $L_{Ar,T}$ (dB)	Emergency operations $L_{Ar,T}$ (dB)
P1191-01	Microsoft Ireland Operations Limited	J	NSL 1	34	34	40
SD15A/0133	Microsoft Operations Ireland Ltd.	NP 12	NSL 1	30	-	46
SD15A/0133	Microsoft Operations Ireland Ltd.	NP 08	NSL 2	39	-	43
P1196-01	Greener Ideas Limited	R14	NSL 1	38	-	-
P1196-01	Greener Ideas Limited	R01	NSL 2	36	-	-
P1196-01	Greener Ideas Limited	R02	NSL 9	35	-	-
P1196-01	Greener Ideas Limited	R03	NSL 10	35	-	-
P1196-01	Greener Ideas Limited	R04	NSL 11	34	-	-
SD11A/0023	Digital Realty Trust	Detached house off Baldonnel Rd	NSL 2	39	-	-
P1189-01	Google Ireland Limited	NSL-1	NSL 9	33	32	50
P1189-01	Google Ireland Limited	NSL-2	NSL 4	35	27	47
P1189-01	Google Ireland Limited	NSL-3	NSL 14	35	48	56
SD18A/0134	CyrusOne	R5	NSL 19	14	-	43
SD18A/0134	CyrusOne	R4	NSL 18	15	-	45
SD18A/0134	CyrusOne	R3	NSL 17	9	-	45
SD18A/0134	CyrusOne	R2	NSL 16	9	-	45
SD18A/0134	CyrusOne	R1	NSL 15	8	-	47

Reg. No.	Site name	Planning report NSL location ref.	Corresponding NSL – Dub 11	Day-to-day $L_{Ar,T}$ (dB)	Testing of emergency equipment $L_{Ar,T}$ (dB)	Emergency operations $L_{Ar,T}$ (dB)
SD18A/0134	CyrusOne	R8	NSL 14	3	-	41
SD18A/0134	CyrusOne	R7	NSR 13	3	-	41
P1184-01	Amazon Data Services Ireland Limited	R5	NSL 19	14	-	43
P1184-01	Amazon Data Services Ireland Limited	R4	NSL 18	15	-	45
P1184-01	Amazon Data Services Ireland Limited	R3	NSL 17	9	-	45
P1184-01	Amazon Data Services Ireland Limited	R2	NSL 16	9	-	45
P1184-01	Amazon Data Services Ireland Limited	R1	NSL 15	8	-	47
P1184-01	Amazon Data Services Ireland Limited	R8	NSL 14	3	-	41
P1184-01	Amazon Data Services Ireland Limited	R7	NSR 13	3	-	41
P1170-01	Amazon Data Services Ireland Limited	R01	NSL 19	23	-	34
P1170-01	Amazon Data Services Ireland Limited	R02	NSL 18	25	-	35
P1170-01	Amazon Data Services Ireland Limited	R03	NSL 17	28	-	38
P1170-01	Amazon Data Services Ireland Limited	R04	NSL 16	29	-	38
P1170-01	Amazon Data Services Ireland Limited	R05	NSL 15	30	-	39
P1170-01	Amazon Data Services Ireland Limited	R07	NSL 14	32	-	43
P1170-01	Amazon Data Services Ireland Limited	R08	NSL 13	31	-	43

An example calculation for the cumulative assessment for NSL1 is presented in Table D 2. For all other locations, the cumulative calculations included in in Section 4.2.4.1, follow the same approach.

Table D 2 Cumulative Noise Calculation Day-to-day operations for NSL1

Site name	Planning report NSL location ref.	Corresponding NSL – DUB11	Day-to-day $L_{Ar,T}$ (dB)
Microsoft Ireland Operations Limited	J	NSL 1	34
Microsoft Operations Ireland Ltd.	NP 12	NSL 1	30
Greener Ideas Limited	R14	NSL 1	38
Vantage Data Centres DUB11	-	NSL 1	33

Formula applied: $10\log_{10}(10^{34/10}+10^{30/10}+10^{38/10}+10^{33/10}) = 40.7$ dBA

Cumulative Noise Level NSL 1 = 40.7 dBA

APPENDIX E. RAMBOLL – EXCERPT FROM CHAPTER 9 OF ATTACHMENT-6-3-6-EIAR-PLANNING-JUL-2022.P1-3

Baseline Characterisation Method

Desk Study

9.16 In order to establish baseline noise and vibration conditions in the study area, relevant data was reviewed and assessed. Data was obtained from the following sources:

- Other previous planning applications in the public domain (planning portal);
- Satellite imagery (Google Maps);
- Architectural Drawings, Sections, Elevations; and
- Manufacturer supplied noise data for proposed plant installations.

Field Study

9.17 The existing noise environment was characterised by baseline noise surveys. These were taken in and around the application site to quantify the prevailing ambient and background noise levels during the daytime and night-time periods. The ambient and background noise levels have been used to inform the assessment criteria for plant noise emissions, building envelope and ventilation strategies and construction noise effects.

9.18 The surveys were taken outside of Covid-19 lockdown measures. However, the noise levels measured on site may have been lower due to reduced traffic levels. This is not considered to affect the assessments because the use of lower background levels would form a worst-case in terms of settling plant noise emission limits.

9.19 Attended and unattended measurements have identified the major noise sources around the application site. The locations of noise measurements are detailed in Figure 9.2. LT positions were unattended monitoring positions. ST positions were attended monitoring positions.

9.20 At each measurement location, a comprehensive suite of noise level metrics was recorded. The following noise level indices are relevant to this assessment:

- $L_{Aeq,T}$ The A-weighted equivalent continuous noise level over the measurement period;
- $L_{A90,T}$ The A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe background noise.

9.21 Vibration surveys were not undertaken as there are no active rail links or considerable vibration generating sources within 100m.

Figure 9.2: Noise Measurement Locations (LT positions were unattended monitoring positions and ST positions were attended monitoring positions)

Assessment Method

Methodology

Demolition and Construction Stage

9.22 Published Guidance: BS5228:2009+A1 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites

9.23 BS5228:2009+A1 2014 gives recommendations for basic methods of noise and vibration control relating to construction work. It also provides guidance concerning methods of predicting and measuring noise and vibration and assessing their impacts on those exposed to it. The prediction method considers the noise emission level of proposed plant, the separation distance between the source and the receiver and the effect of the intervening topography and structures.

9.24 The approach adopted in BS5228:2009+A1 2014, calls for the designation of a noise sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction

noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

9.25 BS5228:2009+A1 2014 sets out guidance on permissible noise levels relative to the existing noise environment. Table 9.3 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors as recommended by BS5228:2009+A1 2014. These are construction noise levels only and not the cumulative noise level due to construction plus existing ambient noise.

Table 9.3: BS5228:2009+A1 2014 Assessment Categories

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A (Note A)	Category B (Note B)	Category C (Note C)
Night-time (23:00 to 07:00)	45	50	55
Evenings and weekends (Note D)	55	60	65
Daytime (07:00 to 19:00) and Saturdays (07:00 to 13:00)	65	70	75

Note A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

Note B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

Note C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

Note D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

9.26 Noise limits have been set for the purposes of the construction noise effects assuming daytime working (07:00-19:00). It should be noted that this assessment method is only valid for residential properties.

9.27 Part 2 of the standard gives recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration.

9.28 The legislative background to vibration control is described and recommendations are given regarding procedures for the establishment of effective liaison between developers, site operators and local authorities. The standard also provides guidance on measuring vibration and assessing its effects on the environment.

Demolition and Construction Noise Assessment

9.29 Proposed demolition and construction works on the site will involve the use of a variety of working methods, and operations will vary across the site throughout the construction period. Therefore, noise levels from the works are likely to vary over time as the distance from the noise sources and the type of construction activity change. Note BS5228-1:2009+A1:2014 states that calculations to receivers over 300m away should be treated with caution.

9.30 The exact working methodology and plant to be employed on site for the demolition/construction work have not yet been established. This level of detail will only be available post-planning when specialist contractors are engaged; therefore a realistic worst case has been assessed.

9.31 An estimate of the expected noise levels over a representative period has been prepared using typical types of plant commensurate for works of this nature, and noise emission data for plant obtained from BS5228-1:2009+A1:2014. As a 'worst case', the assessment has assumed that all plant will operate for each phase of work at a given location within the site.

9.32 Construction noise predictions have been based on the methodology contained within BS5228-1:2009+A1:2014. This enables predictions to be made of the noise emissions from the construction activities for given distances from the works.

9.33 The daytime construction noise criteria used for identifying potentially significant impacts has been identified as 65 dB $L_{Aeq,10hr}$, based on the measured noise levels at the site (Category A).

9.34 The following construction stages have been considered:

- Demolition;
- Enabling Works and Stream Enhancements;
- Substructure;
- Superstructure;
- Internal Fit-out; and
- External works.

Demolition and Construction Traffic Noise Assessment

9.35 There is potential for disturbance to occur as a result of heavy goods vehicles (HGVs) travelling on the public highway. Impacts of this nature are typically more likely to occur close to the construction site access, or on sections of road that are subject to low levels of preconstruction traffic.

9.36 The HGV movements on the roads nearest the site have been considered for the purposes of identifying significant impacts. This approach has been taken because they are bounded by noise-sensitive receptors in close proximity; therefore, they provide the worst case for the assessment.

9.37 The number of HGVs attributable to the demolition and construction works will be highest during demolition and earthworks.

9.38 This assessment has been undertaken using the haul route method outlined in BS5228-1:2009+A1:2014. The maximum number of trips will be included within the CEMP.

Demolition and Construction Vibration Assessment

9.39 BS5228-2:2009+A1:2014 states that for the majority of people vibration levels between 0.14 and 0.3 mm/s PPV are just perceptible. A vibration level of 1.0 mm/s is sufficient to cause complaint, but tolerable with prior warning; whereas a level of 10 mm/s is intolerable for anything more than a very brief exposure. Vibration levels exceeding 15 mm/s PPV are sufficient to result in minor cosmetic damage in light/unreinforced buildings. This magnitude of vibration is not considered likely as a result of the proposed construction activities being undertaken, and therefore an assessment of building damage has not been undertaken. No piling is proposed as part of the development.

9.40 Perceptibility of vibration is considered in the assessment.

Operation Stage

9.41 Published Guidance: BS4142:2014+A1:2019 Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas

9.42 BS4142:2014+A1 2019 provides a method for rating industrial and commercial sound and method for assessing resulting impacts upon people. The method is applicable to fixed plant installations, sound from industrial and manufacturing process and other associated activities.

9.43 The basis of BS4142:2014+A1:2019 is a comparison between the background noise level in the vicinity of residential locations and the rating level of the noise source under consideration. The relevant parameters in this instance are as follows:

- Background Level, $L_{A90,T}$: defined in the Standard as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, and quoted to the nearest whole number of decibels;
- Specific Level, $L_{Aeq,T}$: the equivalent continuous 'A' weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T;

- Residual Level, $L_{Aeq,T}$: the equivalent continuous 'A' weighted sound pressure level at the assessment location in the absence of the specific sound source under consideration, over a given time interval, T; and
- Rating Level, $L_{Ar,Tr}$: the specific sound level plus any adjustment made for the characteristic features of the noise.

9.44 The standard specifies that noise measurements of one hour should be used during the day (07:00-23:00) and 15 minutes at night (23:00-07:00).

9.45 Potential impacts are predicted from the difference between the representative background level at a noise sensitive receptor and the rating level from the noise source considered. The standard suggests that the greater the excess, the greater the magnitude of impact.

9.46 In determining the significance of the impact, BS4142:2014+A1:2019 requires a consideration of the context of the assessment i.e. the nature of the existing acoustic environment and the new noise source, and the sensitivity of the affected receptors.

Operational Noise Modelling Approach

9.47 The predicted noise levels likely to be generated during the operational phase of the proposed development due to new items of fixed plant have been calculated using the proprietary noise modelling software CadnaA®. The operational noise predictions have been undertaken in accordance with the noise prediction framework set out in ISO 9613-2 'Acoustics – Attenuation of sound during propagation outdoors – Part 2 General method of calculation'.

9.48 The ISO 9613 noise prediction model assumes that individual sources act as point sources; the noise level reducing by 6 dB for every doubling of distance. Noise from line sources reduce by 3 dB per doubling of distance. The model takes into account the distance between the sources and the receptors and the amount of attenuation due to atmospheric absorption and ground cover.

9.49 The topography on and around the site has been modelled using topographical survey information. The acoustic ground absorbency has been modelled according to local conditions.

Cumulative Stage

9.50 For the purposes of assessing the cumulative effects, consideration has been given to all cumulative schemes that have the potential to result in a significant cumulative effect alongside the proposed development. Full details of all the cumulative schemes are given in Chapter 2: EIAR Process and Methodology. The baseline and assessment of significance, and the judgement of the magnitude of change stages are as above for the demolition and construction and operation stages. Only receptors for which the proposed development is predicted to result in a significant residual effect alone are included in this part of the assessment

Assessment Criteria

9.51 The criteria used to assess if an effect is significant or not, is set out in subsequent sub-sections. This is determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the effect. In considering the significance of an effect, consideration has been given to the duration of the effect, the geographical extent of the effect and the application of professional judgement.

Receptor Sensitivity/Value Criteria

9.52 The sensitivity of receptors has been classified as low, medium or high, in accordance with the criteria set out in Table 9.4.

Table 9.4: Receptor Sensitivity Criteria

Sensitivity	Criteria
Low	Industrial, commercial and retail premises
Medium	Places of worship, community facilities, offices
High	Specialist vibration sensitive equipment, residential properties, educational buildings, medical facilities, care homes, hotels

9.53 Table 9.5 details the distances at which certain construction activities are likely to give rise to a just perceptible level of vibration. These figures are based on historical field measurements to inform BS5228:2009+A1:2014.

Table 9.5: Distances at which vibration may just be perceptible

Construction Activity	Distance from Activity (m)
Heavy vehicles (e.g. dump trucks)	5-10
Excavation	10-15
Hydraulic breaker	15-20
Rotary bored piling	20-30
Driven piling	50-100
Continuous flight auger (CFA) piling	10-20

9.54 The distances provided in Table 9.5 have been used to assess potential vibration impacts at surrounding properties.

Impact Magnitude Criteria

Demolition and Construction Noise

9.55 The magnitude of impact has been classified as low, medium or high, in accordance with the criteria set out in Table 9.6.

Table 9.6: Impact Magnitude Criteria – Demolition and Construction Noise

Magnitude of Impact	Façade noise level dB(A)
Low	<65
Medium	65-70
High	>70

Demolition and Construction Vibration

9.56 NSRs located at distances equal to or greater than those provided in Table 9.5, may be subject to perceivable vibration – this would result in a low magnitude of impact. NSRs located at distances less than those provided, may experience levels of vibration which could cause complaints, i.e. a medium magnitude of impact. High magnitudes of impact are unlikely to occur.

Operational Phase Building Services Plant

9.57 Plant rating noise limits have been set following the methodology contained within BS4142:2014+A1:2019. Based on guidance from BS4142:2014+A1:2019 and noise limits defined by the EPA, the following magnitudes of impact have been used:

Table 9.7: Impact Magnitude Criteria – Operational Building Services Noise Emissions

Magnitude of Impact	Description
	Noise due to the normal operation of the proposed development, shall not exceed the lesser of the following limits:
Low	• Daytime (07:00-19:00) 55 dB $L_{Ar,Tr}$ or 10 dB above background. • Evening (19:00-23:00) 50 dB $L_{Ar,Tr}$ or 0 dB above background. • Night time (23:00-07:00) 45 dB $L_{Ar,Tr}$ or 0 dB above background.

Baseline Conditions

Existing Baseline

9.66 The existing noise climate across the application site varies with location. The northern portion of the site generally experiences higher levels of noise due to the influence of the surrounding road network and other commercial/industrial uses. Elsewhere, the noise levels in central part and southern portion of the site are influenced more by other industrial uses and aircraft movements from the nearby Casement Aerodrome.

9.67 A summary of the noise measurements at each position is provided below. The typical $L_{A90,T}$ values have been derived from statistical analysis in line with BS4142:2014+A1 2019.

Table 9.10: Summary of Noise Measurements at Monitoring Position LT1

Measurement Period	Time Period	Log Average $L_{Aeq,T}$	Typical $L_{A90,T}$ dB
25/06/2021 to 02/07/2021	Daytime (07:00-19:00)	53	46
	Evening (19:00-23:00)	50	44
	Night time (23:00-07:00)	47	42

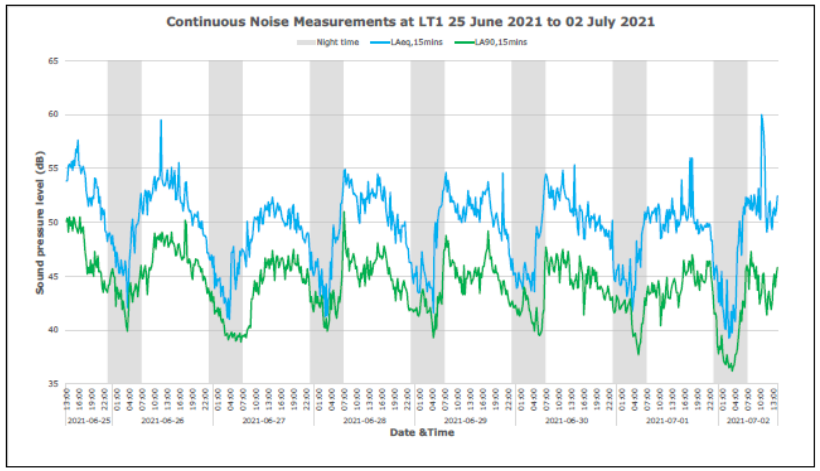


Figure 9.3: Continuous noise measurements at LT1

9.68 It is evident from the survey data recorded at LT1 that the noise levels did not vary significantly throughout the duration of the survey. The dominant noise sources were road traffic noise, aeroplanes and helicopters and more distant noise from other industrial land uses.

Table 9.11: Summary of Noise Measurements at Monitoring Position LT2

Measurement Period	Time Period	Log Average $L_{Aeq,T}$	Typical $L_{A90,T}$ dB
25/06/2021 to 02/07/2021	Daytime (07:00-19:00)	47	42
	Evening (19:00-23:00)	45	40
	Night time (23:00-07:00)	42	38

9.69 The noise climate at LT2 during the survey was dominated by road traffic noise and aircraft movements from the department of defence/Casement Aerodrome. Distant plant noise from the Google Data Center Campus was also audible at this position.

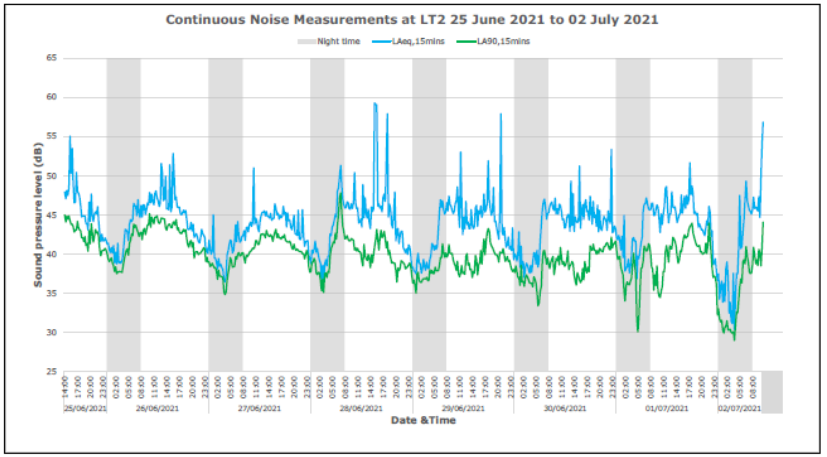


Figure 9.4: Continuous noise measurements at LT2

Table 9.12: Summary of Noise Measurements at Monitoring Position ST1

Date of measurement	Time	$L_{Aeq,15mins}$ dB	$L_{A90,15mins}$ dB
23/06/2021	23:17	54	40
24/06/2021	00:28	48	39
	01:33	45	37
02/07/2021	11:14	67	46
	13:31	69	49
	16:58	69	51

9.70 The noise climate at STI was dominated by road traffic noise during the daytime, with occasional planes and helicopters also contributary. Other sources included cyclists in the cycle lane along New Nagor Road and birdsong. During the night time, road traffic noise was reduced with only one car approximately every 30mins. Humming from nearby industrial units was more clearly audible during the night time measurements.

Table 9.13: Summary of Noise Measurements at Monitoring Position ST2			
Date of measurement	**Time**	**$L_{Aeq,15mins}$ dB**	**$L_{A90,15mins}$ dB**
23/06/2021	23:39	38	33
24/06/2021	00:48	38	34
	01:54	36	34
02/07/2021	11:35	45	39
	13:52	49	43
	17:19	44	40

9.71 During the daytime the noise climate at ST2 was dominated by distant road traffic noise and the nearby car garage workshop (hammering, banging, and cars idling). During the night time, the noise climate was dominated by distant road traffic noise.

Table 9.14: Summary of Noise Measurements at Monitoring Position ST3			
Date of measurement	**Time**	**$L_{Aeq,15mins}$ dB**	**$L_{A90,15mins}$ dB**
24/06/2021	00:05	39	35
	01:13	40	37
	02:11	39	36
02/07/2021	13:11	46	44
	15:41	44	41
	16:38	45	40

9.72 During the daytime the noise climate at ST3 was dominated by distant road traffic noise and the occasional aircraft noise as noted for ST1 above. Some nearby construction noise was also noted. During the night time, humming from other data centers was more audible, along with faunal clicks in nearby trees.

Table 9.15: Summary of Noise Measurements at Monitoring Position ST4			
Date of measurement	**Time**	**$L_{Aeq,15mins}$ dB**	**$L_{A90,15mins}$ dB**
24/06/2021	00:52	41	39
	23:43	41	38
	01:53	41	39
02/07/2021	12:52	46	43
	15:22	44	42
	16:20	50	42

9.73 During the daytime the noise climate at ST4 was dominated by road traffic noise and overheard aircraft movements. Other distant sources included a lorry reversing, a car alarm and fan exhaust noise from the Google Data Center. During the night time, road traffic noise was more distant with the 'hum' from Google's plant more audible.

Table 9.16: Summary of Noise Measurements at Monitoring Position ST5			
Date of measurement	**Time**	**$L_{Aeq,15mins}$ dB**	**$L_{A90,15mins}$ dB**
23/06/2021	23:22	49	39
24/06/2021	00:31	39	37
	01:35	39	36
02/07/2021	12:32	41	39
	15:01	41	37
	16:01	46	41

9.74 The noise climate at ST5 was similar to that at ST4, with the loudest industrial noise contributions coming buildings located to the north of New Nangor Road. During the night time, it was noted that contributions from Digital Realty's Data Center were more audible.

Table 9.17: Summary of Noise Measurements at Monitoring Position ST6			
Date of measurement	**Time**	**$L_{Aeq,15mins}$ dB**	**$L_{A90,15mins}$ dB**
24/06/2021	00:06	34	33
	01:13	50	32
	02:15	36	33
02/07/2021	11:59	64	43
	14:38	64	39
	17:44	65	39

9.75 The noise climate at ST6 in the daytime was dominated by road traffic noise, vehicles accessing the 'Junior Genius' creche, and children playing in the nearby gardens. During the night time, no local vehicle movements were noted except for the measurement at 01:13 when an articulated lorry passed the measurement position. Otherwise, plant noise from the Google Data Center dominated the noise climate during the night time.

9.76 A summary of the weather conditions during the survey period is provided below (as measured at monitoring position LT2):

Table 9.18: Summary of Weather Conditions During Monitoring Period				
Average Wind Direction	**Average Wind Speed (m/s)**	**Average Ambient Temperature (°C)**	**Average Pressure (bar)**	**Average Precipitation (mm)**
South-East (SE)	1.3	14.1	1009.6	0.0

Future Baseline

9.77 The future baseline of the site and study area will be the continued construction of phases of the business parks across the area defined by the South Dublin County Council Development Plan 2016-22 under use zoning Objective EE.

9.78 If any new development of a data center (or other) were proposed, an assessment of the potential noise and vibration effects on the surrounding receptors would need to be considered.

9.79 The Existing Baseline has been used to form the basis of the noise and vibration assessment as this provides a reasonable worst-case.