Noise and Vibration Assessment

Steeven’s Lane 110kV Substation

ESB

July 2026

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1. Introduction

This Noise and Vibration Impact Assessment has been prepared by Malachy Walsh and Partners (MWP) to accompany a planning application by the Electricity Supply Board (ESB)(the Applicant) to An Coimisiún Pleanála (ACP) for a proposed 110 kV Gas Insulated Switchgear (GIS) substation and associated infrastructure in Dublin 8.

The purpose of this report is to assess the potential noise and vibration impacts associated with the construction, and operation of the Proposed Development, and to evaluate the likely effects on the surrounding environment.

2. Site Location and Context

The Proposed Development site is located on unoccupied brownfield land owned by Diageo, immediately adjacent to the Diageo Guinness Brewery at James's Street. The site currently comprises a number of vacant and derelict buildings, together with an associated yard area.

It is bounded to the north and northeast by the industrial lands of the Guinness Brewery. Steeven's Lane forms the western boundary, serving primarily pedestrians, cyclists, and the Luas Red Line, with limited vehicular access restricted to the proposed development site and St Patrick's University Hospital located on the opposite side of Steeven's Lane.

To the south, the Proposed Development site is bordered by mixed-use and residential properties, including 132-134 James's Street and Steevens Gate Apartments. The site location within the greater Dublin area is shown in Figure 2-1.

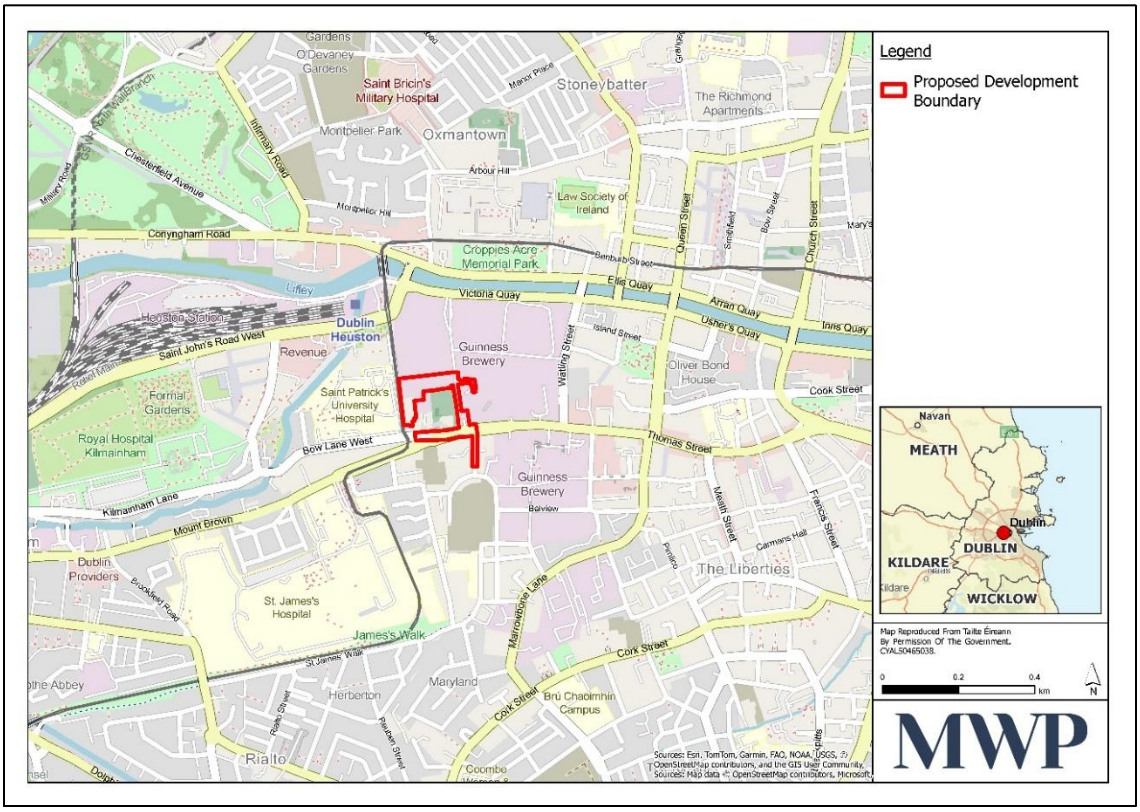

Figure 2-1: Proposed Site Location

3. Proposed Development

The characteristics of the Proposed Development are fully described in the Planning and Environmental Considerations Report (PECR) and the Outline Construction Environmental Management Plan (oCEMP) accompanying this planning application, and this Noise and Vibration Assessment Report should be read in conjunction with those documents. In addition, full details of the proposed design, layout, elevations, sections, and associated site development works are provided within the planning drawings.

A summary of the Proposed Development is provided below to set the context and aid clarity.

3.1 Substation Development

The Proposed Development will consist of a 110 kV / MV electrical substation and will include the following elements:

- Demolition of all existing buildings on site including a former office building, warehouse and storage shed;
- The construction of 110 kV / MV substation compound with the following electrical plant within the substation:
    - A two storey 110 kV / MV Gas Insulated Switchgear (GIS) building (c. 559 m^2; 14.1 m in height);
    - Two bunded 110 kV / MV transformers in transformer bays (c. 6.75 m in height) and surrounding fire walls (c.6.1 m high) and associated electrical equipment;
    - All associated and ancillary site development and infrastructural works, including site clearance, demolition of existing western boundary wall and gates, provision of new boundary treatments and gates along the western site boundary, replacement of the existing retaining wall along the northern and northeastern site boundary, provision of new boundary treatments along the southern and south eastern site boundary, site services including electrical circuits, lighting, telecommunications and drainage.

3.2 Connection to Electricity Grid

The Proposed Development will also involve the installation of six 110 kV underground cable (UGC) circuits connecting the proposed Steevens Lane 110 kV substation to key locations, including:

- Loop-in connection joint bays on the existing Francis Street – Heuston Square 110kV circuit at Bow Lane West and Echlin Street / James' Street;
- Diageo's 110 kV substation (subject to a separate and future consenting process), and
- Ducting for future use to be terminated in joint bays at St James's Gate Medical car park, north of James' Street.

And the installation of 14 circuit MV UGC between the proposed substation and new joint bays at St James's Gate Medical car park, north of James' Street.

The combined total length of the circuits is approximately 1.5 km, and they will be installed as either double or single circuits.

Figure 3-1 shows the Proposed Development footprint and illustrates the positions of the Proposed Development components and infrastructure within the development boundary.

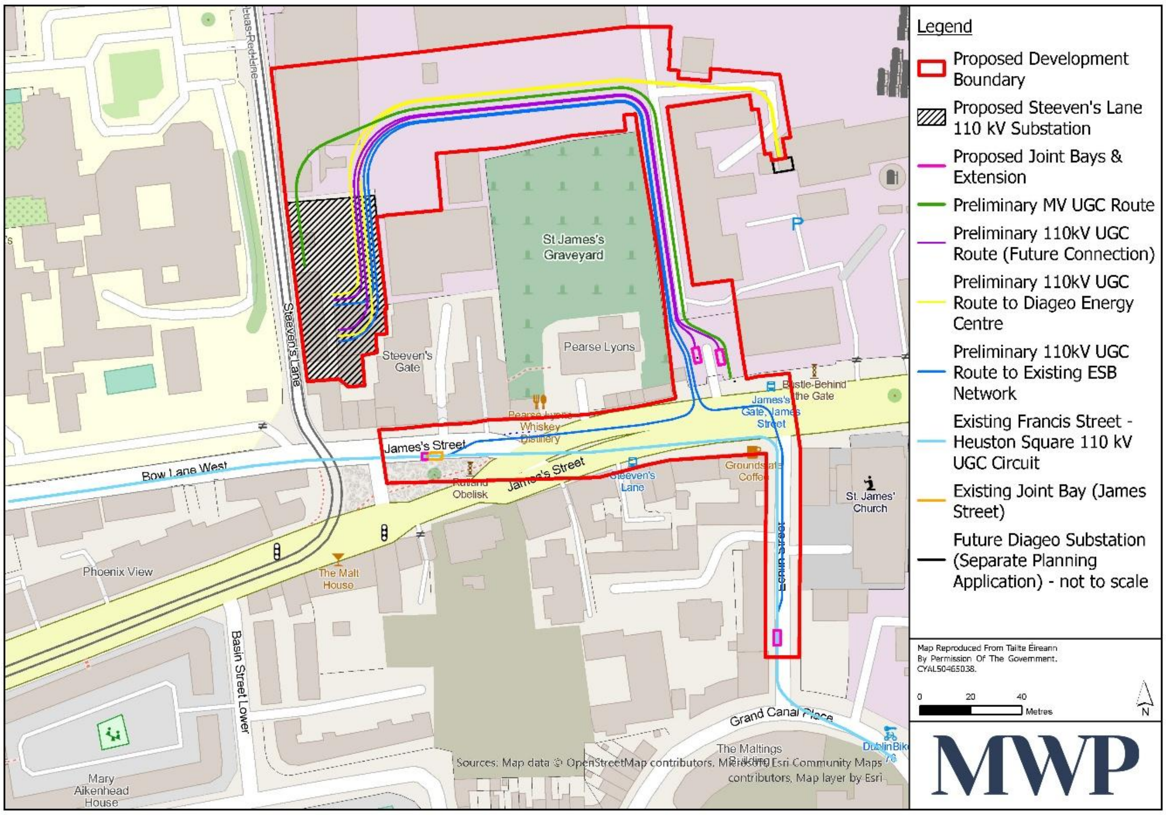

Figure 3-1: Proposed Development Footprint within the development boundary

4. Methodology

4.1 Substations and Noise Emissions

The main noise sources from a substation are from the transformer(s). The noise is generally recognisable as a steady hum which arises from electric and magnetic forces within the transformer. Infrequent noise may also arise from voltage changes (tap changer) and cooling fans under high loads.

Construction noise will occur during excavation and earth moving, continuous flight auger (CFA) piling, laying of hardstandings and transportation of materials. Enabling of construction works will include demolition of all existing buildings on site including a former office building, warehouse and storage shed.

4.2 Fundamentals of Environmental Noise

Fundamentally, noise is vibrations of the air which are detectable by the ear. Sound waves radiate out spherically from a sound source in three dimensions. The human ear can detect a very wide range of pressure variations. In order to cope with this wide range, a logarithmic scale (decibel (dB) scale) is used to translate pressure values into manageable numbers from 0 dB to 140 dB. 0 dB is the threshold of hearing, and 120 dB is the threshold of pain.

Measuring in decibels means that a 3 dB increase is equivalent to a doubling of the sound energy and a 10 dB increase in a tenfold increase in energy. For broadband sounds which are very similar in all but magnitude, a change or difference in noise level of 1 dB is just perceptible under laboratory conditions, 3 dB is perceptible under most normal conditions and a 10 dB increase generally appears twice as loud. A healthy human ear is also sensitive to a large range of frequencies (approximately 20 Hz to 20,000 Hz) and varies in sensitivity depending on the frequency. The human ear is not equally sensitive to sound at all frequencies and is less sensitive to sound at low frequencies and high frequencies. A-weighting (dB A) is the main way of adjusting measured sound pressure levels (noise) to take account of the uneven human response to frequencies. Figure 4-1 illustrates some everyday sounds on the dB(A) scale. A quiet bedroom is around 35 dB(A), a busy office around 60dB(A) and a rock concert around 100 dB(A).

Figure 4-1: The Level of Typical Common Sounds on the dB(A) Scale

4.3 Scope of Assessment

The scope of the assessment has been defined by industry standard best practice and guidance used in Ireland. In general, this includes:

- Establishing the existing or baseline noise conditions at noise sensitive locations (NSLs)
- Establishing noise threshold targets based on the measured baseline noise levels in accordance with best practice and guidance.
- Using computer software and calculations, predict the noise emissions from the Proposed Development at the NSLs.
- Comparing the predicted noise emissions against the noise limit criteria adopted for demolition, construction and operational phases. The predicted noise emissions must not exceed the noise limit criteria.

- Assessing demolition, construction and operational phase vibration impacts at nearby sensitive receptors with reference to applicable guidance, to confirm that vibration levels remain below thresholds for human comfort and building integrity.

4.4 Criteria for Evaluating Noise and Vibration Effects

4.4.1 Demolition and Construction Phase Noise

There is no statutory guidance in Ireland relating to the maximum noise levels permitted during construction works, and in the absence of statutory guidance or other specific limits prescribed by local authorities, the thresholds outlined in the British Standard 5228-12009+A1:2009, Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise has been adopted in this assessment, as they are recognised by the expert community as the most appropriate in the assessment of construction noise. The noise levels, which are reproduced in Table 4-1, are typically deemed acceptable.

Table 4-1: Construction Stage Noise Level Thresholds

Assessment category and threshold value period (T)	Threshold values, L_{AeqT} dB		
	Category A Note A	Category B Note B	Category C Note C
Night-time (23:00 to 07:00hrs)	45	50	55
Evening and Weekends Note D	55	60	65
Daytime (07:00 – 19:00hrs) and Saturdays (07:00 – 13:00hrs)	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.

The existing ambient noise levels (LAeq,T) at noise sensitive locations (NSLs) NSL2 to NSL10, from baseline noise surveying, discussed further in Section 5.2, are more than the Category A threshold values from BS 5228 'Example method 1 – The ABC method' in the daytime, evening, and night-time. Therefore, at NSL2 to NSL10, the predicted noise from construction works should not exceed the Category C values outlined for daytime, evening and night-time periods, in order to prevent significant effects.

While no routine works are expected during the evening and night-time periods, occasional out-of-hours works may be undertaken subject to agreement with the relevant local authority. Therefore, a limit of 75 dB LAeq,T is considered an appropriate threshold for daytime works for NSL2 to NSL10, with any evening and night-time works required to comply with the relevant Category C threshold values (i.e. 65 dB LAeq,T and 55 dB LAeq,T respectively), unless otherwise agreed with the local authority.

Existing ambient noise levels (LAeq,T) at NSL1 were equal to the Category A threshold values; therefore, Category B criteria are applicable in accordance with BS 5228 'ABC method'. Therefore, the predicted noise from construction works should not exceed the Category B values, and a limit of 70 dB LAeq,T is considered an appropriate daytime threshold noise limit for NSL1. Any evening and night-time works at NSL1 should comply with the corresponding Category B threshold values (i.e. 60 dB LAeq,T and 50 dB LAeq,T respectively), unless otherwise agreed with the local authority.

4.4.1.1 Traffic Noise

Vehicular movement to and from the construction site for the proposed development will make use of the existing road network. In order to assess the potential impact of additional traffic on the human perception of noise, the following two guidelines are referenced: DMRB Noise and Vibration (UKHA 2020) and EPA Guidelines (EPA, 2022). For construction traffic, due to the short-term period over which this impact occurs, the magnitude of impacts is assessed against the 'short term' period in accordance with the DMRB Noise and Vibration (UKH 2020) document.

Table 4-2 sets out the classification of changes in noise level to impact on human perception based on the guidance contained in these documents.

Table 4-2: Classification of Magnitude of traffic noise changes for Construction Traffic

Change in Sound Level	Subjective Reaction	DMRB Impact Magnitude (Short-term)	EPA Significance Ratings
Less than 1 dB	Inaudible	Negligible	Imperceptible
1 – 2.9	Barely Perceptible	Minor	Not Significant
3- 4.9	Perceptible	Moderate	Slight, Moderate
≥ 5	Up to a doubling of loudness	Major	Significant

4.4.2 Demolition and Construction Phase Vibration

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. For the purpose of the Proposed Development, the range of relevant criteria used for demolition and construction works for both building protection and human comfort are expressed in terms of Peak Particle Velocity (PPV) in mm/s.

Peak Particle Velocity is a measure of the velocity displacement in terms of millimetres per second (mm/s). It is defined as follows within BS 7385-2 (BSI 1993) as 'the maximum instantaneous velocity of a particle at a point during a given time interval'.

4.4.2.1 Building Response

There is no published statutory Irish guidance relating to the maximum permissible vibration level. The following standards are the most widely accepted in the context and are referenced here in relation to cosmetic or structural damage to buildings:

- British Standard BS 5228-2 (BSI 2014b), and;
- British Standard BS 7385-2 (BSI 1993)

These standards differentiate between transient and continuous vibration. Surface construction activities are transient because they occur for a limited period at a given location. Certain activities, such as piling, may give rise to higher magnitude or more continuous vibration and are typically assessed on a more conservative basis within these standards.

BS 7385-2 provides guidance on vibration levels for building damage, and BS 5228-2 adopts and applies this guidance. For soundly constructed residential property and similar light framed structures that are generally in good repair, a threshold for minor or cosmetic damage (i.e. non-structural damage) should be taken as a PPV (in frequency range of predominant pulse) of 15mm/s at 4 Hertz (Hz) increasing to 20mm/s at 15 Hz and 50mm/s at 40Hz and above. The standard also notes that below approximately 12.5mm/s PPV, the risk of damage tends towards zero.

Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in BS 5228 -2 Table B.2 might need to be reduced by up to 50%. On a cautious basis, therefore, continuous vibration limits are often conservatively assumed as 50% of those for transient vibration across all frequency ranges. Historically important buildings that are difficult to repair might require special consideration on a case-by-case basis, but buildings of historical importance should not be assumed to be more sensitive unless they are structurally unsound.

If a building is in an unstable state, then it will tend to be more vulnerable to the possibility of damage arising from vibration or any other ground borne disturbance. The vibration limit range for protected and historical buildings is typically taken as up to 50% lower than that for light framed buildings, depending on structural integrity. Where no structural defects are noted, the same limit s for light framed buildings apply.

For other structures and buildings that are determined to be potentially vulnerable to vibration due to significant structural defects, more stringent criteria have been applied for transient vibration. It is assumed that known buildings and structures of this kind, will be subject to condition surveys well in advance of any construction works. The results of conditions surveys will determine whether a building or structure is classed as "vulnerable".

Table 4-3 sets out limits as they apply to vibration frequencies at 4Hz where the most conservative limits are required. At higher frequencies, the relevant limit values for transient vibration within Table B.2 and Figure B.1 of BS5228-2 (BS 5228-2, 2014) will apply, with similar reductions applied for continuous vibration and those for protected structures.

For line 2 of Figure B.1. at frequencies below 4Hz, a maximum displacement of 0.6mm (zero to peak) should be used instead of a PPV limit. Taking the above into consideration, the vibration criteria for building response are set out in Table 4-3.

Table 4-3: Transient Vibration Guide Values for Cosmetic Damage (BS5228-2)

Vibration Limits for Buildings (PPV) at the closest part of building to the source of vibration at a frequency of 4Hz		
Building Type	Transient Vibration	Continuous Vibration
Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s	25 mm/s
Unreinforced or light framed structures. Residential or light commercial-type buildings	15 mm/s	7.5 mm/s
Protected and Historic Buildings 1	6 mm/s – 15 mm/s	3 mm/s – 7mm/s
Identified Potentially Vulnerable Structures and Buildings with Low Vibration Threshold	3mm/s	

[1] *The relevant threshold value to be determined on a case-by-case basis. Where sufficient structural information is unavailable at the time of assessment, the lower values within the range will be used, depending on the specific vibration frequency.*

4.4.2.2 Human Response

Human response to vibration stimuli occurs at orders of magnitude below those associated with any form of building damage, hence vibration levels lower than those indicated in Table 4-4 can lead to concern.

Table 4-4 presents the significance table relating to potential effects to building occupants during construction based on guidance from BS5228-2 and the DMRB Noise and Vibration (UKHE 2020) document.

Table 4-4: Guidance on Effects on Human Response to PPV Magnitudes

PPV Range	BS 5228-2 (Note A, B, C)
≥10 mm/s PPV	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.
≥1 to <10mm/s PPV	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents
≥0.3 to <1mm/s PPV	Vibration might be just perceptible in residential environments.
<0.3 mm/s PPV	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.

4.4.2.3 Luas

The Transport Infrastructure Ireland (TII) Code of Engineering Practice for Works on, Near or Adjacent to the Light Railway identifies vibration as a potential risk to the tramway. Section 4.1(d) of the Code lists:

"Any works causing vibration that may affect the tramway such as demolition or foundation construction works"

as activities requiring consideration under the works approval process.

This confirms that vibration effects must be considered where there is potential to affect the integrity or operation of the light railway infrastructure.

Appendix 3 of the TII Code further defines maximum allowable vibration limits at the light railway in terms of peak particle velocity (PPV). These are set at 10 mm/s for vibration frequencies at or below 50 Hz, with higher trigger thresholds of 12 mm/s and 15 mm/s applying for frequencies above 50 Hz. The Code adopts a staged response approach whereby works may proceed below the lowest trigger level, require review and modification if intermediate levels are exceeded, and must cease if higher thresholds are reached or if damage is suspected. These values represent maximum permissible levels and are intended as intervention thresholds rather than design targets.

Reference is also made to BS 7385-2:1993, which provides guidance on the response of structures to vibration and indicates that the onset of cosmetic damage typically occurs at vibration levels in the range of approximately 15 mm/s to 50 mm/s PPV, depending on building type and vibration frequency.

Given the sensitivity of Luas infrastructure, including track alignment, track slab, and overhead line equipment, together with the requirement under the TII Code to ensure that no adverse effect occurs to railway operations, a precautionary approach has been adopted for this assessment. A vibration criterion of 5 mm/s PPV at the nearest Luas infrastructure is proposed as a conservative assessment threshold. This level is significantly below the TII Level 1 trigger value of 10 mm/s and comfortably below levels associated with cosmetic structural damage, thereby providing an appropriate margin of protection during demolition and construction works.

This approach is considered robust and appropriate for planning stage assessment, ensuring that potential vibration impacts are controlled well within accepted limits and that any requirement for further mitigation or monitoring can be addressed at detailed design and construction stages in consultation with TII.

4.4.3 Operational Phase Noise

In the absence of a standardised national framework for operational noise limits in planning-related assessments, it is common practice to derive appropriate assessment criteria from a range of recognised sources. These typically include relevant local authority Noise Action Plans, together with established guidance such as the EPA's NG4 Noise Guidance and BS 4142:2014+A1:2019, which provides a methodology for assessing industrial and commercial sound.

A review of the Dublin City Council Noise Action Plan 2024–2028 indicates that it does not define specific noise limits for commercial or mixed-use developments. In light of this, the assessment criteria adopted for the Proposed Development are based on the guidance set out in EPA NG4 and BS 4142, which provide a suitable and widely accepted basis for evaluating operational noise impacts.

4.4.3.1 NG4 Guidance

In the absence of specific noise limits for this type of development, the most appropriate criteria are set out in The Environmental Protection Agency (EPA) Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (Environmental Protection Agency, 2016).

The guidelines for completing a noise impact assessment, as per NG4 Guidelines, is displayed in Figure 4-2.

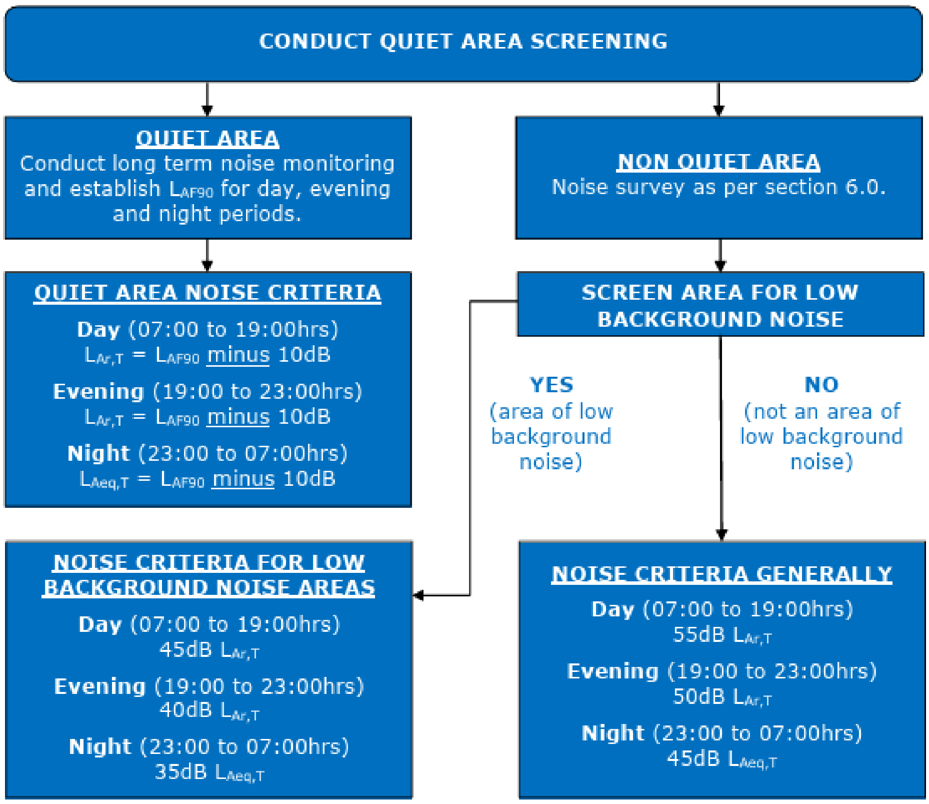

Figure 4-2: EPA NG4 Noise Criteria

The aforementioned guidelines requires that sites are screened to determine whether they are a 'quiet area' in accordance with the EPA publication Environmental Quality Objectives – Noise in Quiet Areas (2003). This screening is required to determine the most applicable noise limits for sites. The site does not meet the defined criteria of a 'Quiet Area'.

Next NG4 requires the site to be screened to determine if the site is in an 'area of low background noise'. Background noise levels are examined to see if they satisfy the following criteria:

- Average Daytime Background Noise Level ≤40dB L_{AF90}, and
- Average Evening Background Noise Level ≤35dB L_{AF90}, and
- Average Night-time Background Noise Level ≤30dB L_{AF90}.

For a site to be considered an *'Area of Low Background Noise'*, all three criteria must be satisfied.

Background noise levels measured during the baseline survey, discussed further in Section 5.2, indicated that none of the above criteria were satisfied at any Noise Monitoring Location (NML). Therefore, for the purposes of this assessment, all Noise Sensitive Locations (NSLs) are considered to fall within the *'All Other Areas'* category.

Based on this classification, it is considered appropriate to apply an operational noise target 45 dB LAeq,T at each Noise Sensitive Location (NSL). This aligns with the night-time noise limits outlined in Table 4-5 for the *'All Other Areas'* category.

Table 4-5: Recommended Noise Limit Criteria (NG4, January 2016)

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-time Noise Criterion, dB, $L_{ar,T}$ (23:00 to 07:00hrs)
Quiet Area	Noise from the licensed site to be at least 10dB below the average daytime background noise level measured during the baseline noise survey	Noise from the licensed site to be at least 10dB below the average evening background noise level measured during the baseline noise survey.	Noise from the licensed site to be at least 10dB below the average night-time background noise level measured during the baseline noise survey
Areas of Low Background Noise	45dB	40dB	35dB
All other Areas	55dB	50dB	45dB

4.4.3.2 BS4142

BS 4142:2014+A1:2019 *Methods for Rating and Assessing Industrial and Commercial Sound* is the industry-standard method used to assess sound from industrial or commercial sources, including building services plant, at residential receptors. The standard uses outdoor sound levels to assess the likely effects of sound on people within nearby dwellings or residential premises.

The assessment involves comparing the rating level (LAr,T) of the specific sound source with the background sound level (LA90,T) measured in the absence of the source. Where sound contains acoustic features such as tonality, impulsivity or intermittency that are readily perceptible against the residual sound environment, a correction may be applied to the specific sound level to derive the rating level. Section 6.3.5 of this assessment summarises the noise characteristics (tonality, impulsivity, intermittency) of the Proposed Development.

BS 4142:2014+A1:2019 provides the following guidance for interpreting the difference between the rating level and the background sound level:

A difference of around +10 dB or more is likely to indicate a significant adverse impact, depending on context.

A difference of around+5 dB is likely to indicate an adverse impact, depending on context.

Where the rating level does not exceed the background sound level, this indicates a low impact, depending on context.

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4.4.4 Operational Phase Vibration

Operational phase vibration levels will be assessed against the criteria set out in Section 4.4.2. Where predicted vibration levels comply with these criteria, effects would be considered negligible and significant vibration impacts would not be expected.

5. Existing Receiving Environment

5.1 Nearest Noise Sensitive Locations

In the first instance it is considered appropriate to define a noise sensitive location (NSL). The Environmental Protection Agency (EPA) states the following in terms of defining an NSL:

"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 for which its proper enjoyment requires the absence of nuisance levels."

For the purposes of this assessment, the nearest NSLs to the proposed development are shown in Figure 5-1 and identified as follows:

- NSL 1 – Steeven's Gate Apartments (1-131)
- NSL2 – Apartments 132 and 133 James's Street
- NSL3 – Proposed Apartments (ACP Case 319034) at 134 James's Street
- NSL4 – St Patrick's University Hospital
- NSL5 – Sundial House
- NSL6 – James's Street Apartments (22-50)
- NSL7 – Guiness Medical Department
- NSL8 – Apartments Echlin Street
- NSL9 – St James's Church and Parochial Hall
- NSL10 – Dr Steeven's Hospital

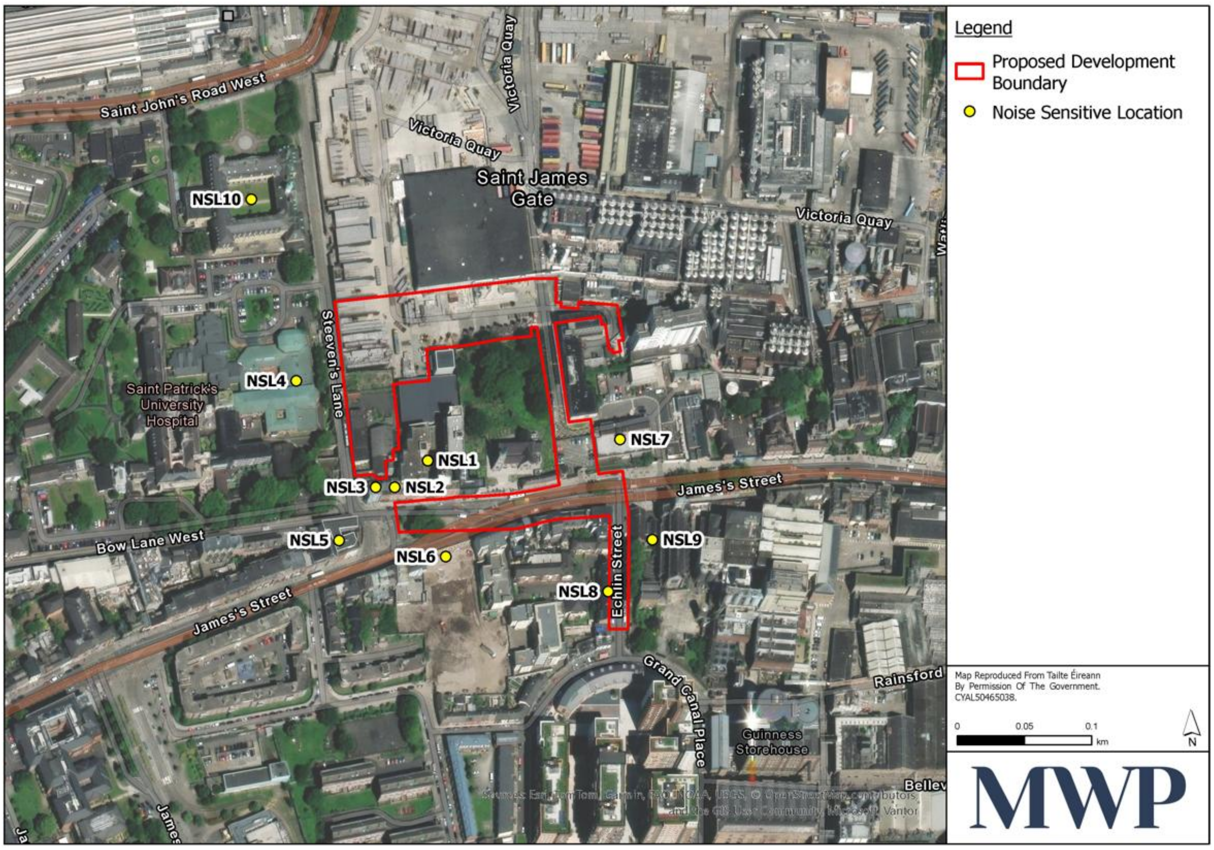

Figure 5-1: Noise Sensitive Locations (NSLs)

5.2 Baseline Noise Survey

In addition to desk study noise data information gathered as part of this planning application, a baseline environmental noise survey was conducted on by Kieran Barry and William Murphy of MWP on 30th March in the vicinity of the Proposed Development in order to quantify the existing noise environment at the nearest NSLs that may be affected by the Proposed Development.

5.2.1 Noise Monitoring Locations (NMLs)

Noise monitoring was undertaken at NMLs considered representative of the locations of noise sensitive locations NSLs. Table 5-1 shows NMLs and which NSLs they are representative of, refer to Figure 5-2.

Photos of each NML are included in **Appendix A**.

Table 5-1: Noise Monitoring Locations

Noise Monitoring Location (NML)	Noise Sensitive Location (NSL)
NML1	Representative of NSL1
NML2	Representative of NSL4, NSL10
NML3	Representative of NSL2, NSL3, NSL5, NSL6
NML4	Representative of NSL7, NSL8, NSL9

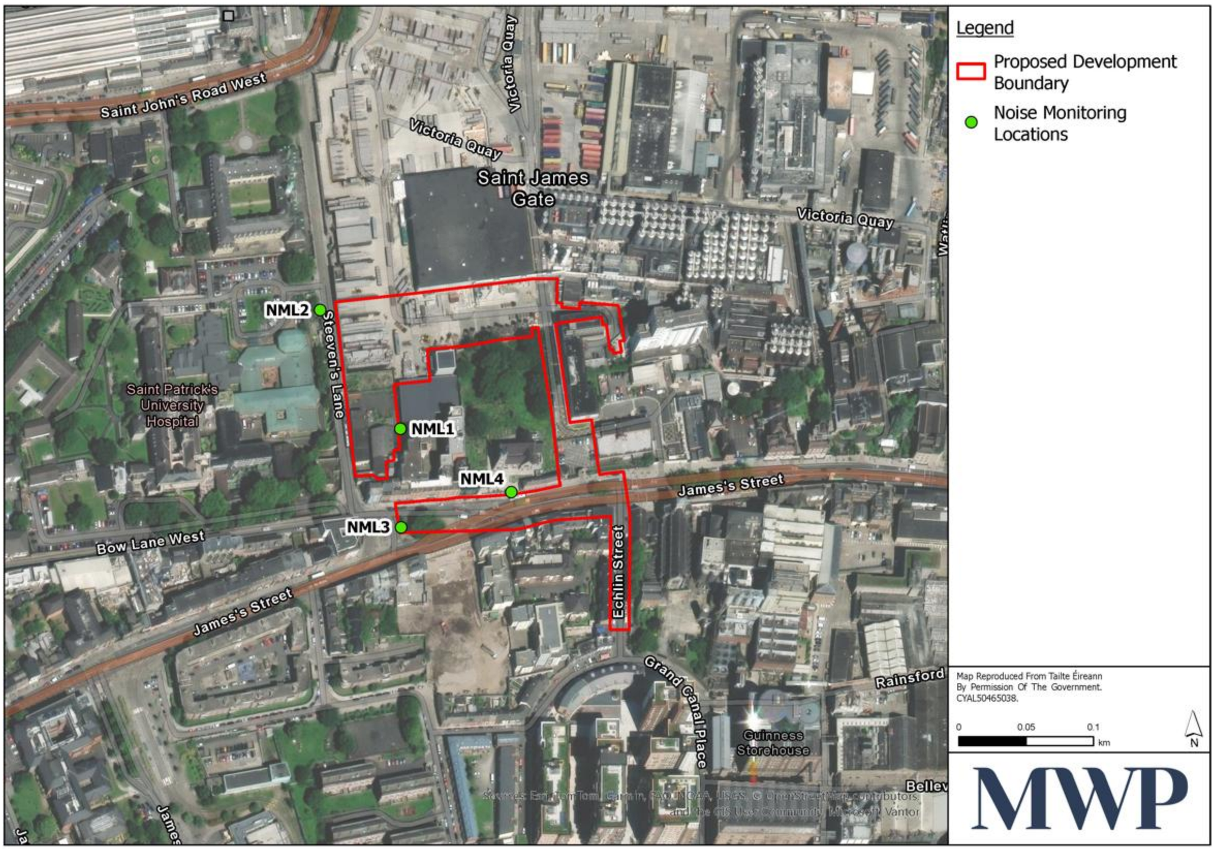

Figure 5-2: Noise Monitoring Locations

5.2.2 Survey Periods and Procedures

MWP personnel (Kieran Barry and William Murphy) conducted the noise monitoring on 30th March 2026.

Noise measurements were conducted at the four locations identified, NML1, NML2, NML3 and NML4.

Daytime measurements were conducted over 30-minute periods, with 30-minute measurements during the evening period and 15 to 30 minute measurements during the night-time period, in accordance with NG4 guidance.

The survey results were noted onto a Survey Record Sheet immediately following each sample and were also saved to the instrument memory for later analysis where appropriate. Survey personnel noted the primary sources contributing to noise build-up during the survey.

5.2.3 Instrumentation and Setup

Sound level meters used during the noise survey were located away from reflective surfaces, in open ground. The microphone was at a height of 1.5 m above the ground. The measurements were performed using the following equipment:

Table 5-2: Noise Monitoring Equipment

Manufacturer	Equipment Model	Serial Number	Microphone	Calibration Date
Bruel & Kjaer	2255	2255-100272	Type 4966	26th June 2024
Bruel & Kjaer	4231	2665058	-	23rd June 2025
Larson Davis	831	0003826	PCB PCB377B02	11th June 2024
Larson Davis	CAL200	11262	-	12th June 2025

Each noise meter microphone was protected using a windshield. Before and after each measurement period, the calibrator was field calibrated. The Larson Davis 831 noise meter was calibrated using a Larson Davis CAL200 Sound Level Calibrator Serial Number 11262. The Bruel & Kjaer noise meter was calibrated using a Bruel and Kjaer 4231.

The calibration certificates are attached as **Appendix B**. Weather conditions were dry and cool with occasional sunshine with light to moderate winds less than 5 meters per second.

5.2.4 Measurement and Parameters

The noise survey results are presented in terms of the following parameters:

- L_{Aeq} 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. This parameter is representative of the specific noise from plant when plant is the dominant noise source, i.e. there is no extraneous noise from sources such as traffic.
- L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order 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. A summary of the acoustic terminology used in this report is included in **Appendix C**.

5.2.5 Noise Survey Results

The noise monitoring locations illustrated in Figure 5-2 can be considered representative of the ambient noise environment of the closest NSLs which may be impacted by the Proposed Development. The following observations were recorded during the noise monitoring periods:

5.2.5.1 NML1

NML1 was located within the Proposed Development site, positioned within a vacant yard bordered by the Diageo facility to the north and a residential apartment building to the south.

Main contributing noise to the soundscape is forklifts and trucks operating in and around keg bays within the Diageo Facility. Other contributing noise at NML1 included Luas movements and intermittent traffic observed on Steevens Lane. Average measured noise levels during the daytime were 64 dB LAeq and 56 dB LA90.

Noise levels during the evening period at NML1 reduced slightly due to reduced activity at keg bays however, the acoustic environment remained influenced by ongoing industrial operations at the Diageo site, truck movements and continued Luas services, maintaining a relatively consistent noise floor. Measured levels were 51 dB LAeq and 46 dB LA90.

Noise levels during the night-time period at NML1 reduce further with a general reduction in traffic flows along Steevens Lane, however Luas services were still intermittently audible. The acoustic environment remains mainly influenced by continuous operational activities within the Diageo facility, including intermittent forklift movements and occasional vehicle activity associated with logistics and servicing operations. Average noise levels were 50 dB LAeq and 46 dB LA90, demonstrating that a relatively elevated background sound level persists even during quieter periods.

Table 5-3: NML1 Baseline Noise Survey Results

NML1	Time and Date	L_{Aeq} 30min dB	L_{A90} 30min dB
Daytime	11:30 30/03/2026	63	56
	13:30 30/03/2026	62	54
	15:30 30/03/2026	67	57
Average		64	56
NML1	Time and Date	L_{Aeq} 30min dB	L_{A90} 30min dB
Evening	20:30 30/03/2026	51	46
NML1	Time and Date	L_{Aeq} 15min dB	L_{A90} 15min dB
Night	23:30 30/03/2026	50	46
	00:30 31/03/2026	50	46
Average		50	46

5.2.5.2 NML2

NML2 was located outside the main entrance to St Patrick's University Hospital on Steevens Lane.

The noise climate during the daytime was dominated by frequent Luas movements, which represent the principal noise source at this location. Additional contributions arose from pedestrian activity, particularly given the proximity to hospital and city centre amenities, as well as local vehicular movements accessing the hospital. As a result, this location recorded the highest daytime noise levels of all monitoring points, with average values of 71 dB LAeq and 52 dB LA90.

Evening conditions were broadly consistent with daytime, as Luas services, pedestrian flows, and localised traffic remained active. While there is a slight reduction in overall activity, the character of the sound environment remains largely unchanged. Measured levels were 70 dB LAeq and 50 dB LA90, confirming sustained elevated ambient noise levels.

A reduction in pedestrian, traffic, and Luas activity was observed during the night-time period. However, the location remained influenced by residual urban noise, including intermittent industrial/plant noise from the Diageo facility and occasional vehicle movements. Noise levels remained relatively elevated for a night-time urban environment, with average values of 68 dB LAeq and 45 dB LA90.

Table 5-4: NML2 Baseline Noise Survey Results

NML2	Time and Date	L_{Aeq} 30min dB	L_{A90} 30min dB
Daytime	11:40 30/03/2026	71	52
	13:20 30/03/2026	72	52

NML2	Time and Date	L_{Aeq} 30min dB	L_{A90} 30min dB
	15:39 30/03/2026	71	53
Average		71	52
NML2	Time and Date	L_{Aeq} 30min dB	L_{A90} 30min dB
Evening	19:37 30/03/2026	70	50
NML2	Time and Date	L_{Aeq} 15min dB	L_{A90} 15min dB
Night	00:42 31/03/2026	70	45
	00:27 31/03/2026	66	45
Average		68	45

5.2.5.3 NML3

NML3 was positioned at a junction of Bow Lane, the R810, and Steevens Lane, representing a busy urban roadside location with high exposure to transport-related noise.

The daytime noise environment was strongly influenced by continuous road traffic along the R810, combined with Luas movements, pedestrian activity, and intermittent emergency vehicle sirens faintly audible. In addition, temporary road works at a man hole were taking place across the road from the monitoring point during the survey period, contributing to increased noise levels. Measured levels of 68 dB LAeq and 59 dB LA90 indicate a relatively high and consistent noise climate dominated by road traffic.

During the evening period, the roadworks ceased however there was continued traffic flow and Luas operation maintaining elevated ambient sound levels. The measured noise levels during the evening period were 66 dB LAeq and 59 dB LA90.

During the night-time period, a reduction in traffic volumes and Luas services resulted in a noticeable decrease in noise levels. However, pedestrian activity remained present, particularly associated with nearby social and commercial uses, and intermittent traffic noise persisted. Average noise levels during the night-time were 63 dB LAeq and 45 dB LA90.

Table 5-5: NML3 Baseline Noise Survey Results

NML3	Time and Date	L_{Aeq} 30min dB	L_{A90} 30min dB
Daytime	12:14 30/03/2026	68	59
	13:54 30/03/2026	68	59
	16:13 30/03/2026	68	59
Average		68	59
NML3	Time and Date	L_{Aeq} 30min dB	L_{A90} 30min dB
Evening	20:10 30/03/2026	66	59
NML3	Time and Date	L_{Aeq} 15min dB	L_{A90} 15min dB
Night	23:53 30/03/2026	62	45
	00:09 30/03/2026	64	45

NML3	Time and Date	L_{Aeq} 30min dB	L_{A90} 30min dB
Average		63	45

5.2.5.4 NML4

NML4 was located on the R810 adjacent to the Pearse Lyons Distillery.

The daytime sound environment was characterised by continuous road traffic, high levels of pedestrian activity, and Luas noise. A low-flying helicopter was observed during the second daytime monitoring period, contributing to short-term elevated noise levels. Average daytime measurements at NML4 were 69 dB LAeq and 60 dB LA90.

During the evening, similar noise sources as recorded during the daytime remained active, particularly traffic and pedestrian movements. While some reduction in activity was observed, the overall character of the environment remained largely unchanged. Noise levels during the evening at NSL3 were recorded 68 dB LAeq and 57 dB LA90.

The main source of noise at NML4 during the night-time period was intermittent traffic noise. There was also passing pedestrians occasionally audible on street, sometimes conversing with each other. Other noise contributions included faint ambulance and police sirens occasionally audible in distance. The average recorded night-time noise levels at NSL4 were 66 dB LAeq and 53 dB LA90.

Table 5-6: NML4 Baseline Noise Survey Results

NML4	Time and Date	L_{Aeq} 30min dB	L_{A90} 30min dB
Daytime	12:46 30/03/2026	69	59
	15:05 30/03/2026	70	61
	16:45 30/03/2026	68	59
Average		69	60
NML4	Time and Date	L_{Aeq} 30min dB	L_{A90} 30min dB
Evening	20:45 30/03/2026	68	57
NML4	Time and Date	L_{Aeq} 15min dB	L_{A90} 15min dB
Night	23:20 30/03/2026	66	51
	23:36 30/03/2026	66	54
Average		66	53

5.3 Desktop Review of Noise Mapping

A desktop review of publicly available data has been undertaken to further characterise the baseline noise environment in the study area. Reference has been made to the most recent Round 4 noise maps published by the Environmental Protection Agency (EPA) (http://gis.epa.ie) for road, rail and industry noise. The Published noise maps are provided for the overall day-evening-night period in terms of Lden and Lnight parameters, defined below.

L_{den} is the 24-hour noise rating level determined by the averaging of the Lday with the Levening (plus a 5 dB penalty) and the Lnight (plus a 10 dB penalty). Lden is calculated using the following formula, as defined within the Noise Regulations:

Where:

- **L_{day}** is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all day periods of a year. The 12-hour daytime period is between 07:00hrs and 19:00hrs
- **$L_{evening}$** is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the evening periods of a year. The four-hour evening period is between 19:00hrs and 23:00hrs.
- **L_{night}** is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the night periods of a year. The eight-hour night-time period is between 23:00hrs and 07:00hrs.

The mapping available has been used to further inform the existing noise levels on the potential development site. This is discussed in Section 5.3.1 to Section 5.3.3.

5.3.1 Road Noise

Strategic noise mapping prepared under the Environmental Noise Directive includes both the regional road to the south of the proposed site and Steeven's Lane to the west. The published Lden noise contours, illustrated in Figure 5-3, show that road traffic noise from these mapped routes extends across the proposed site and affects the closest noise-sensitive locations. This demonstrates that traffic noise is the principal contributor to the existing acoustic environment during daytime, evening and night-time periods.

The corresponding Lnight contours, refer to Figure 5-4, representing night-time noise from major roads only, also overlay the proposed site, indicating that traffic remains a dominant source of noise during night-time hours. Overall, the strategic mapping confirms that the Proposed Development is situated within a traffic-influenced noise environment, which is a key consideration in the subsequent assessment of noise effects.

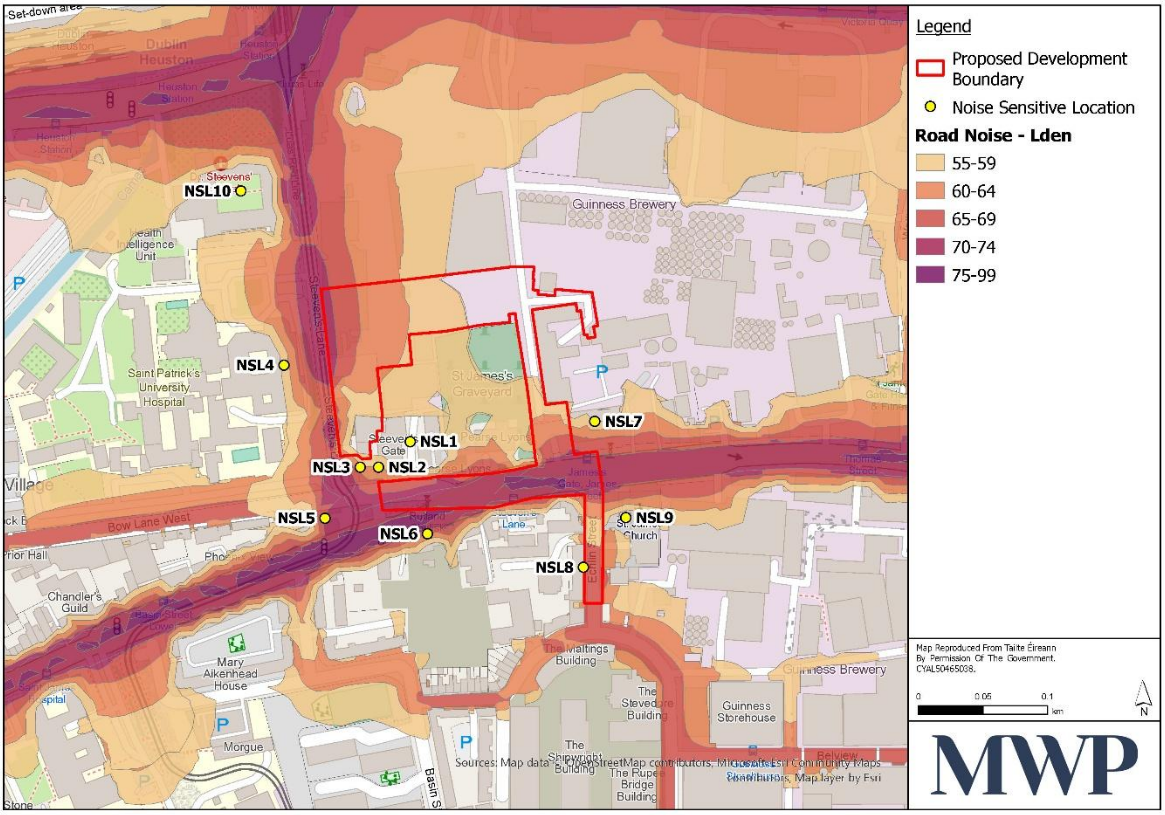

Figure 5-3: Strategic Noise Mapping Lden – Road noise

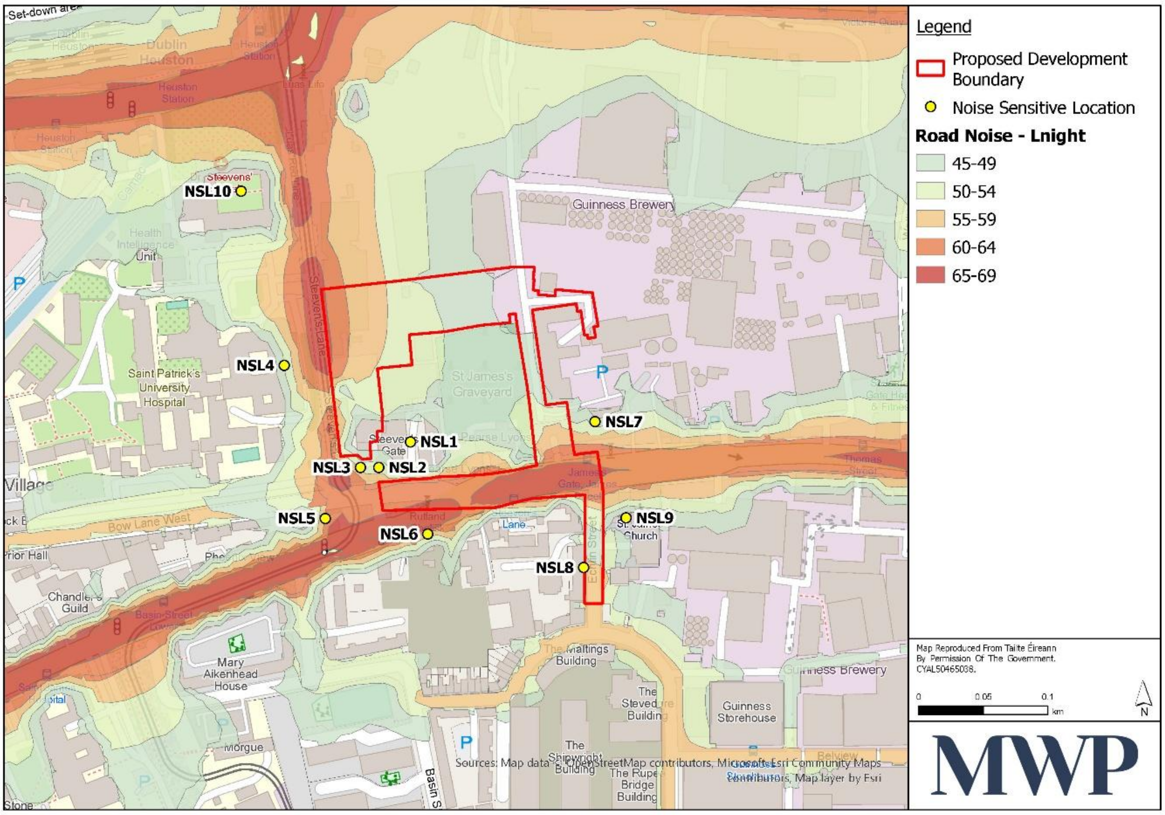

Figure 5-4: Strategic Noise Mapping Lnight – Road noise

5.3.2 Rail

The Luas alignment runs immediately to the west of the Proposed Development Site, with Heuston Station located to the north-west. These rail sources are included within the Strategic Noise Mapping undertaken under the Environmental Noise Directive. The published Lden rail noise contours, shown in Figure 5-5, demonstrate that rail-related noise extends over the Proposed Development Site and affects the nearest noise-sensitive locations. The corresponding night-time strategic mapping, refer to Figure 5-6, also indicates that rail activity is a dominant contributor to the baseline noise environment during night-time hours, when road traffic flows are reduced. Overall, rail movements represent a significant and locally controlling element of the existing acoustic environment in the vicinity of the Proposed Development Site.

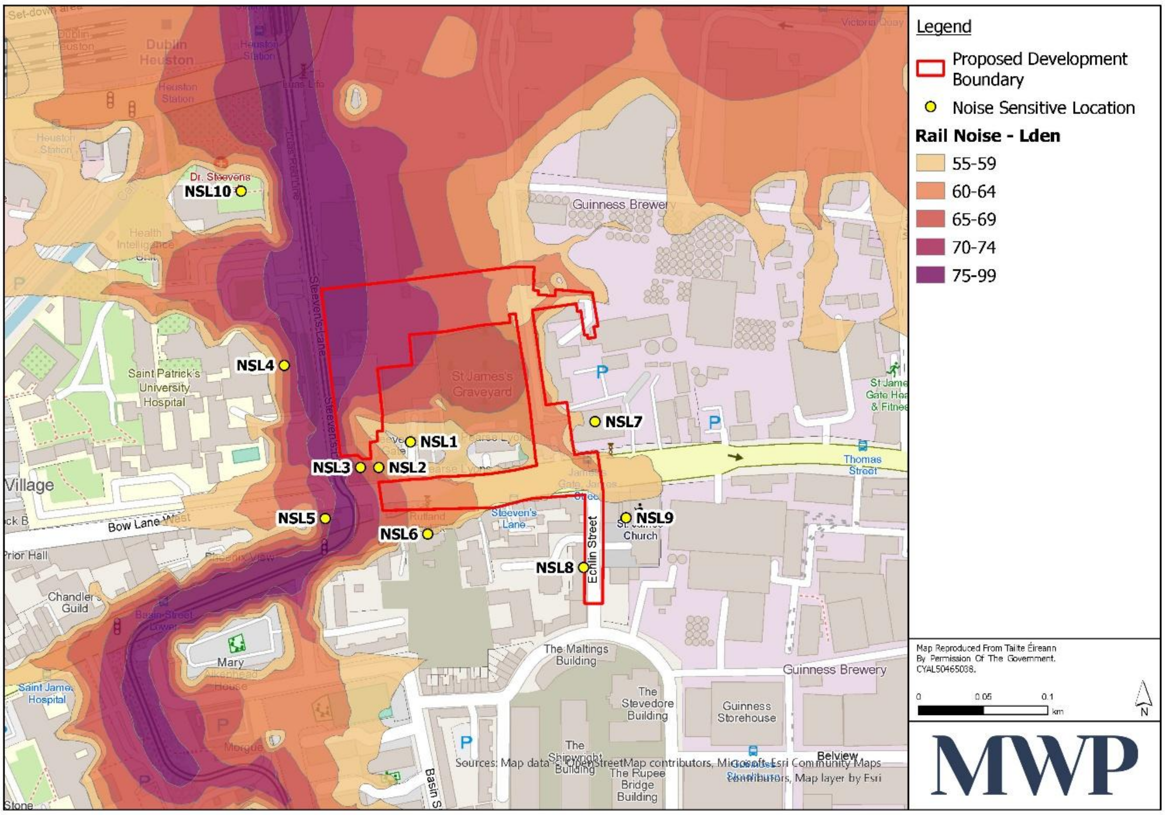

Figure 5-5: Strategic Noise Mapping Lden – Rail noise

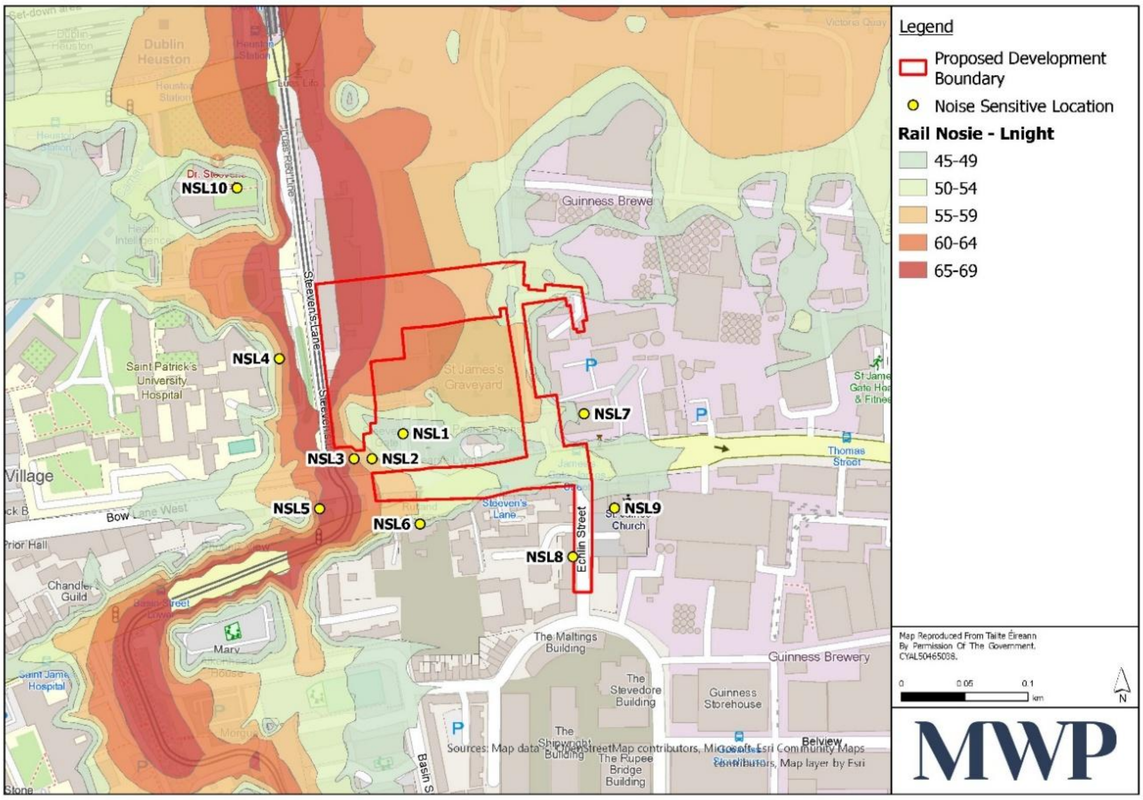

Figure 5-6: Strategic Noise Mapping Lnight – Rail noise

5.3.3 Industry

The baseline noise environment at the Proposed Development site is influenced by nearby industrial and commercial activities located within the surrounding urban area. Strategic noise mapping and baseline noise context mapping indicate that noise emissions associated with these uses extend into the Proposed Development Site and contribute to the overall ambient sound climate. As illustrated on the strategic noise map presented in Figure 5-7 and Figure 5-8, industrial and commercial noise forms part of the composite noise environment, particularly during daytime and evening periods when such activities are most active. This further reinforces the characterisation of the Proposed Development Site as being located within a complex, multi-source urban noise environment, rather than a quiet or acoustically sensitive setting.

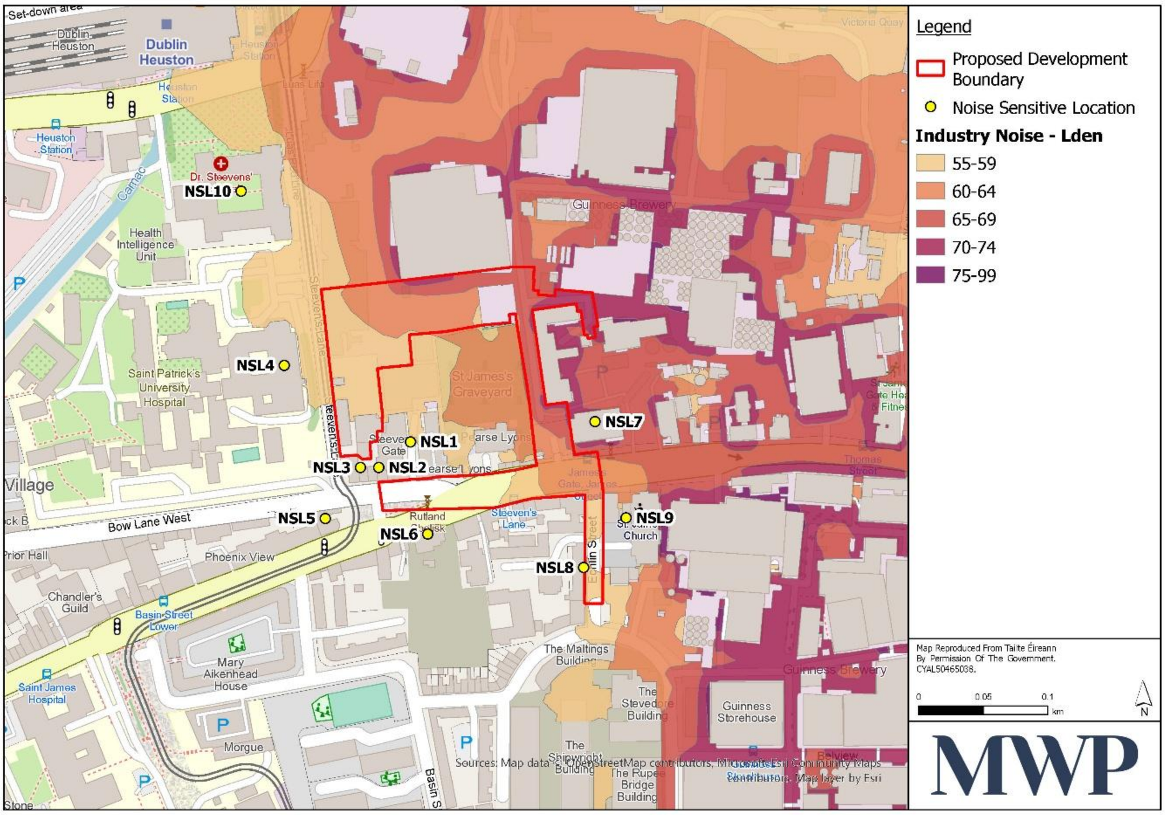

Figure 5-7: Strategic Noise Mapping Lden – Industry noise

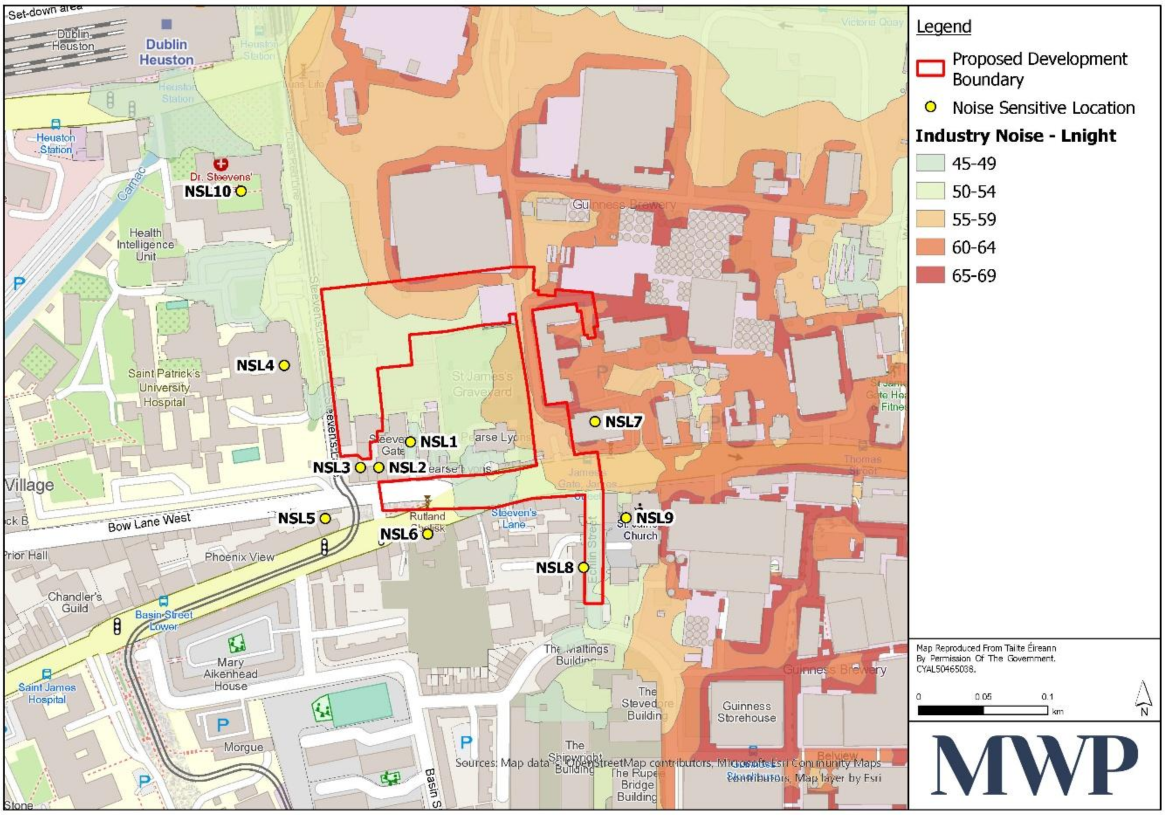

Figure 5-8: Strategic Noise Mapping Lnight – Industry noise

5.4 Historic Monitoring

In addition to the baseline noise survey and strategic noise mapping, a review of available historic noise monitoring data has been undertaken to further characterise the existing acoustic environment in the vicinity of the Proposed Development Site. This includes long-term environmental monitoring carried out at the adjacent Diageo facility, as well as baseline noise surveys undertaken as part of recent nearby planning applications.

The inclusion of this historic data provides additional confidence in the representativeness of the current baseline survey by demonstrating consistency in measured noise levels over time and confirming the established, transport-influenced urban nature of the receiving environment.

5.4.1 Diageo Annual Environmental Report

Annual noise monitoring is undertaken at the adjacent Diageo site. The most recent annual noise survey concluded that measured noise levels at off-site locations did not exceed background noise levels, thereby demonstrating compliance with the requirements of Industrial Emissions Licence P0301-04.

The 2025 Annual Environmental Report (AER) for the site recorded six noise-related complaints. Noise monitoring was undertaken at locations around the site boundary and confirmed compliance with the applicable licence limits.

Each complaint was investigated, with appropriate actions taken and corrective measures identified; these have been either implemented or are currently in progress. Diageo continues to actively review its Noise Management Plan and to investigate further opportunities for noise reduction.

5.4.2 134 James's Street Baseline Noise Data

As part of a planning application for an apartment development at 134 James's Street (Planning Reference: 391223), Wave Dynamics undertook baseline noise monitoring on 4th September 2023 at locations representative of nearby noise sensitive receptors.

One monitoring location (A1) was situated on Steevens Lane adjacent to the grounds of St. Patrick's University Hospital, opposite NSL2 (Proposed Development NML). A second location (A2) was positioned opposite NSL3 (Proposed Development NML).

Measured noise levels at these locations were 70 dB LAeq and 48 dB LA90 at A1, and 66 dB LAeq and 58 dB LA90 at A2 during daytime periods. These values are comparable to those recorded as part of the March 2026 Proposed Development baseline survey, with corresponding measurements of 70 dB LAeq and 52 dB LA90 at NSL2, and 68 dB LAeq and 59 dB LA90 at NSL3.

This comparison indicates that the noise environment in the vicinity of the Proposed Development Site has remained consistent over time and is characteristic of a transport-influenced urban area.

5.5 Characteristics of the Acoustic Environment

The existing acoustic environment in the vicinity of the Proposed Development is characteristic of a dense inner-city setting and is influenced by a combination of transport, commercial and institutional noise sources. This characterisation is based on the findings of the baseline noise survey and supported by EPA Round 4 strategic noise mapping.

Road traffic and Luas movements are the dominant contributors to ambient noise levels across all monitoring locations, providing a consistent and defining influence on the overall sound environment. Additional contributions arise from pedestrian activity, particularly during daytime and evening periods, as well as operational noise from nearby commercial and industrial premises, including the Diageo facility. Intermittent noise sources such as roadworks and emergency vehicle movements were also observed and contributed to temporary increases in measured noise levels.

The strategic noise mapping confirms that the Proposed Development Site is located within noise contours associated with both road and rail infrastructure. The mapped Lden and Lnight contours demonstrate that traffic noise extends across the site and surrounding receptors, while the adjacent Luas alignment represents a significant local rail noise source influencing the area throughout the day, evening and night-time periods.

Measured noise levels reflect a typical urban profile, with elevated and relatively stable daytime LAeq levels driven by continuous transport activity. Background noise levels (LA90) are consistently high, indicating a persistent underlying sound environment. Evening conditions remain broadly similar to daytime, while night-time noise levels show some reduction but continue to be influenced by residual traffic and urban activity. This pattern is consistent with the findings of the strategic noise mapping.

Overall, the acoustic environment is defined by continuous transport-related noise with additional urban influences, resulting in a robust and typical city centre soundscape.

5.6 Conclusion of Existing Ambient Acoustic Environment

The baseline noise survey, supported by EPA strategic noise mapping and historic monitoring data, confirms that the Proposed Development is located within an established, transport-dominated urban noise environment characterised by moderate to high ambient sound levels.

Road traffic and Luas operations are the principal contributors to the existing acoustic climate, with consistently elevated background noise levels observed across all time periods. The strategic noise mapping aligns with the measured data, confirming that both road and rail sources have a widespread and ongoing influence on the site and surrounding noise sensitive receptors.

The overall sound environment is continuous in nature and typical of a busy city centre location. In this context, the receiving environment is not considered to be highly sensitive to change and exhibits a degree of resilience to elevated ambient noise levels associated with transport and urban activity.

The proximity of the Luas alignment is also a key consideration in terms of vibration. While operational vibration forms part of the existing environment, the protection of light rail infrastructure from additional construction-related vibration has been addressed separately through the adoption of conservative assessment criteria.

In summary, the baseline conditions, as established through measurement, mapping, and supporting data, provide a robust and appropriate basis for the assessment of potential noise and vibration impacts associated with the Proposed Development.

6. Potential Impacts

The potential for noise arising from the development has three distinct phases:

- Demolition Phase
- Construction Phase; and,
- Operational Phase

The sources and potential impacts arising from the phases are distinctly different and, therefore, have been discussed separately.

6.1 Demolition and Construction Phase Noise

Table 6-1 shows construction/demolition construction noise limit values based on baseline noise monitoring.

Table 6-1: Construction/Demolition Noise Limit Values

NSL	NML (Representative)	Daytime Ambient Baseline $L_{Aeq,T}$	Adopted Construction Noise Limit $L_{Aeq,T}$
NSL1	NML1	64	70
NSL4, NSL10	NML2	71	75
NSL2, NSL3, NSL5, NSL6	NML3	68	75
NNSL7, NSL8, NSL9	NML4	69	75

The overall demolition and construction phase for the Proposed Development is expected to have a duration of approximately 3 years.

The nearest noise-sensitive location (NSL1) is located at a distance of approximately 5 m from the site boundary, and therefore represents a worst-case receptor for construction and demolition noise.

6.1.1 Substation Site Demolition Noise

Works will commence with the demolition of the northern and eastern retaining walls.

Demolition works of the existing building structures will be undertaken using a controlled top-down deconstruction methodology, whereby finishes and structural elements are removed in a sequence broadly reversing the original construction process. This approach provides a systematic and safe means of dismantling the structure while maintaining stability at all stages.

Initial works will involve the removal of roof finishes, with materials segregated progressively to facilitate reuse or appropriate disposal. Following this, structural components at roof level, including roof bracing, cross members, and associated support elements, will be carefully dismantled on a sequential basis. Primary and secondary structural members will then be removed incrementally, one element at a time, ensuring that load paths are maintained and that no instability arises during the works.

Long-reach excavators will be utilised to assist in the overall demolition process where appropriate. However, the majority of demolition will be carried out through the piecemeal removal of masonry and reinforced concrete elements, thereby minimising the need for extensive breaking or cutting operations. This approach will reduce impulsive noise generation, particularly at the most sensitive interfaces

The closest NSLs to demolition activities will be NSL1/NSL2/NSL3 (~5 m).

The adoption of a top-down deconstruction methodology provides inherent acoustic screening benefits within the constrained urban setting of the site. This approach allows existing external walls, floor slabs, and structural elements to be retained for as long as practicable, enabling these high-mass components to act as effective temporary noise barriers between demolition activities and nearby receptors. The retention of the building fabric reduces direct line-of-sight sound transmission, requiring demolition noise to diffract over and around the structure rather than propagating directly towards sensitive receptors, thereby contributing to a reduction in overall noise impact at surrounding properties.

As demolition progresses downward, noise-generating activities occur at lower elevations and benefit from increasing levels of structural and ground-level shielding. In accordance with BS 5228-1, and given the level of structural retention throughout demolition, a screening reduction of 10 dB has been applied to represent the upper bound of acoustic attenuation achievable under well-screened conditions.

Table 6-2 and Table 6-3 present the predicted noise levels from a number of plant items required during the demolition and construction phases of the Proposed Development at the nearest NSL.

The exact equipment to be used is not known at this stage, but the plant and machinery outlined in Table 6-2 and Table 6-3 are typical of plant commonly used and can provide an accurate assessment of construction noise emissions.

The associated noise levels have been sourced from BS 5228 Noise and Vibration from open and construction sites, totalled, and extrapolated to the nearest noise sensitive location. The resultant noise level is then compared against the relevant noise threshold.

In addition, allowance has been made for the intermittent operation of plant through the application of on-time correction factors. The reference noise levels provided in BS 5228 assume continuous operation over the assessment period; however, in practice, plant operates intermittently over a given time period.

To account for this, each plant item has been assigned an assumed utilisation rate (on-time), and a corresponding correction has been applied to derive an equivalent continuous sound level (LAeq,T). The correction is calculated in accordance with BS 5228 using the following relationship:

$$\text{Correction(dB)} = 10\log_{10}(\text{on-time fraction})$$

For example, plant operating for 50% of the assessment period results in a correction of approximately -3 dB, while plant operating for 20% of the time results in a correction of approximately -7 dB. This approach provides a more representative assessment of actual construction activity, while remaining conservative through the assumption that plant items may contribute cumulatively within the same assessment period.

Using the following equation, noise emissions from the construction/demolition site are extrapolated to the nearest noise sensitive receptor.

$$SPL_2 = SPL_1 - 20\log(r2/r1)$$

Where:

- Sound Pressure Level 1 (SPL_1) = Known noise level at 10m from construction site.
- Sound Pressure Level 2 (SPL_2) = Unknown noise level at nearest receptor.
- r2 = Distance between noise sensitive receptor and construction site.
- r1 = 10 m.

Table 6-2: Plant and Machinery and Associated Noise Levels Typically Used in Demolition

Plant and Machinery	Sound Pressure Level @10m LAeqT	Assumed On-Time	On-time Correction (dB)	Corrected LAeq,T @10 m (dB)	Top Down Screening Reduction (dB)	Predicted Sound Pressure Level at @ 10m	Predicted Sound Pressure Level at NSL1/NSL2/NSL3
Long-Reach Excavator demolition excavator	78	50%	-3	75	-10	65	71
16t Excavator with hydraulic grab	76	40%	-4	72	-10	62	68
Standard tracked excavator for piece-meal masonry demolition	76	40%	-4	72	-10	62	68
Excavator-mounted hydraulic breaker[2]	82	20%	-7	75	-10	65	71
Total Predicted Sound Pressure Level						70	76

The demolition noise predictions detailed in Table 6-2 indicate the demolition activities will exceed the adopted daytime construction noise limit of 70 dB LAeq,T at NSL1 by approximately 6 dB and the adopted daytime construction noise limit of 75 dB LAeq,T at NSL2/NSL3 by approximately 1dB, however noise levels will be below daytime construction noise limits at all other NSLs.

[2] Breaker assumed intermittent and not operating concurrently

Noise levels at more distant NSLs will be further reduced due to attenuation with distance. In addition, 1200 mm high protective hoarding will be installed above the demolition line of works to protect the adjacent Luas infrastructure at Steevens Lane. This hoarding will also provide additional acoustic screening, resulting in further reductions in noise levels at surrounding receptors to the west.

Mitigation measures outlined in Section 7.1 will be utilised to further reduce any impacts associated with the demolition phase of the Proposed Development.

6.1.2 Substation Site Construction Phase Noise

Construction activities associated with the proposed 110 kV substation development will generate noise from a range of plant and equipment used during the civil construction and electrical installation phases. These activities include excavation, piling, materials handling, compaction, concrete works, and general plant operation, all of which have the potential to give rise to temporary increases in ambient noise levels.

Given the constrained urban setting of the site and the close proximity of nearby noise sensitive locations (NSL1, NSL2 and NSL3), located approximately 5 m from the site boundary, construction noise requires careful management. However, in comparison to the demolition phase, construction activities are generally more predictable in nature, less impulsive in character, and can be effectively controlled through appropriate plant selection, sequencing of works, and mitigation measures.

A significant component of the construction phase is the installation of piled foundations. These works will be undertaken using Continuous Flight Auger (CFA) piling techniques, which are widely recognised as a low-noise alternative to traditional driven piling methods. As is the case with the demolition noise assessment, the assessment of construction noise has been carried out in accordance with BS 5228-1:2009+A1:2014. Reference noise levels for CFA Piling have been obtained from Annex D, Table D.4 Ref 98. These indicate typical sound pressure level in the range of approximately 80 dB LAeq,T at 10 m for CFA piling operations. The closest point of CFA piling to a NSL is approximately 15m, and as such has been calculated at this distance in Table 6-3.

The plant and equipment considered representative of the construction phase are presented in Table 6-3. While the exact plant selection will be confirmed at construction stage, the equipment identified reflects typical plant used for works of this nature and provides a robust basis for noise prediction. The assessment represents a conservative worst-case scenario, assuming all plant items are operating simultaneously.

For the purposes of this assessment, 3 dB attenuation has been applied at noise sensitive locations (NSLs), taking account of the presence of 3 m high site hoarding together with the influence of receptor height. While the hoarding will provide a degree of attenuation at lower levels, its effectiveness reduces with increasing elevation, particularly for multi-storey receptors where partial or full line-of-sight to the source may be retained.

The applied 3 dB attenuation is therefore considered to represent a reasonable and appropriately conservative approximation of the overall attenuation likely to occur in practice, accounting for the combined influence of barrier effects and variation in receptor elevation.

Table 6-3: Plant and Machinery and Associated Noise Levels Typically used in Construction

Plant	Sound Pressure Level @10m LAeqT	Assumed On-Time	On-time Correction (dB)	3 dB attenuation (Hoarding/Change in receptor elevation)	Corrected LAeq,T @ 10m (dB)	Predicted Sound Pressure Level @ NSL1/NSL2/NSL3
Telescopic Handler	71	40%	-4	-3	62	68
Mobile Crane	70	30%	-5	-3	60	66
15-30T Excavator	78	40%	-4	-3	71	75
12T Roller	80	20%	-7	-3	70	74
Dump truck	78	30%	-5	-3	70	74
Tractor & Trailer	79	30%	-5	-3	71	75
15-20T Rubber Tired Excavator	68	50%	-3	-3	62	66
3-10T mini digger	69	50%	-3	-3	63	67
Diesel Generator	61	100%	0	-3	58	62
CFA Piling Rig	80	40%	-4	-3	73	70
Total Predicted Sound Pressure Level					79	82

The predicted construction noise level at NSL1, NSL2 and NSL3 is approximately 82 dB LAeq,T. The adopted daytime construction noise criterion of 70 dB LAeq,T at NSL1 is exceeded at locations in proximity to the works, with exceedances reducing as separation distance increases. The criterion of 75 dB LAeq,T at NSL2 and NSL3 is also exceeded at close range, by approximately 7 dB at the nearest points.

Predicted noise levels decrease progressively with distance from the works, however, exceedances of the more stringent 70 dB criterion at NSL1 persist closer to the source of construction activity.

Given the proximity of NSL1/NSL2/NSL3, additional mitigation measures will be implemented to reduce noise levels at source and along the propagation path. These measures, including the use of enhanced localised screening, careful plant selection, and active noise management, are described in detail in Section 7.1. With these measures in place, construction noise levels at nearby receptors are anticipated to be reduced to within, or below, the applicable noise limits.

6.1.3 Grid Connection Works

Noise arising from construction activities associated with the proposed grid connection has been assessed against a daytime construction noise limit of 75 dB LAeq,T at the façades of the nearest noise-sensitive receptors.

This criterion is considered appropriate given the urban context of the site, the predominance of daytime works, and the existing traffic-dominated baseline noise environment in the surrounding area.

The grid connection works will involve typical urban utility construction activities including:

- Excavation of cable trenches within public streets and footpaths
- Localised breaking and reinstatement of road surfaces
- Cable laying, pulling, and jointing operations
- Backfilling and compaction
- Intermittent movements of delivery and service vehicles

Noise will also arise primarily from diesel-powered construction plant operating intermittently and progressing along the route of the grid connection. Activities will not be static and move sequentially along the street corridor.

Sections of the grid connection will be constructed within active public streets, where residential and mixed-use buildings are typically in close proximity to the works.

For assessment purposes, the nearest noise-sensitive receptors are assumed to be located at distances of approximately 5-10 metres from construction activity, which represents a conservative worst-case scenario.

The existing baseline environment is characterised by:

- Continuous road traffic noise
- Comercial and industrial activity
- General city-centre background noise.

As a result, daytime ambient noise levels are already elevated relative to quieter suburban locations.

The majority of grid connection activities are expected to generate noise levels that are generally at or below the 75 dB LAeq,T criterion at nearby façades during normal operation.

Certain activities, most notably temporary duration road surface breaking, have the potential to generate higher noise levels for limited periods. These works are however not expected to result in significant adverse impacts for the following reasons:

- These activities will be intermittent and of short duration
- Works will progress linearly, limiting the exposure time at any single receptor
- Elevated noise events will occur against a backdrop of existing daytime traffic noise.

On occasion, works may need to extend into evening or night-time hours, however, any such works will be subject to prior agreement with Dublin City Council, and noise levels during these periods will be required to comply with applicable construction noise limits as agreed with the Planning Authority.

6.1.4 Demolition and Construction Phase Traffic Noise

During the construction phase, traffic associated with the Proposed Development will comprise a mix of Light Goods Vehicles (LGVs) and Heavy Goods Vehicles (HGVs) travelling to and from the site.

A review of the available information indicates that there will be no more than 30 two-way HGV trips per day during the construction/demolition phase. This increase in vehicle movements has been assessed against baseline traffic data for the year 2026.

As stated in the DMRB Noise and Vibration (UKHE 2020), Volume 11, Section 3, Part 7, in order to increase traffic noise levels by 1 dB 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 will therefore not introduce a level of traffic that will result in a significant noise impact.

6.2 Demolition and Construction Phase Vibration

The potential for vibration effects associated with the demolition and construction phases of the Proposed Development has been assessed with reference to the criteria outlined in Section 4.4.2, including:

- building response criteria (Section 4.4.2.1);
- human response criteria (Section 4.4.2.2); and
- the precautionary vibration criterion adopted for Luas infrastructure (Section 4.4.2.3).

The site is located within a constrained urban environment, with adjacent receptors located within approximately 5 m of the works and Luas infrastructure located at approximately 2 m from the site boundary. In this context, vibration effects are dependent on construction methodology and control measures, and a precautionary, control-led approach has been adopted in accordance with BS 5228-2.

6.2.1 Demolition Phase Vibration

6.2.1.1 Demolition Phase Vibration Effects on Buildings

Demolition will be undertaken using a controlled top-down methodology, progressing in a sequential manner and avoiding high-energy impact or uncontrolled collapse. Breaking activities associated with demolition are recognised as transient vibration sources. Empirical data from BS 5228-2 indicates that, at distances of approximately 5 m, vibration levels may reach the order of 5–15 mm/s Peak Particle Velocity under typical unconstrained conditions.

At such distances, these levels may overlap with lower threshold values for cosmetic damage for sensitive or potentially vulnerable structures, as defined in Section 4.4.2.1. As a result, there is potential for short-duration vibration levels to approach these criteria at very close proximity to the works.

However, the demolition methodology proposed incorporates measures specifically intended to minimise vibration generation. These include the use of low-impact and manual techniques at building interfaces, careful sequencing of demolition, avoidance of sudden load release, and the use of temporary works to maintain structural stability throughout the process. In addition, pre-condition surveys will be undertaken and a programme of vibration monitoring will be implemented, supported by a Trigger Action Response framework.

Taking these factors into account, while vibration levels may approach guideline values during short-duration activities at close distances, the risk of cosmetic damage is considered low and will be effectively managed through the proposed control measures. Mitigation measures for Demolition and Construction vibration levels are summarised in Section 7.1.

6.2.1.2 Demolition Phase Vibration Effects on Human Receptors

Human sensitivity to vibration occurs at levels significantly lower than those associated with the onset of building damage. Based on the criteria outlined in Section 4.4.2.2, vibration may become perceptible at levels above approximately 0.3 mm/s PPV and may give rise to potential complaint at levels exceeding approximately 1 mm/s PPV.

Given the proximity of nearby receptors, vibration generated during demolition activities is likely to be perceptible at times and, during more intensive operations such as structural breaking, may approach levels where some degree of disturbance could arise. However, such effects will be temporary and intermittent in nature, occurring only during active demolition works and restricted to permitted working hours.

The use of controlled demolition techniques, combined with appropriate site management practices and stakeholder communication, will further limit potential disturbance. On this basis, vibration effects on nearby receptors are considered to be temporary and not significant. Mitigation measures relating to demolition and construction vibration are outlined in Section 7.1.

6.2.1.3 Demolition Phase Vibration Effects on Luas Infrastructure

The Proposed Development is located within very close proximity to the Luas Red Line, with works occurring within approximately 2 m of the nearest running rail. In accordance with Section 4.4.2.3, a precautionary vibration limit of 5 mm/s Peak Particle Velocity has been adopted, and the requirements of the TII Code of Engineering Practice for Works on, Near or Adjacent to the Luas Light Rail System apply.

The TII Code identifies demolition as an activity with the potential to generate vibration capable of affecting the light railway and requires that such works are subject to approval, monitoring and control under a formal permitting regime. Given the proximity of the works, there is potential for vibration levels during demolition to approach or exceed precautionary criteria in the absence of mitigation.

However, the demolition methodology for the Proposed Development has been designed to minimise vibration at source, including the use of controlled, sequential demolition techniques and restrictions on high-energy activities in proximity to the Luas. These measures are supplemented by a comprehensive programme of monitoring and control.

A summary of the mitigation measures to be implemented, including the application of Best Practicable Means, the restriction of high-vibration activities at sensitive interfaces, and the use of real-time vibration monitoring with a Trigger Action Response system, is provided in Section 7.1 of this assessment.

All works in proximity to the Luas will be undertaken under a Luas Work Safety Permit and in accordance with the requirements of the TII Code, including monitoring, method control, and coordination with the Luas Network Management Centre.

Taking these measures into account, vibration levels at the Luas infrastructure will be actively managed and controlled throughout the demolition phase.

Accordingly, no adverse effects on the integrity or safe operation of the Luas are predicted

6.2.2 Construction Phase Vibration

6.2.2.1 Construction Phase Vibration Effects on Buildings

Construction works will include foundation installation using Continuous Flight Auger piling together with general civil construction activities. CFA piling is a low-vibration technique which relies on rotary drilling rather than impact loading. Empirical data indicates that vibration levels associated with CFA piling are typically in the order of 1–3 mm/s at a distance of approximately 5 m, reducing significantly with increasing distance.

These levels are substantially below the thresholds for cosmetic damage set out in Section 4.4.2.1, including those applicable to sensitive structures. Other construction activities such as excavation, retaining wall construction and general plant operation are expected to generate only minor vibration in comparison.

Accordingly, vibration during the construction phase is not expected to give rise to cosmetic or structural damage to adjacent buildings.

6.2.2.2 Construction Phase Vibration Effects on Human Receptors

Vibration associated with the construction phase is expected to be low in magnitude. In particular, vibration from CFA piling is likely to fall within the barely perceptible to just perceptible range for most receptors, generally below approximately 1 to 2 mm/s.

While such vibration may be detectable in close proximity to the works, it is not expected to result in disturbance or complaint. Construction activities will be temporary in nature and restricted to standard working hours.

On this basis, vibration effects on human receptors during the construction phase are considered negligible to minor and not significant.

6.2.2.3 Construction Phase Effects on Luas Infrastructure

During the construction phase, the potential for vibration effects on the Luas is reduced relative to demolition due to the use of low-vibration construction techniques, including Continuous Flight Auger piling and controlled civil works.

Predicted vibration levels associated with these activities are expected to remain below the precautionary limit of 5 mm/s Peak Particle Velocity and below relevant trigger thresholds.

Notwithstanding the lower inherent vibration potential, construction works within the zone of influence of the Luas will be subject to strict control measures in accordance with the TII Code of Engineering Practice. These measures include the implementation of appropriate construction methodologies, monitoring requirements, and coordination with the Luas operator.

A summary of the mitigation measures to be implemented during the construction phase, including the application of Best Practicable Means, real-time vibration monitoring, and the adoption of a Trigger Action Response system, is provided in Section 7.1 of this assessment.

All works will be undertaken under the Luas Work Safety Permit system, with ongoing coordination through the Network Management Centre and implementation of operational controls where required.

On this basis, vibration effects on the Luas infrastructure will be effectively controlled.

Accordingly, no adverse effects on the integrity or safe operation of the Luas are predicted during the construction phase.

6.3 Operational Phase Noise

6.3.1 Proposed Development Noise Sources

Discussions with the Applicant, together with a review of the available project documentation, have identified the principal sources of sound with the potential to adversely affect the nearest NSLs.

The substation is modelled as a 110kV Gas Insulated Switchgear ('GIS') substation[3], which is a standard design. Typical components of which are listed below:

- GIS building;
- Transformers and associated electrical equipment;

[3] *An Air Insulated Switchgear ('AIS) substation is where the electrical equipment infrastructure is primarily installed outdoors, with the use of natural air as an insulation between circuits*

- Underground ducting/cables;

There are several ways in which noise can be generated from electricity. Transformer hum is the predominant noise generated at electricity substations and is associated with magnetic and electrical forces within the core of an electrical transformer. The transformers noise sources in the Proposed Development are:

- 2 No. 110 kV/MV 31.5 MVA Power Transformers.

Modern transformers are manufactured with a specified and guaranteed emission level. Improvements in the manufacture of transformers have reduced the associated level of noise emission and hence modern transformers are typically quieter than equivalent capacity older transformers.

6.3.2 Preliminary Sound Power Levels

Table 6-4 provides sound power levels, including associated octave band data used in the noise model associated with a typical transformer on a 110kV system.

Table 6-4: Noise Sources and Sound Power Levels used in Noise Models

Item	Hz dB(A)								dB(A)
	63	125	250	500	1000	2000	4000	8000	Sound Power Level
Substation Compound									
No. 110 kV/MV 31.5 MVA Power Transformers	68	72	74	75	72	70	66	62	80

6.3.3 Operational Phase Noise Prediction Methodology

Noise prediction computer software was used to quantify the impact of the Proposed Development. The noise predictions were undertaken using noise prediction software, specifically Bruel and Kjaer's Predictor Software (iNoise V2026). The software calculations are based on ISO 9613-2024, Attenuation of sound propagation outdoors, Part 2, General Method of Calculation. The ISO 9613-2024 model can take account of the following factors that influence sound propagation outdoors:

- Geometric divergence
- Air Absorption
- Reflecting obstacles
- Screening
- Vegetation; and
- Ground reflections

Table 6-5: Noise Model Input

Item	Description
Noise Source Locations	Planning Drawings
House Locations	Aerial Imagery

Item	Description
Acoustic Emission	Estimate
Source Height	Variable (m)
Topography	Contour Data Provided
Ground Factor	0 Note 1
Receptor Height	Varied (1.5m, 4m, 7m, 10m. 13m, 16m, 19m and 22m)
Wind Direction	Downwind
Relative Humidity	70%
Temperature	10ºC
Note 1: Ground Factor is a value between 0 and 1, where represents hard/reflective surfaces and 1, represents soft absorbent surfaces.	

Given the urban nature of the receiving environment and the presence of buildings of varying heights, operational noise predictions have been undertaken at receptor heights of 1.5 m, 4 m, 7 m, 10 m, 13 m, 16 m, 19 m and 22 m above ground level. These assessment heights represent the range of nearby residential receptors, from ground-floor and lower-level dwellings to upper-floor apartments, and allow potential variations in noise exposure with elevation to be appropriately assessed. The inclusion of the 22 m assessment height provides an additional upper-level assessment plane to ensure that potential noise impacts at elevated receptors are fully considered within the model.

6.3.4 Predicted Noise Levels

Noise contours were generated at heights of 1.5 m, 4 m, 7 m, 10 m, 13 m, 16 m, 19 m and 22 m above ground level. As receptor elevations vary throughout the study area, ranging from ground-floor and low-rise properties to upper-floor apartments at Steeven's Court and along James's Street, no single assessment height is representative of all receptors. Multiple assessment heights were therefore considered to account for variations in receptor elevation and the influence of building screening on predicted noise levels.

Predicted noise levels were reviewed across all assessment heights, with the highest predicted level at each noise-sensitive location adopted for assessment purposes. In some instances, the maximum modelled noise level at a given NSL occurs at an assessment height above the receptor elevation due to reduced screening from intervening buildings. The adoption of the maximum predicted level therefore represents a precautionary and conservative worst-case assessment approach, ensuring that potential operational noise impacts are not underestimated.

Predicted operational noise levels at each noise-sensitive location (NSL) for all assessment heights are presented in Table 6-6, while the corresponding noise contour plots are provided in Figure 6-1 to Figure 6-8.

Table 6-6: Predicted Operational Noise at NSLs

NSL	Predicted Operational Noise @ 1.5m	Predicted Operational Noise @ 4m	Predicted Operational Noise @ 7m	Predicted Operational Noise @ 10m	Predicted Operational Noise @ 13m	Predicted Operational Noise @ 16m	Predicted Operational Noise @ 19m	Predicted Operational Noise @ 22m
NSL1	28	30	34	35	36	37	39	38
NSL2	15	16	16	17	21	26	30	30
NSL3	19	21	21	22	24	25	26	27
NSL4	35	36	37	38	39	39	41	42
NSL5	20	21	20	20	22	23	24	25
NSL6	15	16	17	18	19	20	21	24
NSL7	18	20	21	23	25	26	29	30
NSL8	13	13	14	15	15	16	16	17
NSL9	14	14	15	15	16	17	18	18
NSL10	29	30	30	30	30	31	31	31

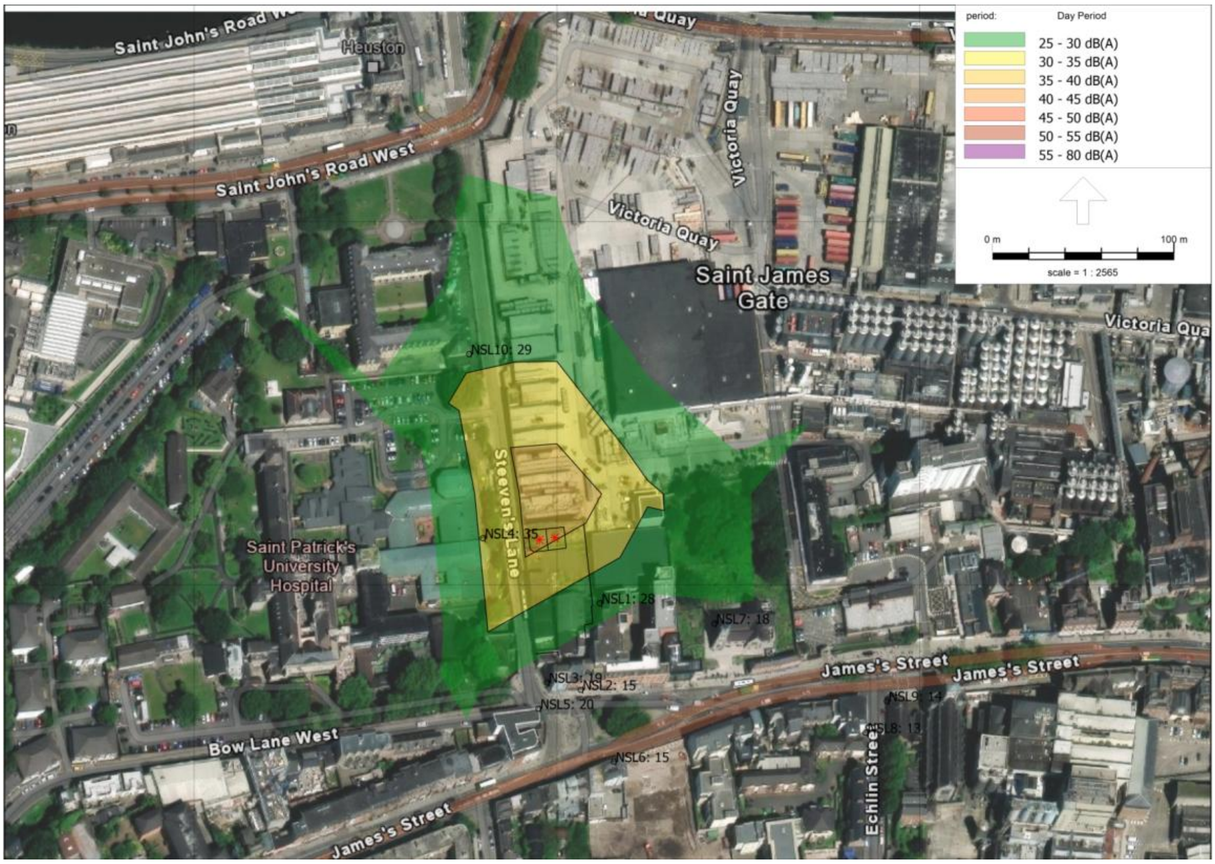

Figure 6-1: Noise Model Contours (1.5m)

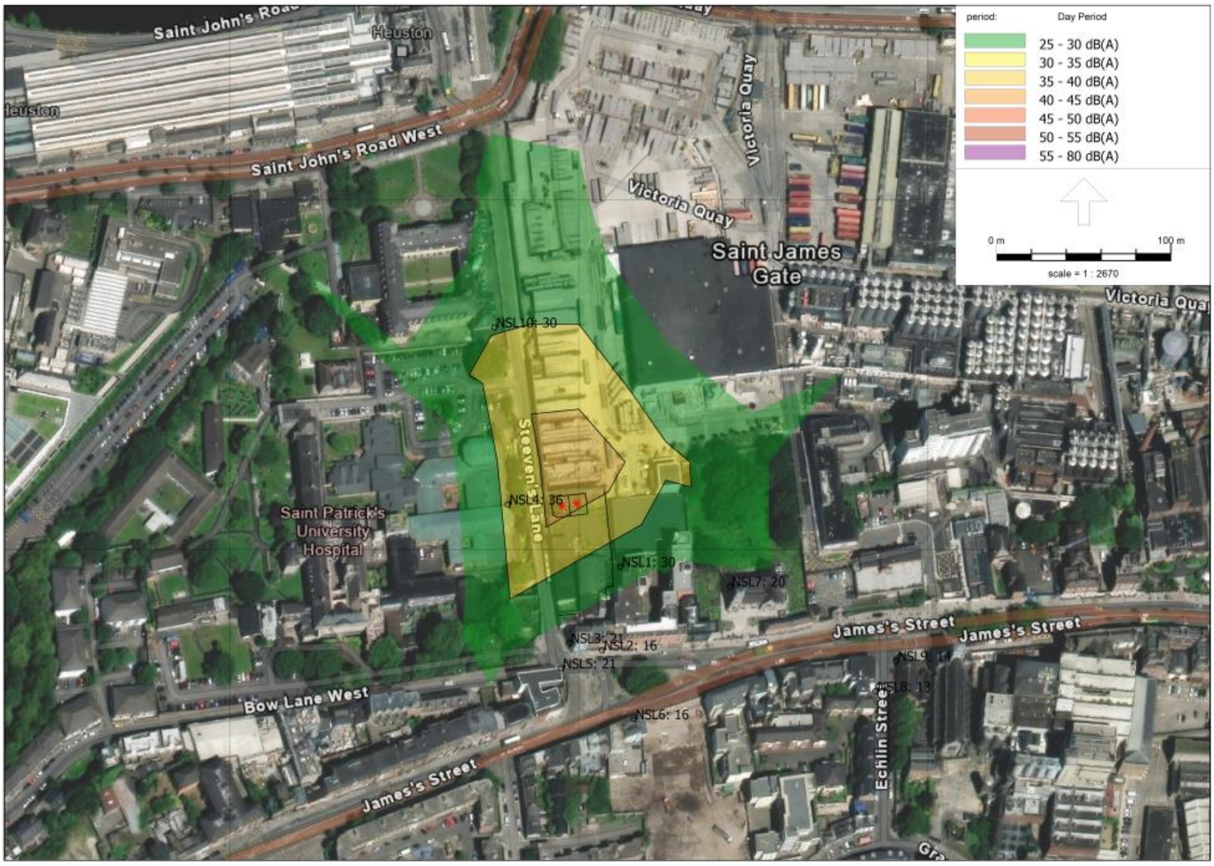

Figure 6-2: Noise Model Contours (4m)

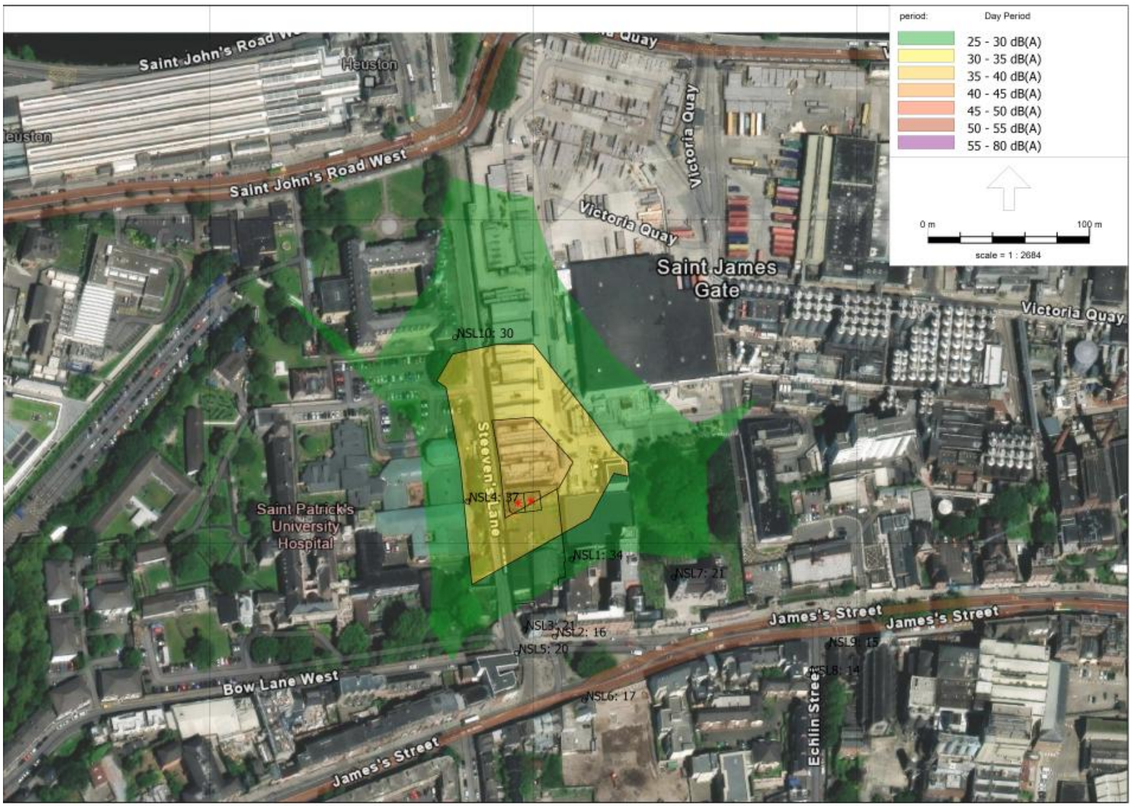

Figure 6-3: Noise Model Contours (7m)

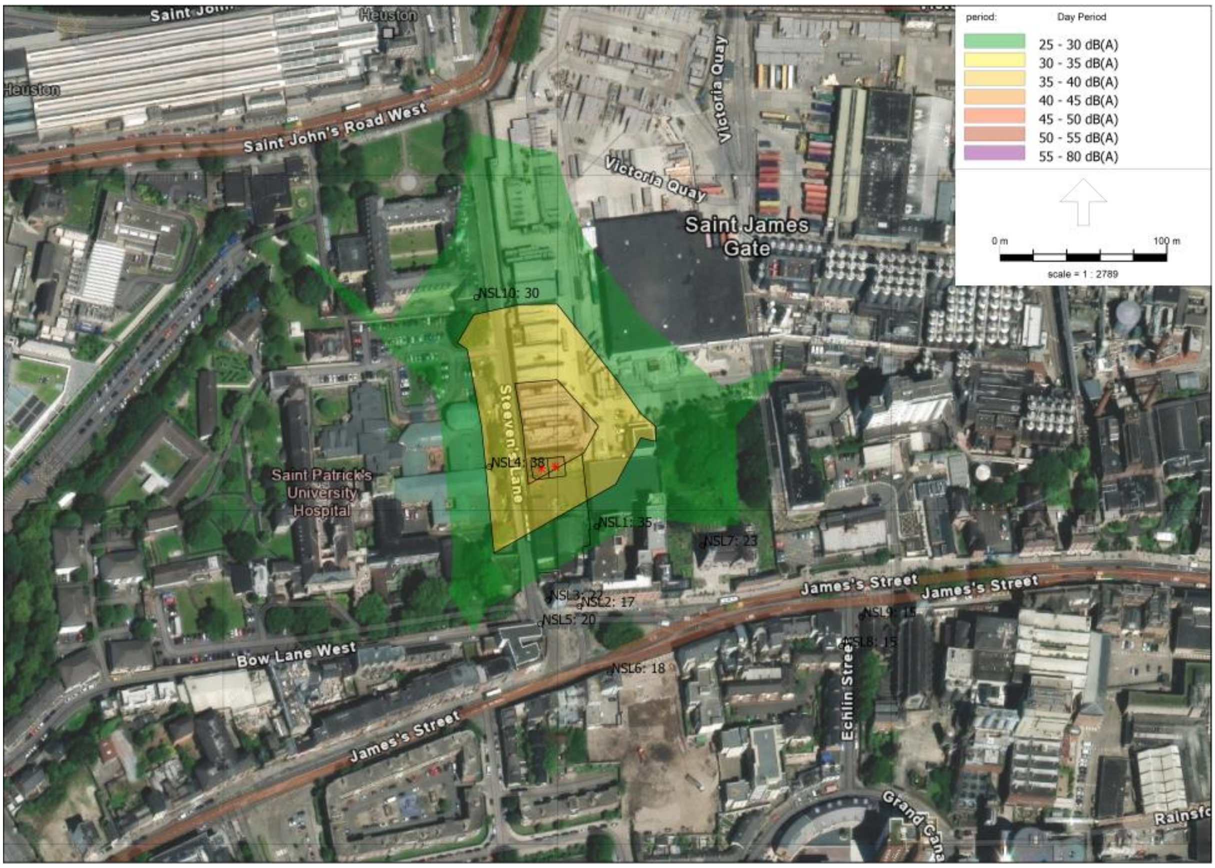

Figure 6-4 Noise Model Contours (10m)

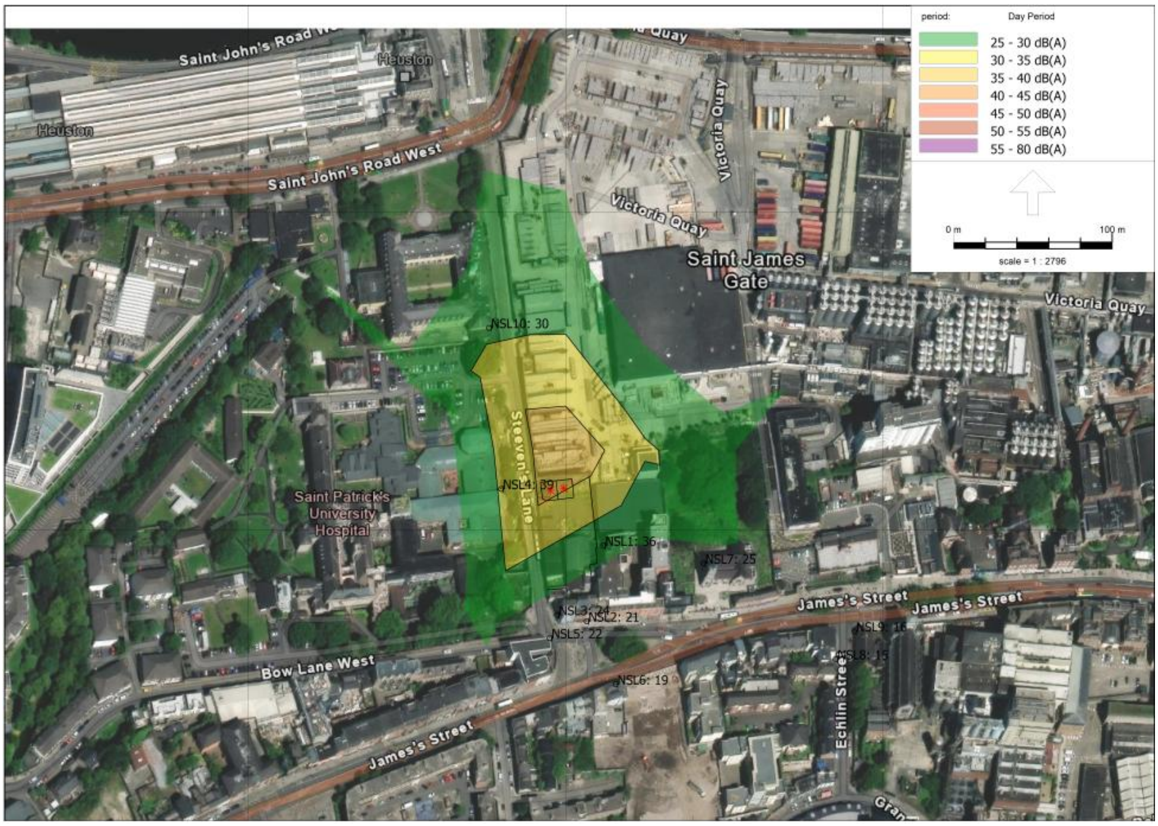

Figure 6-5 Noise Model Contours (13m)

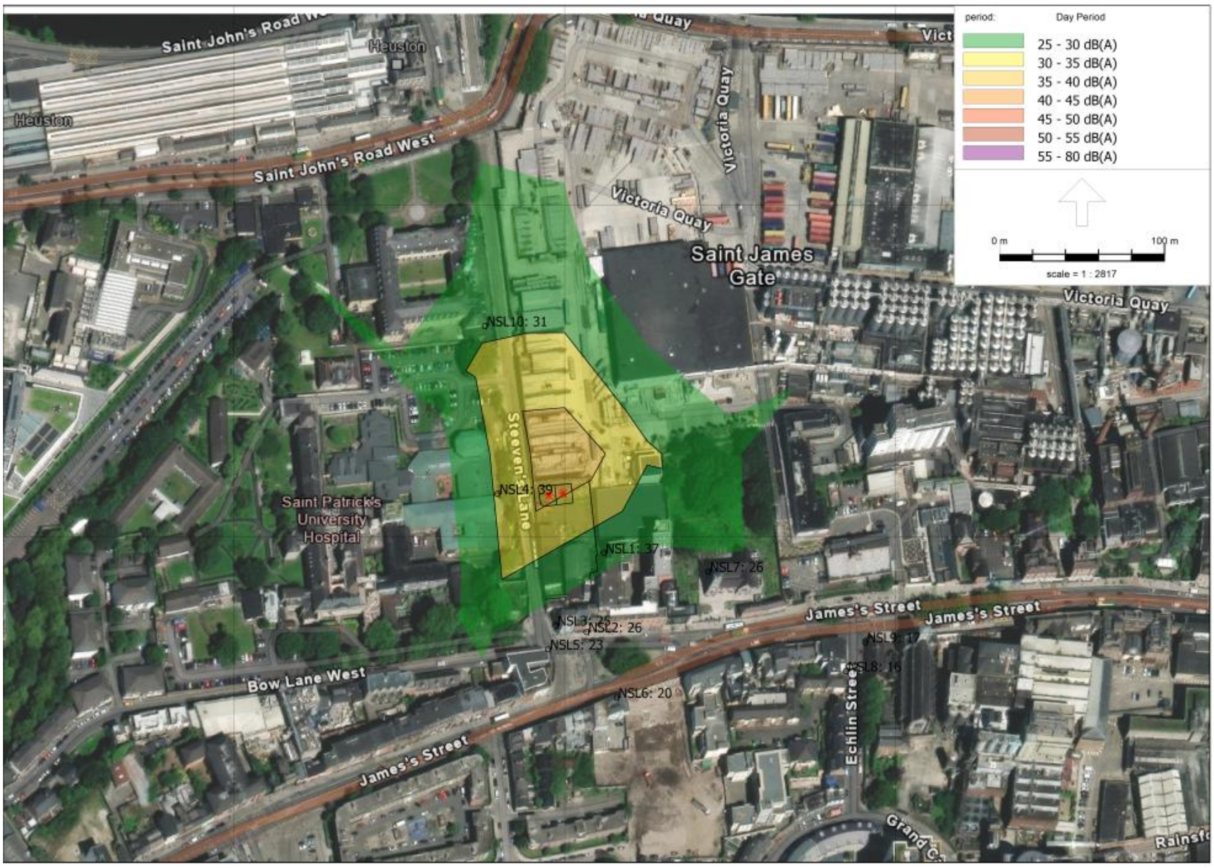

Figure 6-6 Noise Model Contours (16m)

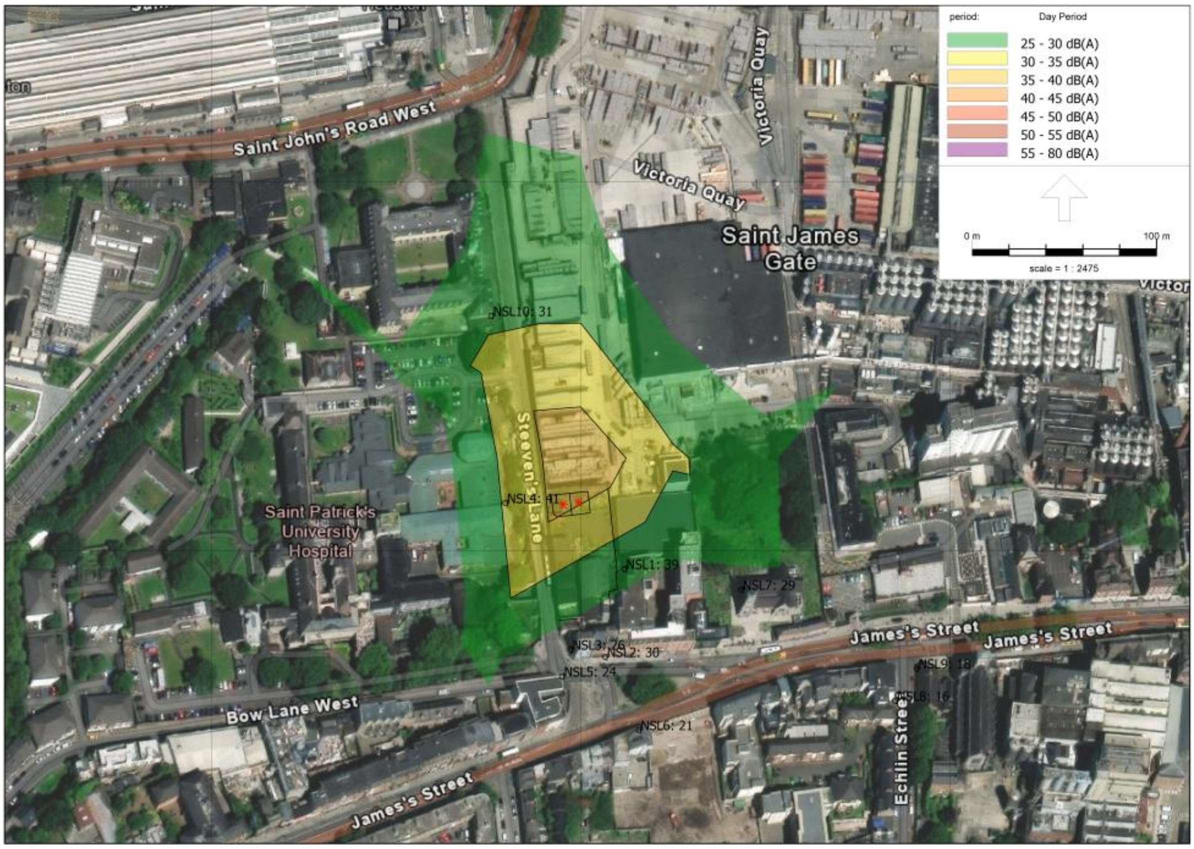

Figure 6-7 Noise Model Contours (19m)

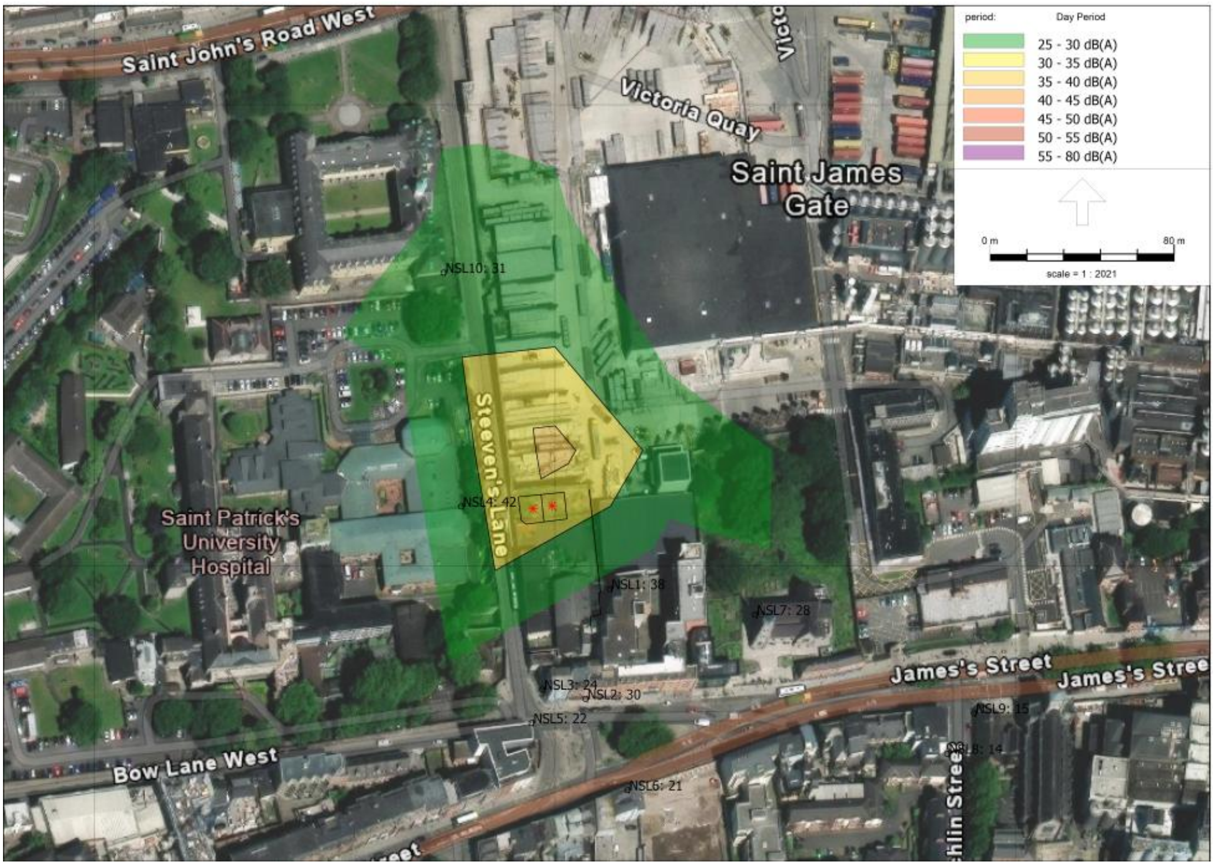

Figure 6-8 Noise Model Contours (22m)

Review of the modelling results indicates that predicted noise levels generally increase with receptor elevation as the screening effects of intervening buildings reduce. Across the study area, the highest modelled noise levels typically occur at the upper assessment heights, with the maximum predicted noise level of 42 dB LAeq,T occurring at the 22m assessment height. Additional model checks undertaken at elevations above 22 m confirmed that noise levels do not increase further. As the majority of identified receptors are located below 22 m, this assessment height is considered to provide a conservative upper-bound assessment of operational noise impacts.

6.3.5 Tonality, Impulsivity and Intermittency

The following extract from the EirGrid Evidence Based Environmental Studies Study 8: Noise Literature review and evidence-based field study on the noise effects of high voltage transmission development (May 2016) states the following in relation to tonality associated with 110kV installations:

'Spectral analysis of the data recorded at this site demonstrated that there were no distinct tonal elements to the recorded noise level'

The operational phase of the proposed substation will consist of continuous noise rather than impulsive noise. Switch operations can cause impulsive audible noise but these are infrequent events and are typically masked by transformer noise. The operation of the Proposed Development does not include any other activity that could create impulsive noise.

Transformer noise is expected to be continuous whenever the substation is operational, with the dominant hum remaining present throughout normal service. While minor variations in sound level may occur due to changes in electrical loading and the operation of cooling equipment, the noise source would not generally be considered intermittent in accordance with BS 4142. Therefore, no intermittency correction is considered applicable.

PIant and equipment shall be maintained to ensure it operates in its normal capacity.

Taking the above into account and given that the predicted operational noise levels are well below baseline noise levels, no tonal, impulsive or intermittent characteristics are expected.

6.3.6 NG4 Operational Noise Assessment

Based on the results of the baseline noise monitoring survey, site-specific operational noise criteria have been derived in accordance with EPA Guidance Note NG4. The adopted criteria are 55 dB LAeq,T for the daytime period, 50 dB LAeq,T for the evening period and 45 dB LAeq,T for the night-time period, reflecting the measured background noise climate at the most representative monitoring location.

The predicted operational noise levels presented in Table 6-7 represent the maximum values derived from the noise model across the assessed receptor heights of 1.5m, 4m, 7m, 10m, 13m, 16m, 19m and 22m above ground level. In some instances, these maximum values occur at assessment heights above the actual receptor elevation and have been adopted as a conservative worst-case representation of potential operational noise exposure. A range of assessment heights was considered to account for varying receptor elevations within the receiving environment, including upper-floor apartments at Steeven's Court and along James's Street. This approach also allows the influence of elevation and building screening on predicted noise levels to be considered and represents a conservative worst-case scenario for each noise-sensitive location (NSL).

Predicted operational noise levels associated with the Proposed Development have been assessed against the NG4-derived criteria at each identified NSL. The calculated noise contributions and corresponding compliance assessment are presented in Table 6-7 and demonstrate that operational noise emissions are predicted to remain within the applicable limits at all assessed receptors.

Accordingly, operational noise associated with the Proposed Development is predicted to comply with the EPA NG4 operational noise criteria at all identified noise-sensitive locations.

Table 6-7 : Maximum Predicted Operational Noise Levels and NG4 Compliance Assessment

NSL	Predicted Operational Noise (dB LAeq,T)	Assessment Period	EPA Noise Limits (dB LAeq,T)			Compliant/Non-Compliant with EPA Noise Limits
			Day	Evening	Night	
NSL1	39	Daytime/Evening/Night-time	55	50	45	Compliant
NSL2	30	Daytime/Evening/Night-time	55	50	45	Compliant
NSL3	27	Daytime/Evening/Night-time	55	50	45	Compliant
NSL4	42	Daytime/Evening/Night-time	55	50	45	Compliant
NSL5	25	Daytime/Evening/Night-time	55	50	45	Compliant
NSL6	24	Daytime/Evening/Night-time	55	50	45	Compliant
NSL7	30	Daytime/Evening/Night-time	55	50	45	Compliant
NSL8	17	Daytime/Evening/Night-time	55	50	45	Compliant
NSL9	18	Daytime/Evening/Night-time	55	50	45	Compliant
NSL10	31	Daytime/Evening/Night-time	55	50	45	Compliant

6.3.7 BS4142 Operational Noise Assessment

In addition to the assessment undertaken in accordance with EPA NG4 guidance, operational noise associated with the Proposed Development has also been considered with reference to the principles set out in BS 4142:2014+A1:2019. BS 4142 compares the rating level (LAr,T), including any applicable tonal or impulsive corrections, with the background sound level (LA90,T) in order to determine the likely significance of effects.

The rating levels presented in Table 6-8 are based on the same conservative approach as described in Section 6.3.6, whereby the highest predicted operational noise level at each NSL, derived from the assessment heights of 1.5m, 4m, 7m, 10m, 13m, 16m, 19m and 22m above ground level, has been adopted. These assessment heights were selected to capture the range of receptor elevations present within the study area, including upper-floor apartments at Steeven's Court and along James's Street. The assessment therefore reflects the worst-case predicted noise exposure at each receptor.

The results of the BS 4142 assessment are presented in Table 6-8 and indicate that the predicted rating levels do not exceed the prevailing background sound levels at any assessed location. For clarity, where the predicted rating level is below the measured background sound level, the reported increase has been presented as 0 dB, indicating no adverse impact. On this basis, the Proposed Development is not expected to give rise to adverse impacts in accordance with BS 4142.

Having regard to the assessment results, the baseline noise environment and the conservative assumptions applied, operational noise associated with the Proposed Development is not expected to result in a discernible increase in ambient noise levels at the identified NSLs.

Table 6-8: BS4142 Assessment

Location	Period	Predicted Rated Noise Levels (dB $L_{Ar,T}$)	Background Noise (dB L_{A90})	Increase dB (Impact)
NSL1	Daytime	39	55	+0 dB (Likely no adverse Impact)
	Evening		46	+0 dB (Likely no adverse Impact)
	Night-time		46	+0 dB (Likely no adverse Impact)
NSL2	Daytime	30	59	0 dB (Likely no adverse Impact)
	Evening		59	0 dB (Likely no adverse Impact)
	Night-time		45	+0 dB (Likely no adverse Impact)
NSL3	Daytime	27	59	0 dB (Likely no adverse Impact)
	Evening		59	0 dB (Likely no adverse Impact)
	Night-time		45	0 dB (Likely no adverse Impact)
NSL4	Daytime	42	52	+0 dB (Likely no adverse Impact)

Location	Period	Predicted Rated Noise Levels (dB $L_{Ar,T}$)	Background Noise (dB L_{A90})	Increase dB (Impact)
	Evening		50	+0 dB (Likely no adverse Impact)
	Night-time		45	+0 dB (Likely no adverse Impact)
NSL5	Daytime	25	59	+0 dB (Likely no adverse Impact)
	Evening		59	+0 dB (Likely no adverse Impact)
	Night-time		45	+0 dB (Likely no adverse Impact)
NSL6	Daytime	24	59	+0 dB (Likely no adverse Impact)
	Evening		59	+0 dB (Likely no adverse Impact)
	Night-time		45	+0 dB (Likely no adverse Impact)
NSL7	Daytime	30	60	+0 dB (Likely no adverse Impact)
	Evening		57	+0 dB (Likely no adverse Impact)
	Night-time		53	+0 dB (Likely no adverse Impact)
NSL8	Daytime	17	60	+0 dB (Likely no adverse Impact)
	Evening		57	+0 dB (Likely no adverse Impact)
	Night-time		53	+0 dB (Likely no adverse Impact)
NSL9	Daytime	18	60	+0 dB (Likely no adverse Impact)
	Evening		57	+0 dB (Likely no adverse Impact)
	Night-time		53	+0 dB (Likely no adverse Impact)
NSL10	Daytime	31	59	+0 dB (Likely no adverse Impact)
	Evening		59	+0 dB (Likely no adverse Impact)

Location	Period	Predicted Rated Noise Levels (dB $L_{Ar,T}$)	Background Noise (dB L_{A90})	Increase dB (Impact)
	Night-time		45	+0 dB (Likely no adverse Impact)

6.4 Operational Phase Vibration

During operation, the substation will comprise predominantly static electrical infrastructure with no significant external moving components. While equipment such as power transformers and associated plant may generate minor vibration due to electromagnetic forces and cooling systems, these vibrations are typically of very low amplitude and are effectively contained within the equipment structure and mounting systems. Such vibration is not perceptible beyond the site boundary and does not result in ground-borne vibration effects. Accordingly, no vibration impacts are anticipated during the operational phase of the development,

6.5 Cumulative Impacts

A summary of other permitted and proposed developments in proximity to the Proposed Development is provided in the Planning and Environmental Considerations Report submitted in support of this application. A review of these developments has been undertaken to identify projects with the greatest potential to give rise to cumulative noise and vibration effects during construction and operation.

On this basis, the following nearby developments are considered to have the most potential to contribute to cumulative noise and vibration impacts:

- Diageo St. James's Gate Decarbonisation and Water Recovery Project, Diageo Ireland **Planning Reference: WEB2472/24**
- Redevelopment of a protected structure and demolition of an existing workshop to facilitate the construction of a seven-storey apartment building comprising 15 residential units, together with all associated site works **Planning Reference: 391223**
- Liffey Valley to City Centre Core Bus Corridor Scheme **Planning Reference: ACP 314056**

These developments have been considered within the cumulative impact assessment due to the nature, scale, and timing of their construction activities and their proximity to the Proposed Development.

6.5.1 Demolition and Construction Phase Noise Cumulative Impacts

6.5.1.1 Diageo St. James's Gate Decarbonisation and Water Recovery Project

NSL1 is located in closest proximity to both the Proposed Development and the St James's Gate Decarbonisation Project and is therefore considered to have the greatest potential for cumulative construction noise effects. However, it is noted that this receptor was not included as a representative noise-sensitive location in the Diageo EIAR and, as such, specific predicted construction noise levels were not provided for this location within that assessment.

NSL3, NSL4 and NSL10 are the nearest noise-sensitive locations potentially affected by both the Proposed Development and the construction and demolition works associated with the St. James's Gate Decarbonisation Project. NSL3 and NSL10 were assessed in the EIAR prepared for the St. James's Gate Decarbonisation Project, in where they are identified as NSR03 and NSR04, respectively. While NSL4 (St Patrick's Hospital) was not explicitly assessed in the Diageo EIAR, the published noise contour plots indicate comparable noise levels at this location and it can therefore be reasonably assumed to experience a similar level of noise exposure.

At NSL10 (Dr Steevens' Hospital), the highest predicted construction noise level associated with the St. James's Gate Decarbonisation Project is 67 dB LAeq,T. Construction noise arising from the Proposed Development is predicted to be approximately 62 dB LAeq,T at this location. When assessed cumulatively, the combined construction noise level is predicted to be approximately 68 dB LAeq,T, which remains below the adopted construction noise threshold of 75 dB LAeq,T.

At NSL4 (St Patrick's Hospital), construction noise levels associated with the Proposed Development are predicted to approach or equal the adopted construction noise threshold of 75 dB LAeq,T. The highest predicted construction noise level associated with the St. James's Gate Decarbonisation Project is approximately 67 dB LAeq,T. Consequently, the combined construction noise level could increase to approximately 76 dB LAeq,T during periods of overlapping peak construction activity, representing a marginal increase of approximately 1 dB above the level associated with the Proposed Development in isolation. In addition, NSL4 benefits from acoustic screening provided by the existing boundary wall. Given the logarithmic nature of sound addition, any increase attributable to cumulative effects is expected to be limited and temporary.

At NSL3, the highest predicted construction noise level associated with the St. James's Gate Decarbonisation Project is 65 dB LAeq,T, while construction noise arising from the Proposed Development is predicted to exceed 75 dB LAeq,T in the absence of mitigation . The resultant cumulative construction noise level is therefore predicted to temporarily exceed the adopted construction noise threshold of 75 dB LAeq,T at this location.

As construction noise levels were not explicitly predicted at NSL1 within the Diageo EIAR, a conservative construction noise level of 67 dB LAeq,T has been assumed for the St. James's Gate Decarbonisation Project at this location, based on the highest construction noise level reported for the assessed receptors. This represents a robust worst-case assumption, noting that actual noise levels at NSL1 are likely to be lower, particularly following implementation of the mitigation measures set out in the Diageo EIAR. Given the close proximity of NSL1 to the Proposed Development, cumulative construction noise levels may, in the absence of mitigation, approach or temporarily exceed the adopted residential construction noise threshold of 70 dB LAeq,T during periods of concurrent high-noise construction activity.

Both developments will implement Best Practicable Means (BPM) to control construction noise, including the use of appropriately silenced plant and equipment, acoustic screening where practicable, and site-specific noise management measures, as outlined in Section 7.1. In addition, coordination between the respective construction programmes will be undertaken, where practicable, to minimise the potential for simultaneous high-noise construction activities. The implementation of these measures is expected to reduce construction noise levels at the nearest receptors and minimise the duration and extent of any potential exceedances.

Overall, cumulative construction noise levels at NSL10 are predicted to remain below the applicable construction noise criterion. While unmitigated worst-case cumulative construction noise levels at NSL1, NSL3 and NSL4 could approach or temporarily exceed the relevant construction noise criteria during periods of overlapping peak construction activity, both developments will implement Best Practicable Means (BPM) and site-specific noise mitigation measures. In addition, coordination between the respective construction programmes will be undertaken, where practicable, to minimise the occurrence of simultaneous high-noise construction activities.

Taking account of these mitigation and management measures, cumulative construction noise levels are expected to be effectively controlled such that the adopted construction noise criteria are not exceeded at nearby noise-sensitive receptors. Any residual cumulative construction noise effects are therefore expected to be temporary and not significant. Consequently, significant cumulative construction noise effects are not anticipated.

6.5.1.2 134 James's Street seven-storey apartment development

Construction works associated with the Proposed Development have the potential to interact cumulatively with the permitted seven-storey residential development at 134 James's Street (Planning Reference: 319034), due to the close proximity of the two sites.

While a standalone construction noise assessment was not undertaken for that permitted development, the Preliminary Construction and Environmental Management Plan indicates that the site is constrained, such that the use of large demolition plant is not practicable. Demolition activities are expected to be relatively low intensity, comprising primarily the use of handheld tools. The buildings to be demolished are predominantly constructed of brick, timber and steel, and significant breaking out of reinforced concrete or other high-noise activities is not anticipated.

Foundation works are proposed to utilise auger piling techniques, which are generally associated with lower noise emissions compared to alternative piling methods. The Preliminary Construction and Environmental Management Plan further states that construction noise levels at nearby noise sensitive receptors are expected to remain below the threshold limits set out in BS 5228 and are therefore not considered significant.

Although the Proposed Development may generate higher temporary noise levels during certain demolition activities, these phases are temporary in nature and will be subject to standard best practice mitigation measures. Given the relatively low noise generating potential of the permitted development, the expected compliance with BS 5228 threshold levels, and the application of mitigation measures for both developments, any overlap in construction activities is unlikely to result in a material increase in overall noise levels at nearby receptors.

Accordingly, while some degree of cumulative interaction may occur due to the proximity of the sites, the resulting cumulative noise impact is not considered to be significant.

6.5.1.3 Liffey Valley to City Centre Core Bus Corridor Scheme

A noise assessment was undertaken as part of the Liffey Valley to City Centre Core Bus Corridor Scheme EIAR, which predicted construction noise levels of up to approximately 73 dB LAeq,T at locations, with mitigation in place. The closest construction works from that scheme to the Proposed Development will occur at James's Street, situated approximately 50 m from the proposed construction and demolition works.

Taking account of both the Proposed Development and the Bus Corridor Scheme, cumulative construction noise levels are estimated to be in the order of 74 dB LAeq,T which is below the adopted construction noise threshold limit of 74 dB LAeq,T.

The Bus Corridor Scheme EIAR identifies a range of standard construction noise mitigation measures, including the selection of low-noise plant, control and management of noise sources, use of screening where practicable, restriction of working hours, community liaison, and noise monitoring. These measures will contribute to the attenuation of construction noise and further reduce the potential for cumulative impacts.

6.5.2 Operational Phase Noise Cumulative Impacts

6.5.2.1 Diageo St Jame's Gate Decarbonisation and Water Recovery Project

Operational noise prediction data for the St. James's Gate Decarbonisation and Water Recovery Project is available in the Diageo EIAR for NSL3 (identified as NSR03 in the Diageo EIAR) as well as NSL10 (identified as NSR04 in the Diageo EIAR). These locations have therefore been used as common reference points for the assessment of cumulative impacts between the two developments.

Operational noise associated with the Diageo development is predicted to result in levels of 31 dB LAeq,T at NSL3 and 40 dB LAeq,T at NSL10. The highest corresponding operational noise contribution from the Proposed Development is predicted to be 27 dB LAeq,T at NSL3 and 31 dB LAeq,T at NSL10.

When assessed cumulatively, combined operational noise levels at these locations are predicted to be approximately 33 dB LAeq,T at NSL3 and 41 dB LAeq,T at NSL10. These levels remain comfortably below the adopted night-time operational noise criterion of 45 dB LAeq,T.

The most exposed receptor to the Proposed Development is NSL1. Although NSL4 is located closer to the Proposed Development, it is situated at a lower elevation and benefits from greater screening provided by surrounding firewalls enclosing the transformer compound. Consequently, higher operational noise levels are predicted at NSL1, where the highest predicted operational noise level is 39 dB LAeq,T.

While NSL1 was not explicitly assessed in the Diageo EIAR, operational noise levels reported for the wider study area do not exceed 40 dB LAeq,T. Accordingly, a conservative operational noise level of 40 dB LAeq,T has been adopted to represent the potential contribution from the permitted Diageo development.

Combining the predicted operational noise level from the Proposed Development with the assumed Diageo contribution results in a cumulative operational noise level of approximately 43 dB LAeq,T. This remains below the adopted operational noise criterion of 45 dB LAeq,T and is therefore considered acceptable.

Accordingly, no significant cumulative operational noise effects are predicted at the assessed noise-sensitive locations.

6.5.2.2 134 James's Street seven-storey apartment development

The permitted seven-storey apartment development at 134 James's Street (Planning Reference: 319034) is primarily residential in nature and is not expected to generate appreciable operational noise emissions. As such, it is not anticipated to contribute to cumulative operational noise impacts in the area.

6.5.2.3 Liffey Valley to City Centre Core Bus Corridor Scheme

The primary noise impact associated with the Bus Corridor Scheme relates to changes in traffic flows. The Proposed Development is not expected to result in any significant increase in traffic volumes, as only a limited number of personnel will attend the substation on an infrequent basis for routine maintenance.

Accordingly, the Proposed Development is not anticipated to contribute to cumulative traffic-related noise impacts, and no significant cumulative operational effects are predicted.

6.5.3 Demolition and Construction Phase Vibration Cumulative Impacts

Potential cumulative vibration impacts associated with the Proposed Development have been considered in combination with the St James's Gate Decarbonisation and Water Recovery Project (Planning Reference: WEB2472/24), the permitted development at 134 James's Street (Planning Reference: 319034), and the Liffey Valley to City Centre Core Bus Corridor Scheme (Planning Reference: ACP 314056).

Construction and demolition activities associated with these developments have the potential to generate vibration, particularly during ground-breaking and breaking operations. However, such activities are inherently temporary, localised, and intermittent in nature.

All developments will be required to implement established best practice vibration control measures, typically in accordance with BS 5228-2, including the use of appropriate plant and methodologies, control of high-vibration activities, maintenance of buffer distances where practicable, and the implementation of vibration monitoring with corrective actions where necessary.

Given the separation distances between works areas, the temporary nature of the most vibration-intensive activities, and the application of standard mitigation and monitoring measures across all developments, the potential for cumulative vibration effects is considered to be low.

Accordingly, significant cumulative construction and demolition vibration impacts are not predicted.

6.5.4 Operational Phase Vibration Cumulative Impacts

There is no significant vibration expected during the operational phase of the Proposed Development or from adjoining developments. No operational phase cumulative impacts are therefore predicted.

7. Mitigation Measures

7.1 Demolition and Construction Phase Noise and Vibration Mitigation

A range of mitigation measures will be implemented during the demolition and construction phases to control noise and vibration at source and to minimise potential impacts at nearby noise sensitive locations (NSLs). These measures are based on the principles of Best Practicable Means (BPM) and are aligned with BS 5228-1:2009+A1:2014, BS 5228-2:2009+A1:2014, and the Dublin City Council (DCC) Good Practice Guide for Construction and Demolition.

Mitigation measures have been sourced also from the MWP Demolition and Construction Methodology Plan, submitted with this application:

The primary mitigation measures include:

- Selection of quiet plant and equipment
- Noise control at source
- Use of screening and site hoarding
- Programming and control of working hours
- Noise and vibration monitoring with a Trigger Action Response system
- Ongoing liaison with the public and stakeholders

7.1.1 Standards, Local Requirements & Working Hours

All construction and demolition activities will be planned, managed, and monitored in accordance with:

- BS 5228-1 (Noise) and BS 5228-2 (Vibration)
- Dublin City Council Good Practice Guide for Construction and Demolition
- EPA NG4 guidance, where applicable
- MWP Demolition and Construction Methodology Plan

Any works within the Luas environment will be subject to the Luas Work Safety Permit system and coordinated with the Network Management Centre.

Any activity within the Luas light rail environment requires a Luas Work Safety Permit (method statement, risk assessment, insurance) and coordination with the Network Management Centre; high-impact tasks may need occupation/possession windows.

Standard working hours will be:

- Monday to Friday: 07:00 to 18:00
- Saturday: 08:00 to 14:00

It may be necessary for some construction operations to be undertaken outside these times. Out of hours works may include activities such as concrete pouring, underground cable installation, trenching and ducting within the public roads, where extended or restricted working hours may be required to minimise disruption to traffic and surrounding buildings. In these circumstances, works outside the above hours will only be undertaken with prior agreement with DCC. In addition, abnormal load deliveries for the electrical equipment will have to be outside of these hours.

7.1.2 Selection of Quiet Plant

Prior to mobilisation, all plant and equipment will be assessed to ensure the lowest practicable noise emissions are achieved.

- Plant with low sound power levels and built-in attenuation will be selected where practicable
- Where quieter alternatives exist, these will be prioritised
- Noisy or defective plant will be repaired, modified, or replaced
- Mitigation by design:
    - CFA piling in place of driven piling
    - Piecemeal demolition techniques

7.1.3 Noise Control at Source

The following measures will be implemented to reduce noise emissions at source:

- Mobile plant (excavators, dumpers, cranes):
    - Equipped with appropriate silencers
    - Engine covers kept closed during operation
    - Switched off when not in use
- Percussive tools:
    - Fitted with noise-reducing attachments
    - Maintained to prevent air leaks
- Fixed plant (generators, compressors, pumps):
    - Located away from NSLs where practicable
    - Enclosed within acoustic housings or lagging
- Materials handling:
    - Avoid dropping materials from height

  - Use lined chutes and dampened surfaces
  - Reduce impact noise from loading/unloading
- General measures:
  - Routine maintenance to prevent excessive noise
  - Use of broadband reversing alarms

7.1.4 Screening and Site Hoarding

Screening will be utilised to reduce noise propagation to nearby receptors.

- Perimeter hoarding (typically 2.4 m to 3.0 m high) will be installed around the site boundary. On the western side of the site, enhanced hoarding extending approximately 1.2 m above the demolition line will be provided to prevent debris from coming into contact with the adjacent Luas infrastructure.
- Hoarding will be constructed of solid materials with sufficient mass (≥7 kg/m²) to provide effective sound attenuation
- Enhanced or lined hoarding will be used where required in close proximity to NSLs
- Localised acoustic screens or hoarded enclosures may be positioned around high-noise activities such as:
  - Piling rigs
  - Breaking operations
  - Excavation works
- Properly positioned hoarding and local screening can achieve noise reductions of up to 10 dB(A)
- Site layout will be optimised to position plant away from NSLs

7.1.5 Programming and Construction Management

- High-noise activities will be undertaken during daytime periods only
- Activities will be sequenced to reduce overlapping noise sources where practicable
- Works near the Luas interface will be coordinated within approved working windows

7.1.6 Monitoring and Trigger Action Response (TAR)

A programme of noise and vibration monitoring will be implemented throughout the demolition and construction phases to verify predicted levels and ensure compliance with agreed limits at nearby noise sensitive locations (NSLs). Noise monitoring will be undertaken using Class 1 sound level meters positioned at representative boundary and receptor locations. Measurements will be logged continuously, typically in 15-minute and hourly periods, with key parameters including LAeq and LAmax recorded. Monitoring systems will incorporate real-time alert functionality to notify site management in the event of exceedances of predefined trigger levels.

Vibration monitoring will also be conducted at the nearest sensitive structures and along the Luas interface, using triaxial geophones to measure Peak Particle Velocity (PPV). Trigger levels will be established with reference to BS 7385-2, taking into account the type, condition, and proximity of surrounding structures. A two-stage Trigger Action Response system will be implemented, comprising an Alert Level and an Action Level. Exceedance of the Alert Level will prompt a review of working methods, plant, and site operations, with increased supervision and control measures introduced. Exceedance of the Action Level will require the immediate cessation of works, followed by investigation and implementation of revised methodologies before works recommence.

Monitoring data will be subject to regular review and, where requested, compiled into periodic reports for submission to Dublin City Council. Such report will include details of monitoring locations, recorded levels, any exceedances, and corrective actions undertaken. A record of all monitoring and site responses will be maintained and made available for inspection as required.

7.1.7 Community and Stakeholder Liaison

A structured approach to community and stakeholder engagement will be maintained throughout the demolition and construction phases to ensure effective communication and prompt response to any concerns arising from the works. A designated Community Liaison Officer (CLO) will be appointed by the Contractor and will act as the primary point of contact for local residents, businesses, and other stakeholders.

Advance notification will be provided to nearby noise sensitive receptors in relation to particularly noisy activities, including details of the nature, timing, and expected duration of such works. A 24/7 contact number will be clearly displayed on site hoarding, allowing members of the public to raise any concerns or complaints, which will be logged, investigated, and responded to in a timely manner. A record of all communications and actions taken will be maintained.

Ongoing coordination will also be undertaken with key stakeholders, including Dublin City Council and the Luas Network Management Centre, particularly for works occurring in proximity to the light rail infrastructure. Any incidents, exceedances, or changes to the planned works that may affect adjacent infrastructure or the public will be communicated promptly in accordance with agreed procedures. Engagement will also be maintained with adjacent land users, including Diageo operations, to ensure that construction activities are coordinated and potential impacts are effectively managed.

7.2 Operational Phase Noise Mitigation

The sound power levels used for this assessment are based on information provided by a potential plant and equipment supplier and can be considered representative. The final selection will be determined through the procurement process. The chosen supplier must demonstrate, prior to installation, that the noise emissions from the Proposed Development do not exceed the allowable noise limit criteria.

No mitigation measures are required above those inherent to the design.

7.3 Operational Phase Vibration Mitigation

No significant effects from vibration are predicted during the operational phase of the Proposed Development and therefore no mitigation measures are required.

8. Conclusion

This Noise and Vibration Impact Assessment has been undertaken to evaluate the potential effects associated with the demolition, construction, and operational phases of the proposed 110 kV GIS substation development in Dublin 8, with particular consideration given to the nearest identified noise sensitive locations (NSLs).

The assessment has been carried out in accordance with recognised national and international guidance, including BS 5228, BS 4142, and EPA Guidance Note NG4, and is informed by site-specific baseline noise monitoring, strategic noise mapping, and historic noise data. The results confirm that the receiving environment is characterised by an established, transport-dominated urban noise climate, with relatively high and consistent ambient and background noise levels arising primarily from road traffic, Luas operations, and surrounding commercial activity.

During the demolition and construction phases, temporary increases in noise levels are anticipated, particularly at the closest receptors located within approximately 5 m of the site boundary. Predicted noise levels indicate that, while certain short-duration activities such as demolition and piling may approach or marginally exceed the adopted daytime construction noise thresholds, these effects will be intermittent, localised, and limited in duration. With the implementation of Best Practicable Means, including careful selection of plant, acoustic screening, programming of works, and real-time noise monitoring with a Trigger Action Response system, demolition and construction noise levels are expected to be effectively controlled. As such, demolition and construction noise impacts are considered temporary and not significant.

Construction and demolition phase vibration has also been assessed. Owing to the adoption of low-vibration construction techniques, including controlled top-down demolition and Continuous Flight Auger piling, vibration levels are expected to remain well below thresholds associated with cosmetic or structural damage. While vibration may be perceptible at nearby receptors during certain activities, these effects will be short-term and intermittent. A precautionary approach has been adopted for the protection of the adjacent Luas infrastructure, including the application of conservative vibration limits and implementation of monitoring and control measures, ensuring no adverse effects on railway operations or infrastructure integrity.

During the operational phase, the principal noise source will be continuous transformer hum from the substation compound. Noise modelling indicates that predicted operational noise levels at all assessed NSLs are significantly below both the baseline background noise levels and the applicable criteria derived in accordance with EPA NG4 guidance. Assessment in accordance with BS 4142 further confirms that operational noise levels are below background levels and are therefore unlikely to give rise to adverse impacts. No significant tonal or impulsive characteristics are expected to alter this conclusion. Operational vibration effects are predicted to be negligible and are not expected to extend beyond the site boundary.

A review of cumulative impacts has also been undertaken, considering nearby permitted and proposed developments. The assessment concludes that, with standard mitigation measures in place, cumulative noise and vibration effects during both construction and operational phases will not be significant.

In summary, the Proposed Development has been designed and assessed in line with current best practice to ensure that noise and vibration effects are appropriately managed. Subject to the implementation of the mitigation measures outlined in this report, the development is not expected to give rise to significant adverse noise or vibration impacts and is considered acceptable from a noise and vibration perspective.

9. References

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Dublin City Council (n.d.). *Good Practice Guide for Construction and Demolition*. Dublin: Dublin City Council.

Appendix A

Noise Monitoring Photos

NML1

NML2

NML3

NML4

Appendix B

Equipment Calibration Certificates

HBK HOTTINGER BRÜEL & KJÆR

The Calibration Laboratory
Teknikerbyen 28, DK-2830 Virum, Denmark

ilac-MRA

DANAK
CAL Reg.No. 307
Member of EA MLA

CERTIFICATE OF CALIBRATION

No: CDK2404116 Page 1 of 6

CALIBRATION OF

Calibrator:	Brüel & Kjær Type 4231	No: 2665058 Id: -
Acoustical Adaptor:	Brüel & Kjær Type UC-0210 (1/2" Adaptor)	
Pattern Approval:	None	

CUSTOMER

Malachy Walsh & Partners
Reen Point, Blennerville, Tralee
Co.Kerry
Ireland

CALIBRATION CONDITIONS

Preconditioning: 4 hours at 23°C ± 3°C
Environment conditions: *See actual values in* ***Environmental conditions*** *section.*

SPECIFICATIONS

The Calibrator Brüel & Kjær Type 4231 has been calibrated in accordance with the requirements as specified in IEC 60942:2017 Annex B - Microphone method. The accreditation assures the traceability to the international units system SI.

PROCEDURE

The measurements have been performed with the assistance of Brüel & Kjær Calibrator Calibration System 3630 with application software type 7763 (version 8.6 - DB: 8.60) by using procedure P_4231_4180_M_LS_A01.

RESULTS

Calibration Mode: **Calibration as received.**

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device(s) under calibration. The results are only applicable for the specific device(s) listed above.

Date of calibration: 2024-06-25 Date of issue: 2024-06-25

Sylvia Wu

Sylvia Wu Andersen
Calibration Technician

Erik Bruus
Approved Signatory

HBK HOTTINGER BRÜEL & KJÆR
The Calibration Laboratory
Teknikerbyen 28, DK-2830 Virum, Denmark

ilac-MRA DANAK
CAL Reg.No. 307
Member of EA MLA

CERTIFICATE OF CALIBRATION

No: CDK2404173 Page 1 of 12

CALIBRATION OF

Sound Level Meter:	Brüel & Kjær Type 2255	No: 2255-100272 Id: -	
Microphone:	Brüel & Kjær Type 4966	No: 3403404	
PreAmplifier:	Brüel & Kjær Type ZC-0043	No: 3399257	
Calibrator:	Brüel & Kjær Type 4231	No: 2665058	
Software version:	FW-2255-000 Version 1.2.0.1325	Pattern Approval:	LNELNE-38713 rev. 0
Instruction manual:	BE1917-11		

CUSTOMER

Malachy Walsh & Partners
Malachy Walsh & Partners
Lisgoold North
Leamlara
T56 E195 Co.Cork
Ireland

CALIBRATION CONDITIONS

Preconditioning: 4 hours at 23°C ± 3°C
Environment conditions: *See actual values in **Environmental conditions** sections.*

SPECIFICATIONS

The Sound Level Meter Brüel & Kjær Type 2255 has been calibrated in accordance with the requirements as specified in IEC 61672-1:2013 class 1. Procedures from IEC 61672-3:2013 were used to perform the periodic tests. The accreditation assures the traceability to the international units system SI.

PROCEDURE

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System 3630 with application software type 7763 (version 9.1 - DB: 9.10) by using procedure B&K proc 2255-E, 4966 (IEC 61672:2013).

RESULTS

Calibration Mode: **Initial calibration.**

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device(s) under calibration. The results are only applicable for the specific device(s) listed above.

Date of calibration: 2024-06-26 Date of issue: 2024-06-26

Jeannie Nielsen
Jeannie Gerd Nielsen
Calibration Technician

J.B.Vedel
Jesper Bo Vedel
Approved Signatory

NSAI
National Metrology Laboratory

Certificate of Calibration

Issued to	Malachy Walsh & Partners Park House Bessboro Road Blackrock Co. Cork

Certificate Number	**25-7221**
Item Calibrated	Larson Davis CAL200 Sound Level Calibrator
Serial Number	11262
ID Number	None
Order Number	33443
Date Received	12 Jun 2025
NML Procedure Number	TFAP-NM-11 Rev 1.5
Method	The above calibrator was allowed to stabilize for a suitable period in laboratory conditions. It was then calibrated by measuring the sound pressure level generated in its measuring cavity (half-inch configuration). The calibrator's operating frequency was also measured.
Calibration Standards	Norsonic 1504A Calibration System incorporating: Agilent 34401A, No. 0736 (Cal. Due Date: 25 Mar 2026) B&K 4180, No. 1069 (Cal. Due Date: 15 Sep 2025) B&K 4228, No. 0741 (Cal. Due Date: 14 Sep 2025)

Calibrated by	David Fleming	Approved by	Dubhaltach MacLochlainn
Date of Calibration	12 Jun 2025	Date of Issue	18 Jun 2025

CIPM MRA

This certificate is consistent with Calibration and Measurement Capabilities (CMCs) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures (CIPM). Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)

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Page 1 of 4

NSAI
National Metrology Laboratory

Certificate of Calibration

Issued to	Malachy Walsh & Partners Reen Point Blennerville Tralee Co. Kerry

Certificate Number	242183
Item Calibrated	Larson Davis Sound Level Meter with PCB PCB377B02 Microphone
Serial Number	0003826 (SLM) and 150020 (Microphone)
ID Number	None
Order Number	30892
Date Received	09 May 2024
NML Procedure Number	TFAP-NM-16
Method	The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters.* This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).
Calibration Standards	Norsonic 1504A Calibration System incorporating: SR DS360 Signal Generator, No. 0735 [Cal Due Date: 01 Sep 2024] Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 01 Sep 2024] B&K 4180 Measuring Microphone, No. 1069 [Cal Due Date: 15 Sep 2025] B&K 4228 Pistonphone, No. 0741 [Cal Due Date: 14 Sep 2025] B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 04 Jan 2025]

Calibrated by	David Fleming	Approved by	Paul Hetherington
Date of Calibration	11 Jun 2024	Date of Issue	11 Jun 2024

CIPM MRA

This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)

NSAI

National Metrology Laboratory

Certificate of Calibration

Issued to	Malachy Walsh & Partners Reen Point Blennerville Tralee Co. Kerry

Certificate Number	242183
Item Calibrated	Larson Davis Sound Level Meter with PCB PCB377B02 Microphone
Serial Number	0003826 (SLM) and 150020 (Microphone)
ID Number	None
Order Number	30892
Date Received	09 May 2024
NML Procedure Number	TFAP-NM-16
Method	The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters*. This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).
Calibration Standards	Norsonic 1504A Calibration System incorporating: SR DS360 Signal Generator, No. 0735 [Cal Due Date: 01 Sep 2024] Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 01 Sep 2024] B&K 4180 Measuring Microphone, No. 1069 [Cal Due Date: 15 Sep 2025] B&K 4228 Pistonphone, No. 0741 [Cal Due Date: 14 Sep 2025] B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 04 Jan 2025]

Calibrated by	David Fleming	Approved by	Paul Hetherington
Date of Calibration	11 Jun 2024	Date of Issue	11 Jun 2024

CIPM MRA

This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)

Appendix C

Glossary of Noise Related Terminology

Terminology	Description
A-weighting	A filter that down-weights low frequency and high frequency sound to better represent the frequency response of the human ear when assessing the likely effects of noise on humans
Acoustic character	One or more distinctive features of a sound (e.g. tones, whines, whistles, impulses) that set it apart from the background noise against which it is being judged, possibly leading to a greater subjective effect than the level of the sound alone might suggest
Acoustic screening	The presence of a solid barrier (natural landform or manmade) between a source of sound and a receiver that interrupts the direct line of sight between the two, thus reducing the sound level at the receiver compared to that in the absence of the barrier
Ambient noise	All-encompassing noise associated with a given environment, usually a composite of sounds from many sources both far and near, often with no particular sound being dominant
Annoyance	A feeling of displeasure in this case evoked by noise
Attenuation	The reduction in level of a sound between the source and a receiver due to any combination of effects including: distance, atmospheric absorption, acoustic screening, the presence of a building façade, etc.
Audio frequency	Any frequency of a sound wave that lies within the frequency limits of audibility of a healthy human ear, generally accepted as being from 20 Hz to 20,000 Hz
Background noise	The noise level rarely fallen below in any given location over any given time period, often classed according to day-time, evening or night-time periods (for the majority of the population of the UK the lower limiting noise level is usually controlled by noise emanating from distant road, rail or air traffic)
dB	Abbreviation for 'decibel'
dB(A)	Abbreviation for the decibel level of a sound that has been A-weighted
Decibel	The unit normally employed to measure the magnitude of sound
Directivity	The property of a sound source that causes more sound to be radiated in one direction than another
Equivalent continuous sound pressure level	The steady sound level which has the same energy as a time varying sound signal when averaged over the same time interval, T, denoted by $L_{Aeq,T}$
External noise level	The noise level, in decibels, measured outside a building
Filter	A device for separating components of an acoustic signal on the basis of their frequencies
Frequency	The number of acoustic pressure fluctuations per second occurring about the atmospheric mean pressure (also known as the 'pitch' of a sound)
Frequency analysis	The analysis of a sound into its frequency components
Ground effects	The modification of sound at a receiver location due to the interaction of the sound wave with the ground along its propagation path from source to receiver
Hertz	The unit normally employed to measure the frequency of a sound, equal to cycles per second of acoustic pressure fluctuations about the atmospheric mean pressure
Impulsive sound	A sound having all its energy concentrated in a very short time period

Terminology	Description
Instantaneous sound pressure	At a given point in space and at a given instant in time, the difference between the instantaneous pressure and the mean atmospheric pressure
Internal noise level	The noise level, in decibels, measured inside a building
L_{Aeq}	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.
L_{A10}	Is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.
L_{A90}	Is the sound level that is exceeded 90% of the sample period. It is typically used as a descriptor for background noise.
L_{Amax}	Is the instantaneous maximum sound level measured during the sample period.
L_{Amin}	Is the instantaneous minimum sound level measured during the sample period.
Level	The general term used to describe a sound once it has been converted into decibels
Loudness	The attribute of human auditory response in which sound may be ordered on a subjective scale that typically extends from barely audible to painfully loud
Noise	Physically: a regular and ordered oscillation of air molecules that travels away from the source of vibration and creates fluctuating positive and negative acoustic pressure above and below atmospheric pressure. Subjectively: sound that evokes a feeling of displeasure in the environment in which it is heard, and is therefore unwelcomed by the receiver
Noise emission	The noise emitted by a source of sound
Noise immission	The noise to which a receiver is exposed
Noise nuisance	An unlawful interference with a person's use or enjoyment of land, or of some right over, or in connection with it
Octave band frequency analysis	A frequency analysis using a filter that is an octave wide (the upper limit of the filter's frequency band is exactly twice that of its lower frequency limit)
Percentile exceeded sound level	The noise level exceeded for n% of the time over a given time period, T, denoted by LAn,T
Receiver	A person or property exposed to the noise being considered
Residual noise	The ambient noise that remains in the absence of the specific noise whose effects are being assessed
Sound	Physically: a regular and ordered oscillation of air molecules that travels away from the source of vibration and creates fluctuating positive and negative acoustic pressure above and below atmospheric pressure Subjectively: the sensation of hearing excited by the acoustic oscillations described above (see also 'noise')
Sound level meter	An instrument for measuring sound pressure level

Terminology	Description
Sound pressure amplitude	The root mean square of the amplitude of the acoustic pressure fluctuations in a sound wave around the atmospheric mean pressure, usually measured in Pascals (Pa)
Sound pressure level	A measure of the sound pressure at a point, in decibels
Sound power level	The total sound power radiated by a source, in decibels
Spectrum	A description of the amplitude of a sound as a function of frequency
Standardised wind speed	Values of wind speed at hub height corrected to a standardised height of ten metres using the same procedure as used in wind turbine emission testing
Threshold of hearing	The lowest amplitude sound capable of evoking the sensation of hearing in the average healthy human ear (0.00002 Pa)
Tone	The concentration of acoustic energy into a very narrow frequency range

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