

9.0 NOISE & VIBRATION

9.1 INTRODUCTION

As detailed in Chapter 1 Introduction, this EIA Report has been prepared to accompany an application for a data storage facility and associated ancillary development at a site north east of the junction of the M18 and the R352 (Tulla Road), Ennis, Co. Clare. The Proposed Development site is illustrated in Figure 9.1 below.

Residential noise sensitive locations are located along a section of the southern boundary of the site where two private residential locations on the north side of the R352 are located. A number of other detached private residences are located opposite the extent of the southern boundary of the site on the opposite side of the R352. To the east of the site the closest noise sensitive residential location is some 250 m from the red line boundary. The nearest noise sensitive locations to the north consist of a number of private residential properties located along a local road at some 430 m from the red line boundary.



Figure 9.1 Project Boundary and Context

The Proposed Development will consist of the construction of a six data storage facility and associated elements will include AHU plant (i.e. 48 per data centre), roof plant (i.e. 1 chiller per data centre) and emergency stand-by generators (i.e. 14 per data centre). The Proposed Development will also include an energy centre a substation and a vertical farm building.

This Proposed Development has been assessed and discussed in this assessment in terms of potential noise and vibration impacts on the surrounding environment.

A glossary of the acoustic terminology used in this chapter is presented in Appendix 9.1.

9.2 METHODOLOGY

9.2.1 Proposed Approach

The following methodology has been adopted for this assessment:

- review appropriate guidance, typical local authority planning conditions, etc. in order to identify appropriate noise criteria for the site operations;
- carry out noise monitoring at a number of locations (e.g. in the vicinity of nearest sensitive properties/boundaries) to identify existing levels of noise in the vicinity of the development;
- development of a detailed 3D noise model to consider the Proposed Development; and
- comment on predicted levels against the appropriate criteria and existing noise levels and outline required mitigation measures (if any).

In the first instance it is considered appropriate to review some basic fundamentals of acoustics.

9.2.2 Fundamentals of Acoustics

In order to provide a broader understanding of some of the technical discussion in this report, this section provides a brief overview of the fundamentals of acoustics and the basis for the preparation of this noise assessment.

A sound wave travelling through the air is a regular disturbance of the atmospheric pressure. These pressure fluctuations are detected by the human ear, producing the sensation of hearing. In order to take account of the vast range of pressure levels that can be detected by the ear, it is convenient to measure sound in terms of a logarithmic ratio of sound pressures. These values are expressed as Sound Pressure Levels (SPL) in decibels (dB).

The audible range of sounds expressed in terms of Sound Pressure Levels is 0dB (for the threshold of hearing) to 120dB (for the threshold of pain). In general, a subjective impression of doubling of loudness corresponds to a tenfold increase in sound energy which conveniently equates to a 10dB increase in SPL. It should be noted that a doubling in sound energy (such as may be caused by a doubling of traffic flows) increases the SPL by 3dB.

The frequency of sound is the rate at which a sound wave oscillates and is expressed in Hertz (Hz). The sensitivity of the human ear to different frequencies in the audible range is not uniform. For example, hearing sensitivity decreases markedly as frequency falls below 250Hz. In order to rank the SPL of various noise sources, the measured level has to be adjusted to give comparatively more weight to the frequencies that are readily detected by the human ear. Several weighting mechanisms have been proposed but the 'A-weighting' system has been found to provide one of the best correlations with perceived loudness. SPL's measured using 'A-weighting' are expressed in terms of dB(A). An indication of the level of some common sounds on the dB(A) scale is presented in Figure 9.2.

The 'A' subscript denotes that the sound levels have been A-weighted. The established prediction and measurement techniques for this parameter are well developed and widely applied. For a more detailed introduction to the basic principles of acoustics, reference should be made to an appropriate standard text.

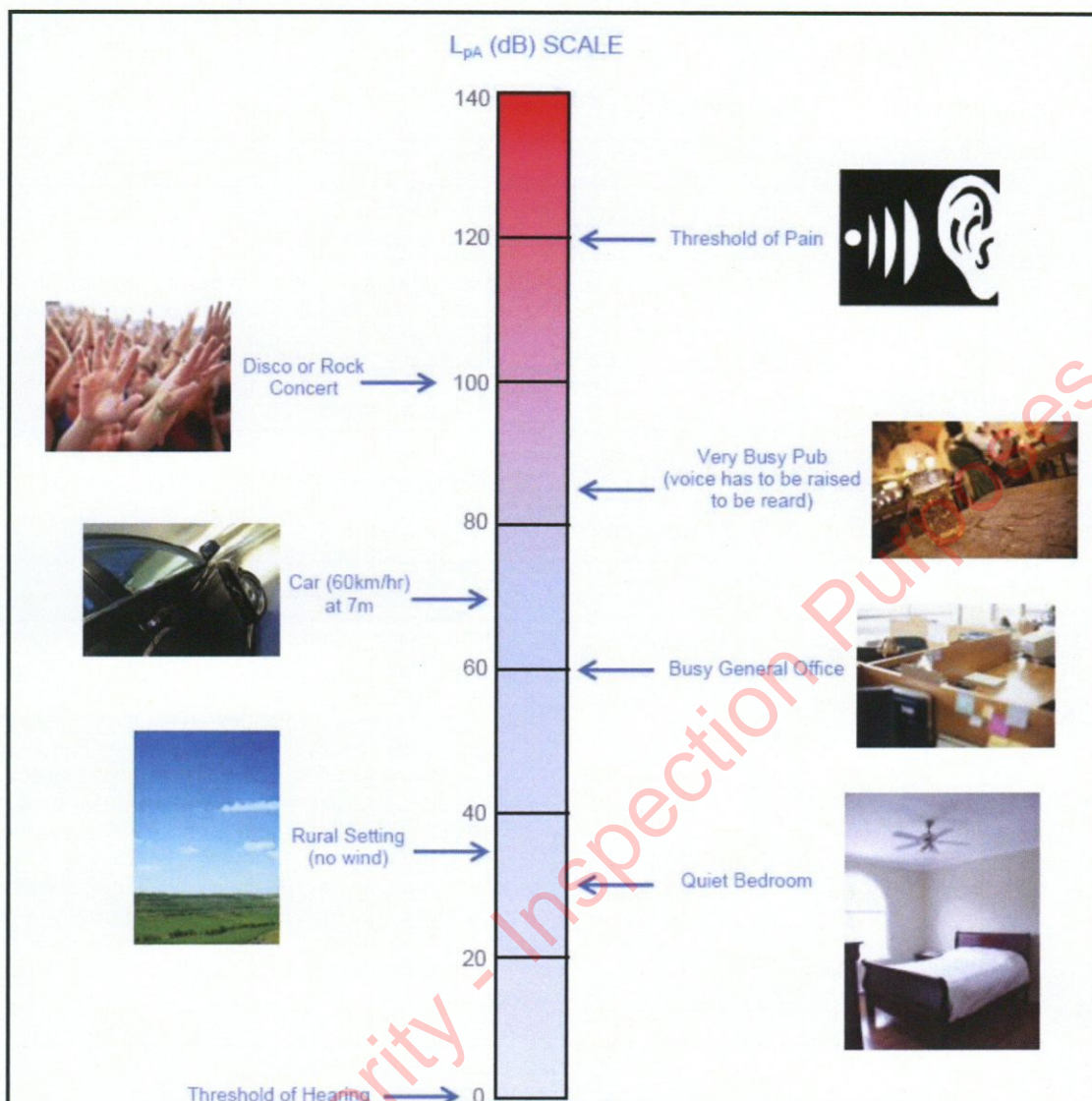


Figure 9.2 dB(A) Scale & Indicative Noise Levels – (EPA: Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016))

9.2.3 Significance of Impacts

The significance of noise and vibration impacts has been assessed in accordance with the EPA Draft EIA Report Guidelines 2017 and EPA Draft Advice Notes for EIS 2015 see Tables 9.1 to 9.3 below. As these guidelines do not quantify the impacts in decibel terms, further reference has been made to the draft 'Guidelines for Noise Impact Assessment' produced by the Institute of Acoustics/Institute of Environmental Management and Assessment Working Party.

With regard to the quality of the impact, ratings may have positive, neutral or negative applications where:

Table 9.1 Quality of Potential Effects

Quality of Effects	Definition
Negative	A change which reduces the quality of the environment (e.g. by causing a nuisance).
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment (e.g. by removing a nuisance).

The significance of an effect on the receiving environment are described as follows:

Table 9.2 Significance of Effects

Significance of Effects on the Receiving Environment	Description of Potential Effects
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.

The duration of effects as described in the Draft EPA Guidelines are:

Table 9.3 Duration of Effects

Duration of Impact	Definition
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

9.2.4 Construction Phase Guidance

Criteria for Rating Noise Impacts

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local authorities normally control construction activities by imposing limits on the hours of operation and may consider noise limits at their discretion.

In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the British Standard BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Noise*.

The approach adopted here calls for the designation of an NSL into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. A threshold noise value is applied to each category. Exceedances (construction noise only) of the threshold value, at the facade of a sensitive receptor during construction, indicates a potential significant noise impact associated with the construction activities. The threshold values recommended by BS5228-1 are depicted in Table 9.4.

Table 9.4 Example Threshold of Significant Effect at Dwellings

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 07:00hrs)	45	50	55
Evenings and weekends ^{Note D}	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 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.

It should be noted that this assessment method is only valid for residential properties.

For the appropriate period (e.g. daytime) the ambient noise level is determined and rounded to the nearest 5 dB. Based on review of baseline noise monitoring to hand (see Section 9.3) the relevant BS5228-1 threshold values at the various assessment locations are discussed in the Table 9.5.

Table 9.5 Rounded Baseline Noise Levels and Associated Categories

Period	Baseline Noise Category	Construction Noise Threshold Value L _{Aeq,1hr} (dB)
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	A	65
Evening (19:00 to 23:00hrs)	A	55
Night time (23:00 to 07:00hrs)	A	45

Guidance on the degree of significance is presented the UK document Design Manual for Roads and Bridges (2020) LA 111 *Sustainability & Environmental Appraisal. Noise and Vibration Rev 2*. The approach is as follows:

- to determine the threshold value for construction noise according to the method from BS5228 described above and
- to compare the predicted construction noise level with the existing noise levels and the threshold value according to the criteria in the table below.

Potentially this procedure is to be followed separately for each noise-sensitive location, however in this instance as the existing noise levels at all survey locations correspond in Category A according to table above, all noise-sensitive locations are considered together.

Similarly, for this proposed development the vast majority of construction works will take place within the 'Daytime' period, i.e. 07:00 – 19:00 on Mondays to Fridays and 07:00 – 13:00 on Saturdays.

The magnitude of the construction noise impact according the DMRB is mapped to the EPA significance terms as detailed in Table 9.6:

Table 9.6 Description of the magnitude of impacts. Adapted from DMRB Table 3.16

Predicted Construction Noise Level is	Magnitude of Impact (DMRB)	EPA Significance of Effect
Below or equal Baseline Noise Level	Negligible	Not Significant
Above Baseline and below or equal to threshold	Minor	Slight – Moderate
Above threshold and below or equal to threshold + 5dB	Moderate	Moderate – Significant
Above threshold + 5dB	Major	Significant – Very Significant

This assessment process determines if a significant construction noise impact is likely. Notwithstanding the outcome of this assessment, the overall acceptable levels of construction noise are set out in the Transport Infrastructure Ireland (TII) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*¹, which should not be exceeded at noise sensitive locations during the construction phase of the development. Table 9.7 sets out these levels.

Table 9.7 Maximum Permissible Noise Levels at the Facade of Dwellings during Construction

Days and Times	Noise Levels (dB re. 2×10^{-5} Pa)	
	L _{Aeq} (1hr)	L _{Amax}
Monday to Friday 07:00 to 19:00hrs	70	80
Monday to Friday 19:00 to 22:00hrs	60*	65*
Saturdays 08:00 to 16:30hrs	65	75
Sundays & Bank Holidays 08:00 to 16:30hrs	60*	65*

Note * Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.

¹ *Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Revision 1, 25 October 2004*, Transport Infrastructure Ireland

In exceptional circumstances there may be a requirement that certain construction works are carried out during night-time periods. In these instances, the relevant evening (60 dB $L_{Aeq,1hr}$) and night-time (50 dB $L_{Aeq,1hr}$) will apply.

Therefore, based on the above the following construction noise criteria are proposed for the site in relation to day to day works during the stated construction hours:

70 dB $L_{Aeq,1hr}$ at noise sensitive location

75 dB $L_{Aeq,1hr}$ at commercial property

Criteria for Rating Vibration Impacts

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5 mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short duration. For example, rock breaking and piling, two of the primary sources of vibration during construction, are typically tolerated at vibration levels up to 12 mm/s and 5 mm/s respectively. This guidance is applicable to the daytime only; it is unreasonable to expect people to be tolerant of such activities during the night.

Guidance relevant to acceptable vibration within buildings is contained in the following documents:

- British Standard BS 7385: 1993: *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration*, and;
- British Standard BS 5228-2: 2009+A1:2014: *Code of practice for noise and vibration control on construction and open sites – Vibration*.

BS 7385 states that there should typically be no cosmetic damage if transient vibration does not exceed 15 mm/s at low frequencies rising to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. These guidelines relate to relatively modern buildings and should be reduced to 50% or less for more critical buildings.

BS 5228 recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. Below these values minor damage is unlikely. Where continuous vibration is such as to give rise to dynamic magnification due to resonance, the guide values may need to be reduced by up to 50%. BS 5288-2 also comments that important buildings which are difficult to repair might require special consideration on a case by case basis.

The TII document *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* also contains information on the permissible construction vibration levels as follows:

Table 9.8 Allowable Vibration during Construction Phase

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
Less than 10 Hz	10 to 50 Hz	50 to 100 Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

9.2.5 Operational Phase – Noise Guidance

The relevant local authority, Clare County Council (CCC), does not have any standard noise conditions listed in the *Noise Action Plan 2018*. Therefore, consideration has been given to the following best practice and national guidance and a review of planning conditions recently applied to similar developments in the area.

In order to establish whether the noise sensitive locations in the vicinity of the site would be considered 'low background noise' areas as defined in the Environmental Protection Agency (EPA) publication *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (NG4 2016) guidance, the noise levels measured during the environmental noise survey need to satisfy the following criteria:

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

Determining Appropriate Noise Criteria

Table 9.9 below outlines the noise emission limit criteria detailed in the NG4 document.

Table 9.9 NG4 Approach for Determining Appropriate Noise Criteria

Scenario	Daytime Noise Criterion, dB $L_{Ar,T}$ (07:00 to 19:00hrs)	Evening Noise Criterion, dB $L_{Ar,T}$ (19:00 to 23:00hrs)	Night Noise Criterion, dB L_{Aeq} (23:00 to 07:00hrs)
Areas of Low Background Noise	45dB	40dB	35dB
All Other Areas	55dB	50dB	45dB

The arithmetic average L_{A90} results at each location are compared against the criteria in Table 9.10.

Table 9.10 Comparison of Measurement Results with NG4 Low Background Noise Area Criteria

Location	Period	L _{A90,T} (dB)	NG4 Screening (dB L _{A90,T})	Satisfies All Criteria for Low Background Noise Area?
A	Daytime	35	≤40	Yes
	Evening	30	≤35	
	Night-time	30	≤30	
B	Daytime	40	≤40	Yes
	Evening	35	≤35	
	Night-time	29	≤30	
C	Daytime	37	≤40	Yes
	Evening	35	≤35	
	Night-time	31	≤30	
D	Daytime	43	≤40	No
	Evening	45	≤35	
	Night-time	32	≤30	

Based on a review of the noise data, in the vicinity of the development site obtained during the baseline noise survey, see Section 9.3, a number of the noise sensitive locations in the vicinity of the site are defined as areas of low background noise as per the NG4 guidance. In these instances, a 45 dB L_{Aeq,15min} daytime, 40 dB L_{Aeq,15min} evening and 35dB L_{Aeq,15min} night-time criteria are applied to day to day operations of the site.

Operational plant and equipment will be selected such that there are no audible tonal or impulsive emissions at noise sensitive locations off site.

Assessment of Significance

The 'Guidelines for Environmental Noise Impact Assessment' produced by the Institute of Environmental Management and Assessment (IEMA) (2014) have been referenced in order to categorise the potential effect of changes in the ambient noise levels during the operational phases of the proposed development.

The guidelines state that for any assessment, the potential significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise. Due to varying factors which effect human response to environmental noise (prevailing environment, noise characteristics, time periods, duration and level etc.) assigning a subjective response must take account of these factors.

The scale adopted in this assessment is shown in Table 9.11 below and is based on an example scale within the IEMA guidelines. The corresponding significance of impact presented in the Draft 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017) is also presented.

The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10 dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

It is considered that the criteria specified in the above table provide a good indication as to the likely significance of changes on noise levels in this case and have been used to assess the impact of operational noise.

Table 9.11 Operational Noise Impact Scale

Noise Level Change dB(A)	Subjective Response	Impact Guidelines for Noise Impact Assessment Significance (Institute of Acoustics)	Impact Guidelines on the Information to be contained in EIA Reports (EPA)
0	No change	None	Imperceptible
0.1 – 2.9	Barely perceptible	Minor	Not Significant
3.0 – 4.9	Noticeable	Moderate	Slight, Moderate
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	Very Significant, Profound

Emergency Operation

In order to provide continuity of service, a number of back-up emergency generators will be provided as part of the current proposal. These generators will only operate in the event of a loss of power supply i.e. temporary grid blackout, when diesel powered back-up generators will be provided to maintain power supply. It is anticipated, based on the Operator's experience, that back-up generators will rarely be used. They will be tested periodically to maintain operational readiness. Routine testing will be conducted during regular weekday daytime periods only. Section 4.4.1 of the Environmental Protection Agency (EPA) document "Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities" (NG4 - 2016) contains the following comments in relation to emergency plant items:

'In some instances, ...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.'

It is therefore considered that the proposed noise criterion of 55 dB $L_{Aeq,1hr}$ on these emergency units is appropriate. Generators will be designed and mitigated in order to achieve this design goal at nearby residential noise sensitive locations.

Recommended Criteria

Following review of relevant guidance, the following noise criteria are proposed for the development:

Table 9.12 Review of Adopted Noise Limits

Activity	Noise Limit dB LAeq,15min per Period			Source
	Day 07:00 – 19:00hrs	Evening 19:00 – 23:00hrs	Night 23:00 – 07:00hrs	
Day to Day Operations	45	40	35	EPA NG4
Generator Testing	45 ^{Note A}	--	--	EPA NG4
Emergency Operation (NSL)	55			EPA NG4

Note A Testing of the emergency generators shall take place between the hours of 08:00 and 17:00 Monday to Friday, testing shall not be permitted on Saturdays, Sundays or public holidays.

Note plant noise emissions are to be designed and plant selected such that they do not contain audible tones and do not have impulsive characteristics at the nearest noise sensitive locations.

9.2.6 Operational Phase – Vibration Guidance

Criteria for Rating Vibration Impacts

Guidance as to an acceptable magnitude of vibration during the operational phase of the development is best taken from British Standard *BS 6472 (1992): Guide to Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)*. The Standard contains recommendations that continuous vibration in residential buildings should not exceed nominally 0.3 mm/s by daytime and 0.2 mm/s by night-time.

It should be noted that the Proposed Development will not give rise to any significant levels of vibration (i.e. less than 0.5 mm/s) off site and therefore the associated impact is identified as long term not significant.

9.2.7 Forecasting Methods

Construction noise calculations have been conducted generally in accordance with BS 5228: 2009+A1:2014: *Code of practice for noise control on construction and open sites - Noise*.

Prediction calculations for operational building services noise, car park activity and vehicle movements on site have been conducted generally in accordance with ISO 9613 (1996): *Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation*.

Changes in road traffic noise on the local road network have been considered using prediction guidance contained within *Calculation of Road Traffic Noise (CRTN)* issued by the Department of Transport in 1988.

9.3 RECEIVING ENVIRONMENT

A series of noise surveys have been undertaken as part of the EIA Report preparation for the Proposed Development. Table 9.13 reviews the findings of these surveys. Full details of the noise monitoring campaign are presented in Appendix 9.2.

If the development is not progressed the existing noise environment will remain largely unchanged. Traffic noise is currently a significant noise source in the vicinity of road networks in the area. In the absence of the proposed development increases in traffic volumes on the local road network would be expected over time and would likely result in slight increases in the overall ambient and background noise levels in the area.

9.3.1 Comment on Noise Levels

Figure 9.3 illustrates the noise sensitive locations in the vicinity of the site at which noise monitoring was undertaken as part of the current assessment.

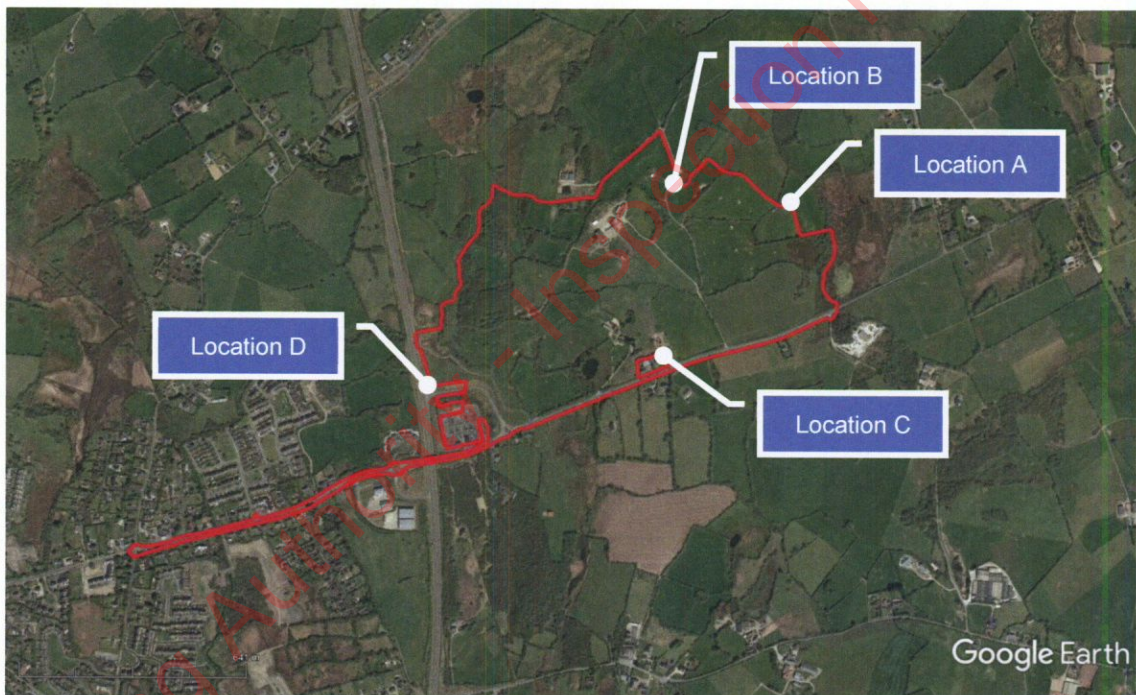


Figure 9.3 Noise Sensitive Locations

Location A Located towards the eastern boundary of the site. This location would be considered to be representative of the noise sensitive residences located to the east of the site.

Location B Located on open ground in the northern section of the site. The location is considered to be representative of noise sensitive locations located to the north along a minor road.

Location C Located to the rear of the closest residential properties located on the southern boundary of the site and off the R352 (Tulla Road). This location would be representative of the various noise sensitive properties located on both sides of the R352 (Tulla Road).

Location D Located to the west of the site. The location would be considered to be representative of noise levels in the vicinity of the Knockaneen halting site.

Road traffic noise, both distant and local was noted as the most significant source of noise and typically dictated ambient noise levels (i.e. $L_{Aeq,T}$) at the nearest noise sensitive locations to the site during daytime and night-time periods.

Background noise levels (e.g. $L_{A90,T}$) at the various locations were typically dictated by local and distant road traffic noise. These levels fell as would be expected into the early hours of the morning when the volume of traffic on the local and wider road network reduced.

Table 9.13 reviews the typical ambient and background noise levels at the sample locations discussed above.

Table 9.13 Review of Typical Noise Levels

Location	Period	Start Time	Sound Pressure Level (dB)	
			$L_{Aeq,15min}$	$L_{AF90,15min}$
A	Day	11:10	49	38
		12:38	44	33
		14:33	38	33
		Average	46	35
	Evening	21:36	36	30
	Night	22:58	39	30
		00:16	34	30
		Average	37	30
B	Day	11:36	45	40
		12:58	45	36
		14:55	49	43
		Average	47	40
	Evening	21:54	42	35
	Night	23:14	42	31
		00:32	37	28
		Average	40	29
C	Day	13:23	53	36
		14:11	51	37
		15:18	50	37
		Average	52	37
	Evening	22:13	53	35
	Night	23:33	50	31
		00:51	32	31
		Average	47	31
D	Day	12:10	63	50
		13:48	64	52
		15:40	65	56
		Average	64	53
	Evening	22:35	63	45
	Night	23:55	54	31
		01:11	45	32
		Average	52	32

These typical noise levels have been considered when discussing appropriate noise criteria in relation to the development as outlined in Table 9.13. Traffic noise from the R352, M18 and other roads in the study area dictated noise levels at all locations during the survey periods in question. It is considered that these conservative assumptions ensured and will ensure that appropriate noise criteria are applied to Proposed Development.

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9.4 CHARACTERISTICS OF THE DEVELOPMENT

The Proposed Development will comprise the construction of the proposed data storage facilities and associated ancillary development over a seven year construction period. The Proposed Development consists of six data storage buildings, an energy centre and associated ancillary development.

When considering a development of this nature, the potential noise and vibration impact on the surroundings must be considered for each of two distinct stages:

- construction phase
- operational phase.

As stated, the construction phase will involve excavation, general site preparation over the development site and the erection of the new buildings over a phased construction period. Comment will also be presented in the following sections in relation to construction traffic on local roads in terms of noise and vibration.

The primary sources of outward noise in the operational context are deemed long term and will involve:

- building services noise;
- emergency site operations, and;
- additional vehicular traffic on public roads.

These issues are discussed in detailed in the following sections.

9.5 POTENTIAL IMPACTS OF THE DEVELOPMENT

9.5.1 Construction Phase

It is predicted that the construction programme will create typical construction activity related noise on site. During the construction phase of the proposed development, a variety of items of plant will be in use, such as excavators, lifting equipment, dumper trucks, compressors and generators.

The proposed general construction hours are 07:00 to 18:00hrs, Monday to Friday and 08:00 to 14:00hrs on Saturdays. Occasional weekday evening works may also be required; however evening activities will be significantly reduced in order to manage any associated noise impacts in an appropriate manner and more stringent construction noise criteria will be applicable during any evening works that may be required. As a result, noise emissions from evening activities are expected to be significantly lower than for other general daytime activities.

Due to the nature of daytime activities undertaken on a construction site there is potential for generation of significant levels of noise. The flow of vehicular traffic to and from a construction site is also a potential source of relatively high noise levels. The potential for vibration at neighbouring sensitive locations during construction is typically limited to excavation works and lorry movements on uneven road surfaces. Due to the proximity of sensitive locations to site works however, there is little likelihood of structural or even cosmetic damage to existing neighbouring dwellings as a result of vibration.

As the construction programme has been established in outline form only, it is difficult to calculate the actual magnitude of noise emissions to the local environment. However, it is possible to predict typical noise levels using guidance set out in BS 5228-1. Table 9.14 outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme.

For the purposes of the assessment, we have assumed that standard good practice measures for the control of noise from construction sites will be implemented. These issues are commented upon in further detail in the mitigation section of this report.

Table 9.14 Typical Noise Levels associated with Construction Plant Items (BS5228-1)

Phase	Item of Plant (BS 5228-1 Ref.)	Construction Noise Level at 10m Distance (dB L _{Aeq,1hr})
1 – Site Preparation	Pneumatic Breaker (C5.6)	95
	Rock Breaker (C9.12)	85
	Wheeled Loader Lorry (C2 28)	74
	Tracked Semi-Mobile Crusher (C9.14)	90
	Track Excavator (C2 22)	72
	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
2 – Foundations	Large Rotary Bored Piling Rig – Cast In-Situ (C3.14)	83
	Tracked Excavator (C3.24)	74
	Concrete Pump (C3.25)	78
	Compressor (C3 19)	75
	Poker Vibrator (C4 33)	78
3 – Steel Erection	Tower Crane (C4.48)	76
	Sarens SCG 120 Crane	86
	Articulated lorry (C11.10)	77
4 – General Construction	Hand tools	81
	Pneumatic Circular Saw (D7.79)	75
	Internal fit – out	70
5 - Landscaping	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
	Surfacing (D8.25)	68

A number of representative noise sensitive locations have been considered in relation to the Proposed Development as illustrated in Figure 9.4.

Table 9.15 Assessment Locations

ID	Description
NSL01	Single storey residences located to the south west of the development site opposite the junction of the access ramp to the M18.
NSL02	
NSL03	Residence located on the opposite side of the R352 (Tulla Road) set back some 80m from the road edge.
NSL04	Closest residential locations along the R352 (Tulla Road) which share a common boundary of the overall proposed development site.
NSL05	Residence located on the opposite side of the R352 (Tulla Road) set back some 80m from the road edge.
NSL06	
NSL07	Closest residential locations along the R352 (Tulla Road) which share a common boundary of the overall proposed development site.
NSL08	Residence located on the opposite side of the R352 (Tulla Road) set back some 70m from the road edge.
NSL09	Residence located on the opposite side of the R352 (Tulla Road) set back some 25m from the road edge.

ID	Description
NSL10	Closest noise sensitive location to the east of the development site.
NSL11	Closest noise sensitive location to the north of the development site.
NSL12	Noise sensitive location within Knockaneen halting site on the opposite side of the M18 to the west of the development site.

Table 9.16 presents the predicted construction noise levels in the vicinity of the site. Calculations have assumed an on time 66% for each item of plant i.e. 8-hours over a 12 hours assessment period.

For the purposes of the indicative predictions it has been assumed that works are taking place at **Locations I, II, III or IV** on site (see Figure 9.5). The predicted construction noise levels at the specific assessment locations for the various construction stages has been detailed in **Table 9.16a (based on plant at Location I)**, **Table 9.16b (based on plant at Location II)**, **Table 9.16c (based on plant at Location III)** and **Table 9.16d (based on plant at Location IV)**.

The highest predicted construction noise level at a specific assessment for the various construction stages has been detailed in Table 9.16e in order that the assessment of significance is based on the worst case predictions presented in Tables 9.16a to 9.16e.

Table 9.16 Review of Potential Daytime Construction Noise Impact

Ref.	Baseline Noise Level dB LAeq,1hr	BS5228-1 Threshold dB LAeq,1hr	Predicted Construction Noise Level for Various Phases (dB LAeq,1hr)				
			Site Preparation	Foundations	Steel Erection	General Construction	Landscaping
NSL01	60	53	55	48	45	60	53
NSL02	61	55	56	49	46	61	55
NSL03	59	52	54	47	44	59	52
NSL04	60	54	55	49	45	60	54
NSL05	58	52	53	47	45	58	52
NSL06	60	54	56	49	46	60	54
NSL07	63	56	57	51	48	63	56
NSL08	59	53	55	47	44	59	53
NSL09	56	50	53	46	42	56	50
NSL10	43	36	40	32	26	43	36
NSL11	45	39	43	34	32	45	39
NSL12	50	43	46	38	35	50	43

Table 9.17 details the baseline noise level measured at the nearest survey noise monitoring location or based on expected ambient noise levels in the vicinity of the location based on proximity to an existing noise source (e.g. road). If the predicted construction noise level is below this value the associated impact is deemed to be 'Not Significant'.

Where the predicted construction noise level is above the baseline noise level but below the stated BS5228-1 threshold value the associated impact is deemed to be 'Slight' if 5 dB or more below the threshold and 'Moderate' up to the threshold value. If a predicted noise level is below or equal to the BS5228-1 threshold value, the impact is deemed to be 'Not Significant'. Where the predicted construction noise level is 5dB or

mode higher than the BS5228-1 threshold value the impact is assumed to be 'Moderate' to 'Significant'.

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Based on the above rationale, and the predicted noise levels presented the assigned impacts are summarised as follows:

Table 9.17 Review of Potential Daytime Construction Noise Impact

Ref.	Baseline Noise Level dB L _{Aeq,1hr}	BS5228-1 Threshold	Construction Phase (dB L _{Aeq,1hr})				
			Site Preparation	Foundations	Steel Erection	General Construction	Landscaping
NSL01	52	65	Moderate	Slight	Slight	Not Significant	Not Significant
NSL02	52	65	Moderate	Slight	Slight	Not Significant	Not Significant
NSL03	52	65	Slight	Not Significant	Slight	Not Significant	Not Significant
NSL04	52	65	Moderate	Not Significant	Slight	Not Significant	Not Significant
NSL05	52	65	Slight	Not Significant	Slight	Not Significant	Not Significant
NSL06	52	65	Moderate	Slight	Slight	Not Significant	Not Significant
NSL07	52	65	Moderate	Slight	Slight	Not Significant	Not Significant
NSL08	52	65	Slight	Slight	Slight	Not Significant	Not Significant
NSL09	52	65	Slight	Not Significant	Slight	Not Significant	Not Significant
NSL10	46	65	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
NSL11	47	65	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
NSL12	64	70	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant

There is no item of plant that would be expected to give rise to noise levels that would be considered out of the ordinary or in exceedance of the levels outlined in Table 9.7 or give rise to a significant impact through the process outlined here. In the majority of cases, the construction noise impact is Not Significant; in a number of cases, a Slight to Moderate impact is predicted.

It is anticipated that the construction of the facility will be completed during normal construction hours i.e. 08:00 to 18:00hrs Monday to Friday and 08:00 to 14:00hrs on Saturdays. However, it is possible that the contractor may wish to carry out certain operations outside these hours i.e. evening hours during long summer days etc. Such occurrences will be kept to a minimum and take place over a short timeframe and as such are unlikely to cause excessive disturbance. A more stringent construction noise criteria (as per Table 9.7) will be applicable during any evening works that may be required.



Figure 9.4 Sample Sensitive Locations Considered for Assessment

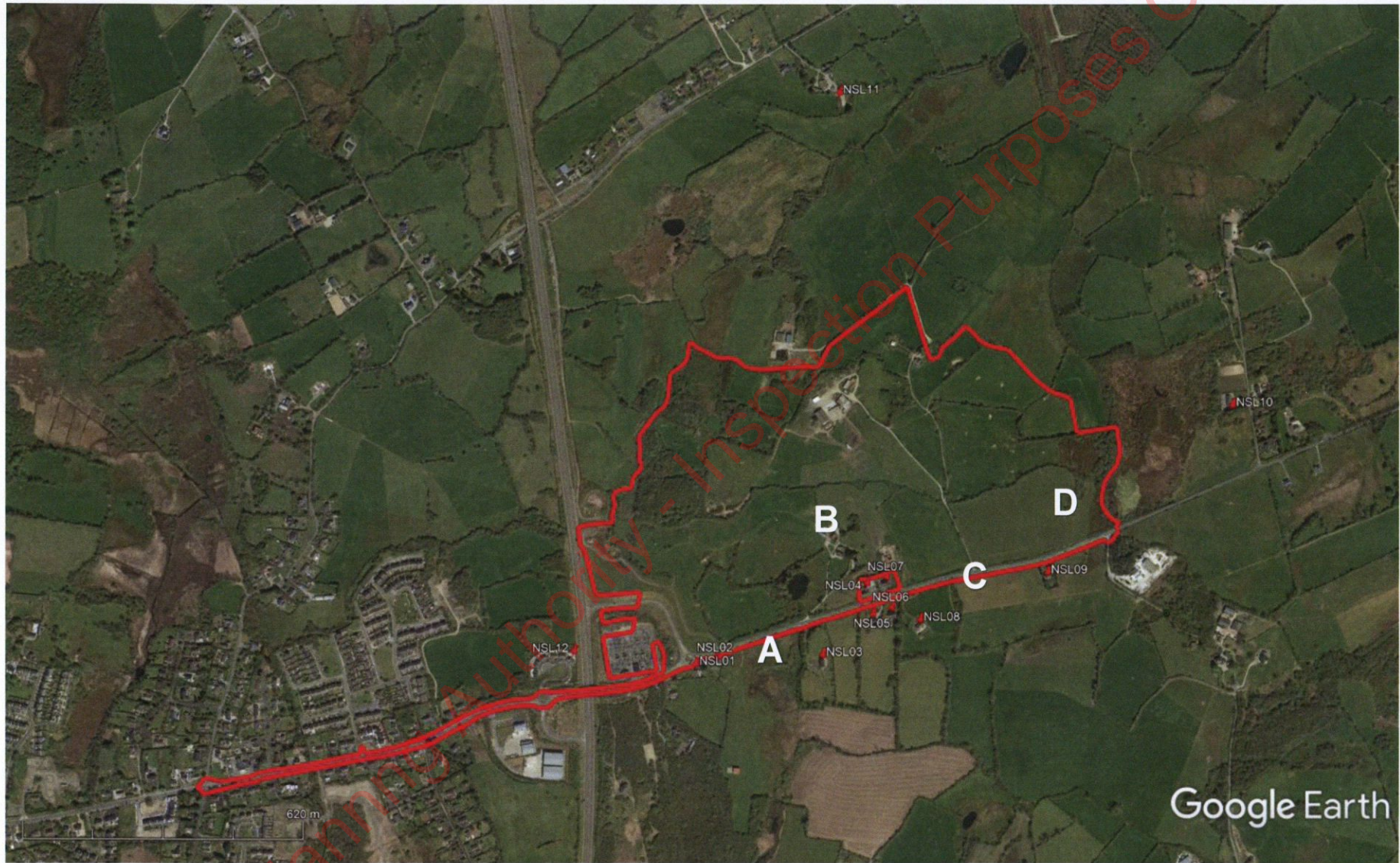


Figure 9.5 Construction Noise Predictions – Assumed Location of Plant

Construction Traffic

In terms of the additional construction traffic on local roads that will be generated as a result of the Proposed Development the following comment is presented: Considering that in order to increase traffic noise levels by 1dB traffic volumes would need to increase by the order of 25% it is considered that additional traffic introduced onto the local road network due to the construction phase associated with various phases of the development, as outlined in the relevant sections of Chapter 12 will not result in a significant noise impact.

Review of Construction Impacts

In terms of noise associated with these construction activities the associated effect is stated to be:

Quality	Significance	Duration
Negative	Slight to Moderate	Short Term

In terms of vibration due to the distance of activities from the site to the nearest sensitive locations and controlling vibration levels to those detailed in Table 9.7 the associated effect is stated to be

Quality	Significance	Duration
Neutral	Imperceptible	Short Term

9.5.2 Operational Phase

The primary sources of outward noise in the operational context are deemed long term and will involve:

- building services noise;
- emergency site operations; and
- additional vehicular traffic on public roads.

These issues are discussed in detailed in the following sections. See Appendix 9.3 for details of the noise modelling undertaken for this assessment and associated assumptions.

Building Services Noise / Emergency Site Operation

Three scenarios have been developed to consider the noise impact of the proposed operations. These are as follows:

- Scenario A – Proposed Data Storage Facility – Day to Day
- Scenario B – Proposed Data Storage Facility – Emergency
- Scenario C – Proposed Data Storage Facility – Generator Testing

Scenario A would be considered to be the most representative of the day to day operation. Scenario B is representative of emergency situation when a power outage or issue with supply from the national grid has occurred. It should be noted that such an event would be expected to be an extremely rare occurrence.

Scenario C considers the impact associated with the occasional testing of proposed back-up emergency generators on the site. Typically, only two generator units will be

tested at any one time. The assessment presented here assumes the closest generators to existing noise sensitive locations are running when presenting expected noise levels associated with the generator testing.

Figure 9.4 highlights the nearest noise sensitive locations at which predictions have been carried out. Various noise contours are also presented for scenarios A, B and C in order to demonstrate the noise impact of the Proposed Development over a wider area.

The results of the iterations of the noise model are presented in Table 9.18. Note all plant will be selected such that no tonal noise emissions are evident at noise sensitive locations.

Table 9.18 Predicted Plant Noise Levels for Various Scenarios

Location	Predicted dB LAeq,T		
	Scenario A Day to Day	Scenario B Emergency	Scenario C Generator Testing
NSL01	32	41	33
NSL02	32	42	34
NSL03	33	47	35
NSL04	34	53	43
NSL05	33	50	40
NSL06	33	50	39
NSL07	34	54	43
NSL08	35	49	39
NSL09	34	45	38
NSL10	32	36	32
NSL11	29	36	29
NSL12	28	36	29

The above predicted levels are based on a situation where the receiver is downwind of all noise sources. For the purposes of the assessment against the adopted criteria this is a robust worst-case assumption.

Comment on Adopted Noise Criteria Day to Day Operations

The predicted noise levels presented in Table 9.18 have been compared to the relevant daytime, evening and night time noise criteria as adopted for this assessment, presented in Table 9.12. It should be noted that the back-up generator testing shall take place only between 08.00 and 17.00hrs. Residents of the adjacent dwelling houses shall be provided with adequate prior warning of the proposed testing times exceeding 1 hour in duration.

Table 9.19 Comparison of Predicted Noise Levels vs. Adopted Noise Criteria

Location	Period	Scenario A Day to Day			Scenario B Emergency			Scenario C Generator Testing		
		Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies?	Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies?	Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies?
NSL01	Day	32	45	✓	41	55	✓	33	45	✓
	Evening		40	✓				--		
	Night		35	✓						
NSL02	Day	32	45	✓	42	55	✓	34	45	✓
	Evening		40	✓				--		
	Night		35	✓						
NSL03	Day	33	45	✓	47	55	✓	35	45	✓
	Evening		40	✓				--		
	Night		35	✓						
NSL04	Day	34	45	✓	53	55	✓	43	45	✓
	Evening		40	✓				--		
	Night		35	✓						
NSL05	Day	33	45	✓	50	55	✓	40	45	✓
	Evening		40	✓				--		
	Night		35	✓						
NSL06	Day	33	45	✓	50	55	✓	39	45	✓
	Evening		40	✓				--		
	Night		35	✓						
NSL07	Day	34	45	✓	54	55	✓	43	45	✓
	Evening		40	✓				--		
	Night		35	✓						
NSL08	Day	35	45	✓	49	55	✓	39	45	✓
	Evening		40	✓				--		
	Night		35	✓						
NSL09	Day	34	45	✓	45	55	✓	38	45	✓
	Evening		40	✓				--		
	Night		35	✓						

Location	Period	Scenario A Day to Day			Scenario B Emergency			Scenario C Generator Testing		
		Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies?	Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies?	Predicted dB L _{Aeq,T}	Criterion dB L _{Aeq,T}	Complies?
NSL10	Day	32	45	✓	36	55	✓	32	45	✓
	Evening		40	✓				--		
	Night		35	✓						
NSL11	Day	29	45	✓	36	55	✓	29	45	✓
	Evening		40	✓				--		
	Night		35	✓						
NSL11	Day	28	45	✓	36	55	✓	29	55	✓
	Evening		40	✓				--		
	Night		35	✓						



Figure 9.6 Scenario A Proposed Data Storage Facility – Day to Day Noise Contour (Extent of 30dB(A))



Figure 9.7 Scenario B Proposed Data Storage Facility (current planning application) – Emergency Noise Contour (Extent of 55dB(A) noise contour)



Figure 9.8 Scenario C Proposed Data Storage Facility (current planning application) – Generator Testing Noise Contour (Extent of 45dB(A) noise contour)

Scenario A All locations are within the relevant adopted daytime, evening and night time limits. All locations comply with the adopted criteria in relation to day to day operations. Figure 9.6 presents a noise contour for Scenario A.

Scenario B All locations are within the relevant adopted emergency operation limit in the rare event that a power loss to the site occurs. Figure 9.7 presents a noise contour for Scenario B.

Scenario C All locations are within the relevant adopted daytime limits by a during periods when two generators are undergoing routine testing. Figure 9.8 presents a noise contour for Scenario C.

Review of Changes in Noise Level

Tables 9.20, 9.21 and 9.22 present the predicted changes in existing noise levels associated with the development for Scenario A at the nearest residential noise sensitive locations to the site.

Table 9.20 Review of Predicted Changes in Existing Noise Levels – Day

Ref.	Daytime (07:00 – 19:00 hrs)				EPA Glossary of Impacts
	Predicted dB L _{Aeq,T}	Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	
NSL01	32	37	38.2	+1.2	Not Significant
NSL02	32	37	38.2	+1.2	Not Significant
NSL03	33	37	38.5	+1.5	Not Significant
NSL04	34	37	38.8	+1.8	Not Significant
NSL05	33	37	38.5	+1.5	Not Significant
NSL06	33	37	38.5	+1.5	Not Significant
NSL07	34	37	38.8	+1.8	Not Significant
NSL08	35	37	39.1	+2.1	Not Significant
NSL09	34	37	38.8	+1.8	Not Significant
NSL10	32	35	36.8	1.8	Not Significant
NSL11	29	40	40.3	+0.3	Not Significant
NSL12	28	43	43.1	+0.1	Not Significant

Review of the predicted increases in noise level at the nearest residential noise sensitive locations conclude that the associated impact is 'Not Significant' at all locations for daytime periods.

Table 9.21 Review of Predicted Changes in Existing Noise Levels – Evening

Ref.	Evening (19:00 – 23:00 hrs)				EPA Glossary of Impacts
	Predicted dB L _{Aeq,T}	Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	
NSL01	32	35	36.8	+1.8	Not Significant
NSL02	32	35	36.8	+1.8	Not Significant
NSL03	33	35	37.1	+2.1	Not Significant
NSL04	34	35	37.5	+2.5	Not Significant
NSL05	33	35	37.1	+2.1	Not Significant
NSL06	33	35	37.1	+2.1	Not Significant
NSL07	34	35	37.5	+2.5	Not Significant
NSL08	35	35	38.0	+3.0	Moderate

Ref.	Evening (19:00 – 23:00 hrs)				EPA Glossary of Impacts
	Predicted dB L _{Aeq,T}	Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	
NSL09	34	35	37.5	+2.5	Not Significant
NSL10	32	30	34.1	+4.1	Moderate
NSL11	29	35	36.0	+1.0	Not Significant
NSL12	28	45	45.1	+0.1	Not Significant

Review of the predicted increases in noise level at the nearest residential noise sensitive locations conclude that the associated impact is 'Not Significant' at ten locations for evening periods and 'Moderate' for the remaining locations.

Table 9.22 Review of Predicted Changes in Existing Noise Levels – Night

Ref.	Night (23:00 – 07:00 hrs)				EPA Glossary of Impacts
	Predicted dB L _{Aeq,T}	Background Level dB L _{A90,T}	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	
NSL01	32	31	34.5	+3.5	Moderate
NSL02	32	31	34.5	+3.5	Moderate
NSL03	33	31	35.1	+4.1	Moderate
NSL04	34	31	35.8	+4.8	Moderate
NSL05	33	31	35.1	+4.1	Moderate
NSL06	33	31	35.1	+4.1	Moderate
NSL07	34	31	35.8	+4.8	Moderate
NSL08	35	31	36.3	+4.9	Moderate
NSL09	34	31	35.8	+4.8	Moderate
NSL10	32	30	34.1	+4.1	Moderate
NSL11	29	29	32.0	+3.0	Moderate
NSL12	28	32	33.5	+1.5	Not Significant

Review of the predicted increases in noise level at the nearest residential noise sensitive locations conclude that the associated impact is 'Moderate' at eleven locations during night-time periods with the predicted impact being 'Not Significant' at one further location.

It is reiterated the predicted noise levels are within the relevant noise criteria considered suitable for the development considering the guidance outlined in EPA: *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016)*.

In terms of noise associated with day to day activities the associated effect is stated to be as follows:

Quality	Significance	Duration
Negative	Not Significant to Moderate	Long Term

Additional Vehicular Traffic on Public Roads

In terms of the additional traffic on local roads that will be generated as a result of this development the following comment is presented: Considering that in order to increase traffic noise levels by 1dB traffic volumes would need to increase by the order of 25% it is considered that additional traffic introduced onto the local road network due to this development will not result in a significant noise impact. The resultant noise impact is **neutral, imperceptible** and **long-term**.

Vibration

There is no source of vibration associated with the day to day operation of the development that will give rise to impacts at nearby sensitive locations. In terms of these the operational phase of the development the associated effect is stated to be:

Quality	Significance	Duration
Neutral	Imperceptible	Long Term

9.6 REMEDIAL AND MITIGATION MEASURES

In order to sufficiently ameliorate the likely noise impact, a schedule of noise control measures has been formulated for both construction and operational phases associated with the Proposed Development.

9.6.1 Construction Phase

With regard to construction activities, reference has been made to BS5228 Parts 1 and 2, which offer detailed guidance on the control of noise and vibration from demolition and construction activities. Various mitigation measures will be considered and applied during the construction of the Proposed Development. As an example, the following measures will be implemented on site:

- limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- establishing channels of communication between the contractor/developer, Local Authority and residents;
- appointing a site representative responsible for matters relating to noise and vibration;
- monitoring levels of noise and/or vibration during critical periods and at critical sensitive locations; and
- all site access roads will be kept even so as to mitigate the potential for vibration from lorries.

Furthermore, a variety of practicable noise control measures will be employed, such as:

- selection of plant with low inherent potential for generation of noise and/ or vibration;
- erection of barriers as necessary around items such as generators or high duty compressors;
- situate any noisy plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary.

We would recommend that vibration from construction activities to off-site residences be limited to the values set out in Table 9.8. It should be noted that these limits are not absolute but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%.

Note Appendix 9.4 presents an recommended construction noise and vibration management plan that will be implemented in terms of the day to day operation of the site. This will focus on opening up and maintaining lines of communication with the local community to address issues in relation to noise and/or vibration and to advise the community of periods where specific activities take place (e.g. rock breaking) that have an increased potential in giving rise to issues off site (Note: no rock breaking is anticipated as part of the Proposed Development).

9.6.2 Operational Phase

Building Services Noise / Emergency Site Operation

Noise from external plant will be minimised by the following measures:

- Purchasing low noise generating equipment, and;
- Incorporating appropriately specified in line attenuators for stacks and exhausts where necessary.

With due consideration as part of the detailed design process, this approach will result in the site operating well within the constraints of the best practice guidance noise limits that have been adopted as part of this detailed assessment.

Additional Vehicular Traffic on Public Roads

The noise impact assessment outlined previously has demonstrated that mitigation measures are not required.

9.7 PREDICTED IMPACTS OF THE DEVELOPMENT

This section summarises the likely noise and vibration impact associated with the Proposed Development, taking into account the mitigation measures.

9.7.1 Construction Phase

During the construction phase of the Proposed Development there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. The application of noise limits and hours of operation (i.e. as per Table 9.7 and Section 9.2.4), along with implementation of appropriate noise and vibration control measures (as summarised in Section 9.6.1), will ensure that noise and vibration impact is kept to a minimum. Also, it is reiterated that any construction noise impacts will be **slight to moderate** (dependant on location), **negative** and **short-term** in nature. Also, it is considered that as the Proposed Development progresses from initial ground works that construction noise impacts will reduce from slight to **not significant**.

9.7.2 Operational Phase

Building Services Noise / Emergency Site Operation

Proprietary noise and vibration control measures will be employed in order to ensure that noise emissions from building services plant do not exceed the adopted criterion at the façade of any nearby noise sensitive locations. In addition, noise emissions should be broadband in nature and should not contain any tonal or impulsive elements. The resultant noise impact is **negative, not significant to moderate** (dependant on location) and **long-term**.

It is reiterated the predicted noise levels are within the relevant noise criteria considered suitable for the development considering the guidance outlined in EPA: *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016)*.

Additional Vehicular Traffic on Public Roads

Any change in noise levels associated with vehicles at road junctions in the vicinity of the Proposed Development is expected to be **imperceptible**. The resultant noise impact is **neutral, imperceptible** and **long-term**.

9.8 CUMULATIVE IMPACTS

During construction of the Proposed Development it is anticipated that construction work on the Proposed Development site will be an audible noise source for certain periods / activities at certain locations. Any construction being completed at other sites within the study area, whilst potentially significant in their own right, as a matter of good practice, would be expected to control impacts on nearest noise sensitive locations to these sites within appropriate limits. Once the mitigation measures outlined in Section 9.6 of Chapter 9 are implemented there should be no significant cumulative impact with permitted, planned or existing developments (as outlined in Chapter 3 Appendix 3.1) as a result of the Proposed Development. There are no similar construction developments noted as being undertaken at the same time as the Proposed Development.

The environmental noise survey takes account of noise emissions from existing developments. It was noted that the existing ambient noise levels in the area were dominated primarily by road traffic on the surrounding road network. The potential cumulative noise emissions during the operational phase of the entirety of the Proposed Development have been modelled with cumulative predicted noise levels presented in Table 9.18 and Figure 9.6 in Chapter 9. In addition, a cumulative assessment, identifying expected increases in noise level is presented in Tables 9.20, 9.21 and 9.22 of Chapter 9. In terms of noise associated with day to day activities the associated effect is stated to be as follows, **negative, not significant to moderate** (dependent on location) and **long term**.

It is reiterated the predicted noise levels are within the relevant noise criteria considered suitable for the development considering the guidance outlined in EPA: *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016)*.

9.9 RESIDUAL IMPACTS

The construction noise assessment has shown that in accordance with the 'significance' thresholds presented in the *British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise* there is not a significant impact at residential locations, subject to the implementation of the mitigation measures outlined in Section 9.6.1.

The robust analysis of potential operational phase plant has shown that in accordance with the scale in the EPA Draft EIA Report Guidelines 2017 there will be a **not significant to moderate** (dependant on location), **negative, long term** impact at the closest residences identified on Figure 9.4. Ambient noise (i.e. $L_{Aeq,T}$) levels are, and will continue to be, dictated by road traffic noise in the area while a low level of plant noise is expected to be audible during lulls in other sources (e.g. distant traffic noise). The predicted change in background noise level due to current application is in the range of 2 to 6 dB during night-time periods. It is reiterated the predicted noise levels are within the relevant noise criteria considered suitable for the development considering the guidance outlined in EPA: *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016)*.

The operational noise assessment of vehicle movements associated with the site has shown that in accordance with the scale in the EPA Draft EIA Report Guidelines 2017 there will be an **imperceptible, neutral, long-term** impact off site noise sensitive locations considering existing traffic volumes on the local road network.

Interactions are addressed in Chapter 16 of this EIA Report.

9.10 REFERENCES

- EPA Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIA Reports) (2017) and draft revised Guidelines on information to be contained in Environmental Impact Statements; and Advice Notes for preparing EIS (2015).
- Draft '*Guidelines for Noise Impact Assessment*' produced by the Institute of Acoustics/Institute of Environmental Management and Assessment Working Party.
- *British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise*.
- Transport Infrastructure Ireland (TII) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*.
- British Standard BS 7385: 1993: *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration*.
- British Standard BS 5228-2: 2009+A1:2014: *Code of practice for noise and vibration control on construction and open sites – Vibration*.
- BS 8233:2014: *Guidance on sound insulation and noise reduction for buildings*.

- Environmental Protection Agencies *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* (January 2016).
- ISO 1996-2:2017 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels*.
- British Standard *BS 6472 (1992): Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz)*.
- ISO 9613 (1996): *Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation*.
- *Calculation of Road Traffic Noise (CRTN)* issued by the Department of Transport in 1988.
- BS EN 1793-1:1998: *Road traffic noise reducing devices – Test method for determining the acoustic performance – Part 1: Intrinsic characteristics of sound absorption*
- BS EN 1793-2:1998: *Road traffic noise reducing devices – Test method for determining the acoustic performance – Part 2: Intrinsic characteristics of airborne sound insulation*.
- BS EN 1794-1:2003: *Road traffic noise reducing devices. Non-acoustic performance. Mechanical performance and stability requirements*
- BS EN 1794-2:2003: *Road traffic noise reducing devices. Non-acoustic performance. General safety and environmental requirements*.

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