9 Noise and Vibration

9.1 Introduction

No revisions were necessary to this EIAR chapter in responding to Dun Laoghaire - Rathdown County Council (DLR CC) decision to request Further Information dated 25th March 2026 in respect of LRD26A/0051/WEB.

This section of the EIAR has been prepared by AWN Consulting Ltd (AWN) to assess the potential noise and vibration impact of the proposed development in the context of current relevant standards and guidance.

This chapter includes a description of the receiving ambient noise climate in the vicinity of the subject site, and an assessment of the potential noise and vibration impact associated with the proposed development during both the short-term construction phase and the long-term operational phase on its surrounding environment. The assessment of direct, indirect, and cumulative noise and vibration impacts on the surrounding environment have been considered as part of the assessment. An assessment of noise from existing sources inward on the development has also been completed.

Mitigation measures are included, where relevant, to ensure the proposed development is constructed and operated in an environmentally sustainable manner that would have a minimal impact on the receiving environment.

9.1.1 Quality Assurance and Competency of Experts

The noise and vibration assessment has been prepared by Abe Scheele (Acoustic Consultant). Abe holds a City and Guilds Level 1 and 2 in Sound Engineering and City and Guilds Music Technology and has completed the Institute of Acoustics (IOA) Diploma in Acoustics and Noise Control. Abe has been working in the field of acoustics since 2016. He is experienced in environmental, building and architectural acoustics. He has knowledge of surveying, computer modelling, impact assessment of environmental noise and architectural acoustic assessments for various sectors including industrial, commercial, and residential.

9.2 Study Methodology

9.2.1 Overview

The assessment has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out in the following sections. In addition to specific noise and vibration guidance documents, the following guidelines were considered and consulted in the preparation of this Chapter:

- EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, 2022; and
- EPA Advice Notes on current practice in the preparation of Environmental Impact Statements, 2003.

The study has been undertaken using the following methodology:

- A review of the most applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development;
- An environmental noise survey has been undertaken in the vicinity of the subject site in order to characterise the existing baseline noise environment;
- Predictive calculations have been performed to estimate the likely noise emissions during the construction phase of the proposed development at the nearest noise sensitive locations (NSLs) to the site;
- Predictive calculations have been performed to assess the potential effects associated with the operation of the development at NSLs surrounding the development site;

- An assessment has been completed of potential cumulative effects that may arise as a result of the proposed development and other existing or proposed plans and projects;
- A schedule of mitigation measures has been proposed, where relevant, to control the noise and vibration emissions associated with both the construction and operational phases of the proposed development; and
- The inward effect of noise from the surrounding environment into the proposed residential buildings has also been assessed to determine the requirements, for additional noise mitigation to ensure a suitable internal noise environment for residential amenity.

9.2.2 Construction Phase

Criteria for Assessing Construction Noise Impacts

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

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

The approach adopted here calls for the designation of a NSL into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a Construction Noise Threshold (CNT) that, if exceeded, indicates a potential significant noise effect is associated with the construction activities.

This document sets out guidance on permissible noise levels relative to the existing noise environment. Table 9.1 sets out the values which, when exceeded, signify a potential significant effect at the façades of residential receptors, as recommended by BS 5228-1:2009+A1:2014.

Assessment category and threshold value period (L_{Aeq})	**Construction Noise Threshold (CNT), in decibels (dB)**		
	Category A1	**Category B2**	**Category C3**
Night-time (23:00 to 07:00hrs)	45	50	55
Evenings and weekends4	55	60	65
Daytime (07:00 - 19:00) and Saturdays (07:00 – 13:00hrs)	65	70	75

Table 9.1: Example thresholds of potential significant effect at dwelling.

[1] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.
[2] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.
[3] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.
[4] 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

It should be noted that this assessment method is only valid for residential properties, and if applied to commercial premises without consideration of other factors, may result in an excessively onerous thresholds being set.

Proposed Threshold Levels for Noise

Taking into account the proposed document outlined above and making reference to the baseline noise environment monitored around the Masterplan development site (referred to in Section 13.3), CNTs are set using Category A for the closest NSLs to the proposed development.

Interpretation of the Construction Noise Levels (CNL)

In order to assist with interpretation of the significance of a CNL, Table 9.2 includes guidance as to the likely magnitude of impact associated with construction activities, relative to the CNT. This guidance is taken from the UK document Design Manual for Roads and Bridges (2020) LA 111 Sustainability & Environmental Appraisal. Noise and Vibration Rev 2 (DMRB: Noise and Vibration - UKHE 2020) and adapted to include the EPA 2022 EIAR Guidelines.

Guidelines for Noise Impact Magnitude Assessment of Significance (DMRB)	**CNL per Assessment Category and Threshold Value Period**	**EPA EIAR Significance Effects**	**Determination of Significance in EIAR Terms**
Negligible	Below or equal to baseline noise level	Not Significant	Not Significant
Minor	Above baseline and below or equal to CNT	Slight to Moderate	CNLs at the upper end of this range will result in higher potential impacts, therefore this range is categorised as Slight to Moderate, acknowledging that values approaching the CNT are greater than Slight. In accordance with DMRB Noise and Vibration (UKHE 2020) and BS 5228-1 ((BSI 2009 +A1 2014a), noise levels below the CNT are deemed 'Not Significant'.
Moderate	Above CNT and below or equal to CNT +5dB	Moderate to Significant	CNLs at the upper end of this range will result in higher potential impacts, therefore this range is categorised as Slight to Moderate, acknowledging that values approaching the CNT are greater than Slight. In accordance with DMRB Noise and Vibration (UKHE 2020) and BS 5228-1 ((BSI 2009 +A1 2014a), noise levels below the CNT are deemed 'Not Significant'.
Major	Above CNT +5 to +15 dB	Significant, to Very Significant	Depending on CNT, duration and baseline noise level. In accordance with the DMRB Noise and Vibration (UKHE 2020), construction noise impacts shall constitute a significant effect where it is determined that a moderate or major magnitude of impact will occur for a duration exceeding: • Ten or more days or night in any 15 consecutive day or nights; and
	Above CNT +15 dB	Very Significant to Profound	

Guidelines for Noise Impact Magnitude Assessment of Significance (DMRB)	CNL per Assessment Category and Threshold Value Period	EPA EIAR Significance Effects	Determination of Significance in EIAR Terms
			• A total number of days exceeding 40 in any six consecutive months.

Table 9.2: Interpretation of CNL at dwelling.

The adapted DMRB guidance outlined will be used to assess the predicted construction noise levels at NSLs and comment on the likely impacts during the construction stages.

Construction Vehicular Traffic

In order to assist with interpretation of construction traffic noise, Table 9.3 includes guidance as to the likely magnitude of impact associated with changes in traffic noise levels along an existing road. This guidance is taken from the DMRB: Noise and Vibration (UKHE 2020). 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 document.

Increase in Traffic Noise Level (dB)	DMRB Magnitude of Impact	EPA Significance of Effect
<1.0	Negligible	Imperceptible
1.0 – 2.9	Minor	Not Significant to Slight
3 – 4.9	Moderate	Slight to Moderate
<5.0	Major	Significant

Table 9.3: Likely effect associated with change in traffic noise level – construction noise (DMRB 2020).

The DMRB guidance outlined will be used to assess the predicted increases in traffic levels on public roads associated with the proposed development and comment on the likely impacts during the construction stage.

For both construction noise and construction traffic, a significant effect is deemed to occur where a moderate or major impact is likely to occur for a period of greater that 10 days/nights over 15 consecutive day/nights, or greater than 40 days over 6 consecutive months.

Criteria for Assessing Construction Vibration Impacts

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 surface construction works for both building protection and human comfort are expressed in terms of Peak Particle Velocity (PPV) in mm/s.

Peak Particle Velocity (PPV)

PPV is commonly used to assess the structural response of buildings to vibration. Reference to the following documents has been made for the purposes of this assessment in order to discuss appropriate PPV limit values:

- British Standard BS 7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration, and;
- British Standard BS 5228: 2009 +A1 2014: Code of practice for noise and vibration control on construction and open Site – Part 2: Vibration (BS5228-2).

BS7385-2:1993 and BS5228-2:2009+A1:2014 advise that, for soundly constructed residential properties and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in

frequency range of predominant pulse) of 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above for transient vibration. 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 Table B.2 of BS5228-2:2009+A1:2014 might need to be reduced by up to 50%. On a cautious basis, therefore, continuous vibration limits are set as 50% of those for transient vibration across all frequency ranges. For buildings or structures that are structurally unsound, lower vibration magnitudes will apply, typically 50% of those for structurally sound buildings. Protected or historic buildings are not automatically assumed to be more vulnerable to vibration unless they have existing structural defects.

The documents note that minor structural damage can occur at vibration magnitudes that are greater than twice those presented in Table 9.4. Major damage to a building structure is possible at vibration magnitudes greater than four times the values set out in the Table. It should be noted that these values refer to the vibration at base of the building.

Table 9.4 sets out the limits as they apply to vibration frequencies below 4 Hz, where the most conservative limits are required.

Structure Type	**Allowable vibration (in terms of PPV) at closest part of sensitive property to source of vibration, at frequency of ≤4 Hz**	
	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

Table 9.4: Recommended construction vibration thresholds for buildings.

Human Perception

Humans are sensitive to vibration stimuli, and perception of vibration at high magnitudes may cause concern to building occupants. BS5228-2:2009+A1:2014 notes that vibration typically becomes perceptible at around 0.15 to 0.3 mm/s and may become disturbing or annoying at higher magnitudes. Higher levels of vibration are typically tolerated for single events or events of short-term duration, particularly during construction projects and when the origin of vibration is known.

Table 9.5 presents the significance table relating to potential impacts to building occupants during construction based on guidance from BS5228-2:2009+A1:2014 and the DMRB Noise and Vibration (UKHE 2020) document and the associated EPA significant ratings.

Criteria	**BS 5228-2**	**DMRB Impact Magnitude**	**EPA Significance Rating**
≥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.	Very High	Very Significant
≥1 to <10 mm/s mm/s	Increasing likelihood of perceptible vibration in residential environments but can be tolerated at the lower end of the scale if prior warning and explanation	Moderate	Moderate to Significant

Criteria	BS 5228-2	DMRB Impact Magnitude	EPA Significance Rating
	has been given to residents		
0.3 to <1 mm/s	Increasing likelihood of perceptible vibration in residential environments	Minor	Slight
<0.3 mm/s PPV	Vibration is unlikely to be perceptible in even the most sensitive situations for most vibration frequencies associated with construction	Negligible	Not Significant

Table 9.5: Guidance on effects of human response to PPV magnitudes.

9.2.3 Operational Phase

Criteria for Assessing Operational Outward Noise Impacts

The main potential source of outward noise from the proposed development will be limited to traffic flows to and from the development site onto the public roads. There will also be an element of mechanical and electrical plant required to service apartment buildings and cafe. It's noted that there is the potential for entertainment noise from music playing within the proposed café space as part of the development. Entertainment noise has the potential to have a negative impact on surrounding residential receptors and hence it is appropriate to specify a noise criterion to protect the future residents in this area.

The relevant guidance documents used to assess potential operational noise and vibration impacts on the surrounding environment are summarised in the following sections.

Change in Traffic Noise Levels

In the absence of any Irish guidelines or standards describing the effects associated with changes in road traffic noise levels, reference has been made to the DMRB Noise and Vibration (UKHE 2020) document, refer to Table 9.6. This document provides magnitude rating tables relating to changes in road traffic noise. For the operational phase of the development, changes in traffic noise are assessed against the long-term magnitude criteria based on the future design year traffic flows along the surrounding road network (i.e. 15 years post opening). In summary, the assessment looks at the impact with and without development at the nearest noise sensitive locations.

Change in Noise Level (dB L_{A10})	DMRB Long-Term Term Magnitude	EPA Classification Magnitude of Impact
<0.1	Negligible	Imperceptible
0.1 – 2.9		Not significant
3 – 4.9	Minor	Slight to Moderate
5 – 9.9	Moderate	Moderate to Significant
10+	Major	Significant to Very Significant

Table 9.6: Likely impact associated with long-term change in traffic noise level (DMRB 2020).

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

Mechanical and Electrical Plant

The proposed development is largely residential in nature comprising a mixture of houses and duplex. There will be minimal mechanical and/ or electrical plant items required to service the development that will generate noise levels outside of the site boundary or at the developments buildings themselves. Plant contained within plant rooms has the least potential for impact, once consideration is given to appropriate design of the space.

The closest noise sensitive locations to any operational plant items are the residential dwellings within the proposed development. To ensure there is no adverse impact on the future inhabitants of the proposed development itself, it is appropriate to refer to internal noise targets derived from BS 8233: 2014: *Guidance on Sound Insulation and Noise Reduction for Buildings*. The recommended indoor ambient noise levels are set out in Table 9.7 and are based on annual average data.

The derived external levels are based on the approximate attenuation provided by a partially open window of 15 dB, as advised in BS 8233 (BSI 2014c), and represent the appropriate noise level at the external façade of the building. For mechanically ventilated buildings, higher external noise levels will achieve the same internal noise levels with closed windows.

Activity	Location	Internal Noise Design	Derived External Levels
Residential Day	Living room	35 dB $L_{Aeq,16hr}$	50 dB $L_{Aeq,16hr}$
	Dining room/area	40 dB $L_{Aeq,16hr}$	55 dB $L_{Aeq,16hr}$
	Bedroom	35 dB $L_{Aeq,16hr}$	50 dB $L_{Aeq,16hr}$
Residential Night	Bedroom	30 dB $L_{Aeq,8hr}$	45 dB $L_{Aeq,8hr}$

Table 9.7: Internal noise design range for residential buildings (BS 8233:2014).

Entertainment noise

There are no Irish standards or guidelines which relate to noise emissions from commercial fitness facilities or for acceptable noise levels within residential buildings.

Guidance for recommended internal noise levels within sensitive spaces is taken from BS 8233 (2014) Guidance on Sound Insulation and Noise Reduction for Buildings. This document sets out recommended internal noise levels for different building types. The recommended internal noise levels for dwellings are set out previously in ***Table 9.7***.

In order to set an external noise level based on the internal criteria noted above, this is done by factoring in the degree of noise reduction afforded by a partially open window, which is typically assumed to be 15 dB. Using this value, the recommended external noise level is 50 dB L_{Aeq}, 16hr for daytime periods.

The level of 50 dB L_{Aeq} 16hr is suitable for noise which does not have any tonal or impulsive characteristics and may not be appropriate for music. Music noise from entertainment premises or other commercial facilities using amplified music is normally controlled by setting a criterion of 'inaudibility'.

Typical conditions require for music noise from commercial premises state:

Sound levels from loudspeaker announcements, music or other material projected from the premises shall be controlled so as to ensure the sound is not audible in adjoining premises or at two meters from the frontage.

In order to ensure a level of inaudibility, music noise breakout should be restricted to a level of a least 10 dB below the prevailing noise environment. In this instance a limit value of 40 dB $L_{Aeq,T}$ during the day and 35 dB $L_{Aeq,T}$ during the night is proposed, these values being 10 dB below the recommended noise level for broadband noise at an external facade.

Criteria for Assessing Inward Noise Impacts

Dublin Agglomeration Noise Action Plan 2024 – 2028

The Dublin Agglomeration Noise Action Plan 2024 – 2028, addresses the requirements of the European Noise Directive 2002/49/EC for local authorities for managing environmental noise. The Noise Action Plan (NAP) states the following in regard to planning guidance –

'The appropriate use of the planning system can be used to help avoid, or minimise, the adverse impacts of noise without placing unreasonable restrictions on development'.

The action plan outlines various guidance to minimise the impact in relation to noise on new developments. Both ProPG Planning and Noise: Professional Practice Guidance on Planning and Noise and BS 8233: Guidance on Sound Insulation and Noise Reduction for Buildings are recommended as guidance to be employed in areas where people are being brought to noise in the form of existing transport noise.

In accordance with the guidance recommended as the NAP policy, the following Acoustic Design Statement (ADS) has been prepared to comply with the requirements of this policy.

Professional Practice Guidance on Planning & Noise (ProPG 2017)

The *Professional Practice Guidance on Planning & Noise* (ProPG 2017)[5] has been generally considered best practice guidance adopted in Ireland the absence of equivalent Irish guidance for inward noise impact assessments.

The ProPG outlines a systematic risk based 2-stage approach for evaluating noise exposure on prospective Site for residential development. The two primary stages of the approach can be summarised as follows: -

- ***Stage 1:*** Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels.
- ***Stage 2:*** Involves a full detailed appraisal of the Proposed Development covering four "key elements" that include: -
    1. ***Element 1*** – Good Acoustic Design Process
    2. ***Element 2*** – Noise Level Guidelines
    3. ***Element 3*** – External Amenity Area Noise Assessment
    4. ***Element 4*** – Other Relevant Issues

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk, based on the pre-existing noise environment. Figure 9.1 presents the basis of the initial noise risk assessment; it provides appropriate risk categories for a range of continuous noise levels either measured and / or predicted on site.

[5] Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH).

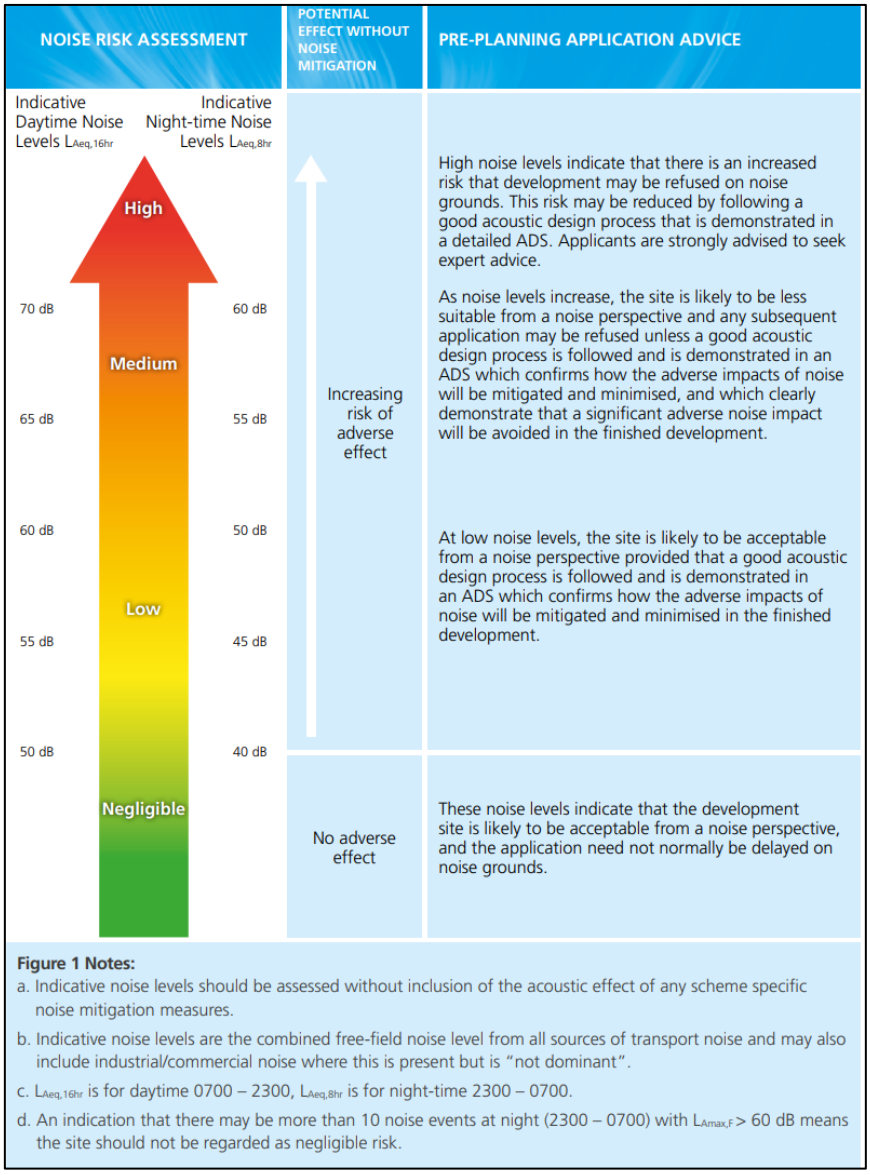

Figure 9.1: ProPG Stage 1 - Initial noise risk assessment

It should be noted that a site should not be considered a negligible risk if more than 10 no. L_{AFMax} events exceed 60 dB during the night period, and the site should be considered a high risk if the L_{AFMax} events exceed 80 dB more than 20 times a night.

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233: 2014. The recommended indoor ambient noise levels are set out in Table 9.7 previously and are based on annual average data.

In addition to these absolute internal noise levels, ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered necessary or desirable, and noise levels exceed the external noise guidelines, then a relaxation of the internal L_{Aeq} values by up to 5 dB can still provide reasonable internal conditions.

ProPG provides the following advice with regards to external noise levels for amenity areas in the development: -

> *"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$."*

Criteria for Assessing Operational Vibration Impacts

There are no noteworthy sources of vibration associated with the operational stage, therefore vibration criteria have not been specified.

9.3 The Existing Receiving Environment (Baseline)

The subject site is located within the Blackrock area, bound to the north by the N31 Templehill Road, to the east by the existing Alzheimer's Society of Ireland Building, to the west by existing residential buildings within the St Vincent's Park and to south fields and Rockfield Park. The surrounding environment in the vicinity of the development site is mixed in nature with retail units and residential areas making up the majority of the surrounding building uses.

Baseline Noise Environment

An environmental noise survey was conducted on the 19th of May 2021 at the site in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise. Specific details are set out below.

An additional environmental noise survey was undertaken on the 2nd of December 2025 in order to confirm the existing noise environment.

Choice of Measurement Locations

The measurement locations are described below and shown in **Figure 9-** along with the approximate site boundary.

N1 located to the east of the site at the boundary of St Vincent's Park.

N2 located to the west of the site at the entrance of The Alheimer Society of Ireland and St Louis's Park

N3 located to the south west of the site in Barclay Ct.

N4 unattended noise monitor located inside the north site boundary adjacent to the N31 Templehill Rd.

N5 located to the east of the site at the boundary of St Vincent's Park.

N6 located to the south of the site at the boundary of Avondale Ct.

N7 unattended noise monitor located inside the north site boundary adjacent to the N31 Templehill Rd.

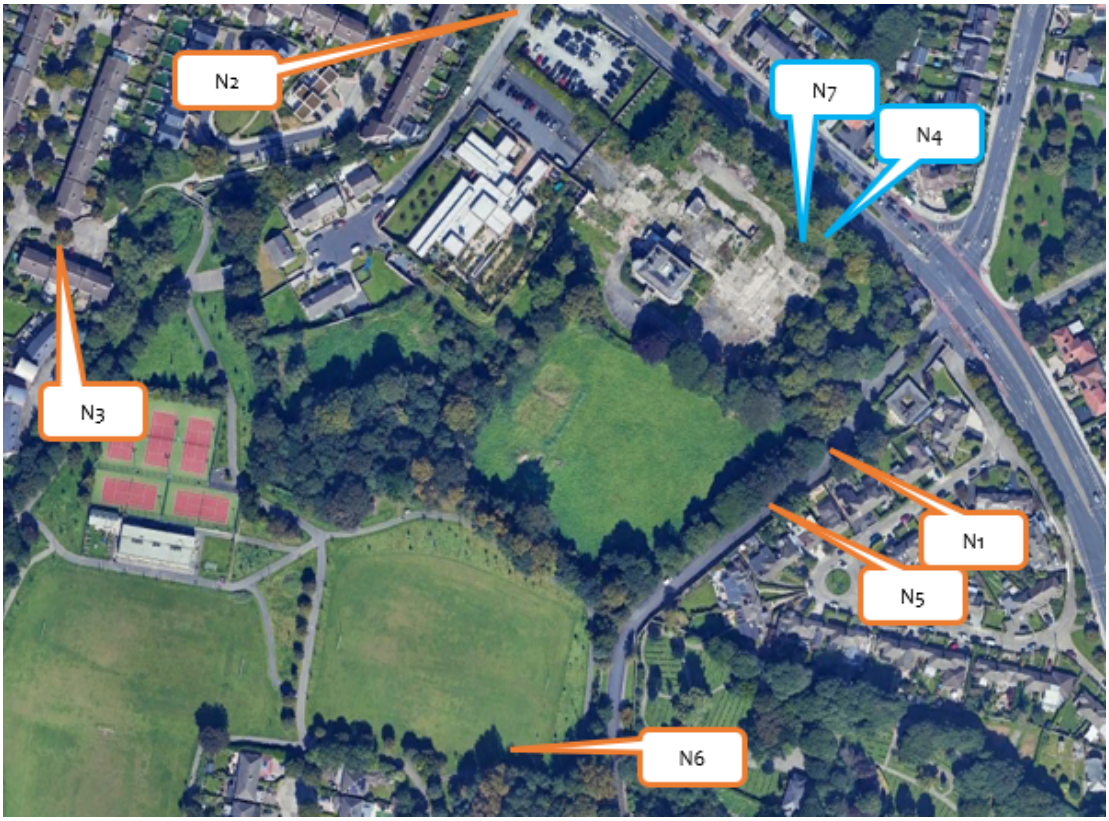

Figure 9.2: Noise Monitoring Locations (Image Source: Google Maps, accessed December 2025)

Survey Periods

The noise survey was carried out over the following periods.

Aspect	Survey Position	Survey Period
Noise	N1	12:37hrs to 17:50hrs on 19 May 2021
	N2	
	N3	
	N4 (Unattended)	12:37hrs to 17:50hrs on 19 May 2021
	N5	14:35hrs on 2 December 2025 to 00:30 on 3 December 2025
	N6	
	N7 (unattended)	14:27hrs to 16:43 on 2 December 2025, and 23:24 on 2 December 2025 to 00:09 on 3 December 2025

Table 9.8 Survey Periods

Instrumentation

The noise measurements were carried out using the equipment listed below. The instrument was calibrated before and after the survey with no significant drift noted.

Measurement	Manufacturer	Equipment Model	Serial Number	Calibration date
Sound Level Meter	Rion	NL-52	1076330	28 November 2024
Sound Level Meter	Rion	NL-52	586940	20 February 2024
Sound Level Meter	Rion	NL-52	1076328	10 September 2025
Calibrator	Rion	NC-75	34724227	12 September 2025

Table 9.9 Noise Monitoring Equipment Details

Measurement 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.

L_{AFmax} is the instantaneous maximum sound level measured during the sample period using the 'F' time weighting.

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.

Survey Results and Discussion

The results of the noise survey at the four monitoring locations are summarised below.

Location N1

Date	Time	Measured Noise Levels (dB re. $2x10^{-5}$Pa)		
		L_{Aeq}	L_{Amax}	L_{A90}
19 May 2021	12:37	49	66	43
	14:42	50	74	42
	16:37	49	65	45
	23.23	42	58	36
	00.31	40	57	31
	01.36	37	58	27

Table 9.10 Measured Noise Levels at N1

At this location, the primary noise sources were observed to be vehicles passing on the Temple Hill Road and leaves rustling with occasional car pass-by, construction noise and birdsong. Traffic noise from junctions with the N31 and the R113 also contributed to measured noise levels. Ambient noise levels were in the range of 49 to 50 dB L_{Aeq}. Background noise levels were in the range of 42 to 45 dB L_{A90}. Night-time ambient noise levels ranged from 37 to 42 dB L_{Aeq}. Night-time background noise levels ranged from 27 to 36 dB L_{A90}. Night-time maximum noise levels were in the range of 57 to 58 dB L_{Amax}.

Location N2

Date	Time	Measured Noise Levels (dB re. $2x10^{-5}$Pa)		
		L_{Aeq}	L_{Amax}	L_{A90}
19 May 2021	12:37	49	66	43
	14:42	50	74	42
	16:37	49	65	45
	23.23	42	58	36
	00.31	40	57	31
	01.36	37	58	27

Table 9.11 Measured Noise Levels at N2

At this location the primary noise sources were observed to be traffic noise on the Temple Hill Road, with occasional reversing sirens and ducks quacking and car pass-by. Ambient noise levels were of the order of 60 to 62 dB L_{Aeq}. Background noise levels were in the range of 48 to 53 dB L_{A90}. Night-time ambient noise levels ranged from 58 to 62 dB L_{Aeq}. Night-time background noise levels ranged from 35 to 37 dB L_{A90}. Night-time maximum noise levels were in the range of 76 to 80 dB L_{Amax}.

Location N3

Date	Time	Measured Noise Levels (dB re. $2x10^{-5}$Pa)		
		L_{Aeq}	L_{Amax}	L_{A90}
19 May 2021	14:04	46	59	43
	16:12	50	65	40
	17:26	46	62	41
	00:09	35	47	33
	01:14	34	56	31
	02:17	37	64	30

Table 9.8 Measured Noise Levels at N3

At this location the primary noise sources were observed to be birdsong, distant traffic noise and distant noise from children playing. Aircraft and birdcall were also noted to be contributing to measured noise levels with cackling raising the L_{Aeq} in the second measuement . Ambient noise levels were in the range of 46 to 50 dB L_{Aeq}. Background noise levels were in the range of 40 to 43 dB $L_{A90.}$

Night-time ambient noise levels ranged from 34 to 37 dB L_{Aeq}. Night-time background noise levels ranged from 30 to 33 dB L_{A90}. Night-time maximum noise levels were in the range of 47 to 64 dB L_{Amax}.

Location N4

The unattended measurements collected over the survey period are summarised below.

Date	**Period**	**Measured Noise Levels (dB re. 2x10^{-5} Pa)**		
		L_{Aeq}	**L_{Amax}**	**L_{A90}**
19 May 2021	Day	60	77	50

Table 9.9 Measured Noise Levels at N3

On installation and collection at this location the primary noise sources were observed to be traffic noise on the Temple Hill Road. Activities relating to the construction on the site also contributed to daytime measured noise. Daytime ambient noise levels ranged from 58 to 63 dB L_{Aeq} with an average of 60 dB L_{Aeq}. Daytime background noise levels ranged from 49 to 52 dB L_{A90} with an average of 50 dB L_{A90}.

Location N5

Date	**Time**	**Measured Noise Levels (dB re. 2x10^{-5}Pa)**		
		L_{Aeq}	**L_{Amax}**	**L_{A90}**
2 December 2025	14:39	50	65	42
	15:55	48	58	43
	17:04	49	63	45
	23:13	46	57	40
	23:30	46	61	40
	23:47	45	57	39

Table 9.10 Measured Noise Levels at N5

At this location, the primary noise sources were observed to be vehicles passing on the Temple Hill Road with occasional car pass-by and birds cackling. Traffic noise from junctions with the N31 and the R113 also contributed to measured noise levels. Ambient noise levels were in the range of 48 to 50 dB L_{Aeq}. Background noise levels were in the range of 42 to 45 dB L_{A90}. Night-time ambient noise levels ranged from 45 to 46 dB L_{Aeq}. Night-time background noise levels ranged from 39 to 40 dB L_{A90}. Night-time maximum noise levels were in the range of 57 to 61 dB L_{Amax}.

Location N6

Date	Time	Measured Noise Levels (dB re. $2x10^{-5}$Pa)		
		L_{Aeq}	L_{Amax}	L_{A90}
2 December 2025	15:24	50	72	40
	16:23	47	68	42
	17:35	42	58	39
	23.20	41	54	38
	23:36	40	50	38
	23:52	39	51	35

Table 9.11 Measured Noise Levels at N6

At this location the primary noise sources were observed to be traffic noise on the Temple Hill Road, with occasional seaguls and airplanes overhead, birds cackling and pedestrian chatter also contributed to the measured noise levels. Ambient noise levels were of the order of 42 to 50 dB L_{Aeq}. Background noise levels were in the range of 39 to 40 dB L_{A90}. Night-time ambient noise levels ranged from 39 to 41 dB L_{Aeq}. Night-time background noise levels ranged from 35 to 38 dB L_{A90}. Night-time maximum noise levels were in the range of 50 to 54 dB.

Location N7

The unattended measurements collected over the survey period are summarised below.

Date	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)		
		L_{Aeq}	L_{Amax}	L_{A90}
2 December 2025	Day	59	68	51
2 to 3 December 2025	Night	55	65	45

Table 9.12 Measured Noise Levels at N7

On installation and collection at this location the primary noise sources were observed to be traffic noise on the Temple Hill Road during the daytime measured noise. Daytime ambient noise levels had were an average of 59 dB L_{Aeq}. Average Daytime background noise levels were of the order of 51 dB L_{A90}.

Average night time ambient noise levels were of the order of 55 dB L_{Aeq}. Average night time background noise levels were of the order of 45 dB L_{A90}.

Survey Summary

The baseline noise levels were typical of an urban location. At Location N1, N2 and N5 the noise environment was dominated by traffic on the Temple Hill Road. At N3 and N6 the noise environment was dictated more so by local sources such as recreation and bird activity around residential units, with traffic noise from the Temple Hill contributing to background noise levels.

Do Nothing Scenario

In the absence of the proposed development being constructed, the noise environment at the nearest noise sensitive locations and within the development site will remain largely unchanged.

9.4 Characteristics of the Proposed Development

Chapter 2 of this EIAR includes a detailed description of the Proposed Development.

9.5 Potential Impact of the Proposed Development

The potential noise and vibration impacts associated with the construction and operational phases of the proposed development are discussed in the following sections. Potential impacts have been assessed based on the cumulative assessment of the permitted development (previously permitted under SHD ABP-303804-19) and the proposed developments combined.

The closest noise sensitive locations have been identified as shown in **Figure 9-. Site Context & Noise Assessment Locations (Image Source: Google Maps)** along with approximate site boundary and described below.

NSL 1 Residential units east of the proposed site at Temple Hill Road some 25m from the nearest significant site works, represented by N5;

NSL 2 The Alzheimers Society of Ireland west of the proposed site at Temple Hill Road some 20m from the nearest significant site works, at a similar set back distance from the Temple Hill road as N5;

NSL 3 Residential dwellings located to the north west of the proposed site some 30m from the nearest significant site works, at a similar set back distance from the Temple Hill road as N7; and,

NSL4 Residential dwellings located to the west of the proposed site some 20m from the nearest significant site works, at a similar set back distance from the Temple Hill road as N5.

Review of the baseline noise survey and the Construction Noise Thresholds detailed in Section 9.2.1.2 indicates that the appropriate CNTs for construction noise at residential properties are as follows:

- NSL 1: Day 65 dB $L_{Aeq,T}$, Evening 55 dB $L_{Aeq,T}$, and; Night 50 dB $L_{Aeq,T}$
- NSL 2: Day 65 dB $L_{Aeq,T}$, Evening 55 dB $L_{Aeq,T}$, and; Night 50 dB $L_{Aeq,T}$
- NSL 3: Day 65 dB $L_{Aeq,T}$, Evening 55 dB $L_{Aeq,T}$, and; Night 55 dB $L_{Aeq,T}$
- NSL 4: Day 65 dB $L_{Aeq,T}$, Evening 55 dB $L_{Aeq,T}$, and; Night 50 dB $L_{Aeq,T}$

Figure 9-. Site Context & Noise Assessment Locations (Image Source: Google Maps)

Construction Phase

Noise

The construction stage will be undertaken over a number of phases from site preparation through to building construction and internal fit out. In terms of the potential noise and vibration impacts, the key stages and activities are expected to involve:

- Site clearance and demolition of existing structures;
- Ground works (excavation and piling);
- Superstructure Construction; and
- Internal fit out.

The construction programme will create typical construction activity related noise onsite. Indicative ranges of noise levels associated with construction may be calculated in accordance with the methodology set out in British Standard Institute (BSI) BS 5228-1:2009 +A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise (BSI, 2014) . This standard sets out sound power / sound pressure levels for plant items normally encountered on construction sites, which in turn enables the prediction of noise levels.

The following section discusses typical noise levels associated with the proposed development demolition/construction phase and comments on potential noise impacts at distances to the nearest Noise Sensitive Locations (NSLs) during the key stages and types of activities that will occur on site.

Demolition Works

The existing buildings and associated structures within the site are demolished as part of the permitted development with some remaining demolition works to be completed. There will be periods when breakers will be required to break out foundations and solid structures.

Excavation and Piling

Piling / coring through rock may be required to allow excavation of the basements in the strata above the rock in accordance with the proposed design. Excavation in rock is not envisaged.

Pile wall is expected to be installed in blocks A1, B1, B2, B3, B4 and D1 to allow excavation of basements. Foundations for these blocks will be a raft type foundation. C1, C2 and C3 shall have strip foundations. E1 and E2 shall have piled foundations. Gate lodge shall have mini piled foundation.

For construction works associated with activities such as excavation and structural works including excavators, loaders, dozers, cranes, generators, concreting works and rotary bored piling noise levels are typically in the range of 70 to 83 dB L_{Aeq} at 10m.

Night-time construction works

Works during night-time hours will apply to the construction of the slabs, for apartment blocks. These works will be limited to concrete power floating application. This would include, one concrete power floater and one generator powering site lighting, operating simultaneously within a work area. It is assumed that one slab in one block will be worked on per night, moving through the site. It is estimated that these works occur for two to three hours, per slab. As such these works will operate near an NSL for a limited period while the majority of these works will occur at further distances.

During the night time power floating works, the construction noise threshold value of 50 dB L_{Aeq} is likely to be exceeded at distances of up to 35m from the works location in the absence of any noise mitigation. Noise mitigation will therefore be required where this activity is scheduled within 35m of NSLs along the boundary of the Proposed Project, mitigation is provided in Section 9.8. With mitigation in place it is expected that there will be a 5 to 10 dB reduction to the noise levels in Table ***9.13*** and hence it is possible that works may take place at distances of 20 m from the residences without causing a significant impact.

Construction of Proposed Structure

For construction work areas with lower noise levels such as those associated with superstructure works including site compounds (for storage, offices and material handling, generators etc.), smaller items of mobile plant (excavators, cranes, dozers), landscaping and concreting works with lower noise emissions, a total construction noise level of 80 dB L_{Aeq} at 10m has been used for the purposes of predictive calculations.

Indicative Construction Noise Levels

Indicative noise calculations have been undertaken which assume that plant items are operating for 66% of the time. Screening from a standard site hoarding of 2.4m is assumed around all site boundaries. It must be stated that for most of the time, plant and equipment will be a greater distance from the nearest NSLs than those used within the calculations and the "on-time" of plant and equipment will be less than those assumed over a normal working day (i.e. the use of piling rigs or breakers for demolition will be in use for shorter periods than those assumed over a normal working day) and consequently will have lower noise levels. The assessment presented is therefore representative of a best estimate conservative scenario representing construction activities.

Table 9.13 presents the calculated noise levels at varying distances.

Taking into account the outline construction programme, it is possible to predict typical noise levels using guidance set out in BS 5228-1:2009+A1:2014. ***Table 9.13*** outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme. The values presented below assume no mitigation measures in place.

Activity	**Item of Plant *(BS5228 Ref)***	**Plant Noise Level L_{Aeq} at 10m**	**Predicted Noise Level, (dB $L_{Aeq,1hr}$) at varying distances**			
			NSL1 (25m)	**NSL2 (20m)**	**NSL3 (30m)**	**NSL4 (20m)**
Site Clearance/Demolition	Track Excavator (C2 21)	71	54	56	52	56
	Tracked Mobile Crane (C4.50)	79	54	56	52	56
	Tracked Crusher (C1.14)	85	65	67	63	67
	Dump Truck (C2.3)	71	62	64	60	64
	Concrete Breaker (C1.4)*	82	68	70	66	70
	Cumulative Site Clearance and Demolition		**71**	**73**	**69**	**73**
Piling	Dump Truck (C2.30)	79	62	64	60	64
	Large Rotary Bored Piling Rig (C3.14)	83	66	68	64	68
	Tracked excavator (D2.21)	71	54	56	52	56
	Cumulative Piling		**67**	**70**	**66**	**70**
General Construction	Dump Truck (C2.30)	79	62	64	60	64
	Tracked excavator (C2.21)	71	54	56	52	56
	Compressor (D7.8)	70	53	55	51	55
	Telescopic Handler (C4.54)	79	62	64	60	64
	Hand-Held Circular Saw (C4.72)	79	62	64	60	64
	Diesel Generator (C4.76)	61	44	46	42	46
	Internal Fit out	70	53	55	51	55

Activity	Item of Plant *(BS5228 Ref)*	Plant Noise Level L_{Aeq} at 10m	Predicted Noise Level, (dB $L_{Aeq,1hr}$) at varying distances			
			NSL1 (25m)	NSL2 (20m)	NSL3 (30m)	NSL4 (20m)
	Cumulative General Construction		**68**	**70**	**66**	**70**
Night Time Works	Power Float (D.6.44)	72	53	55	51	55
	Diesel Generator (C4.76)	61	39	41	37	39
	Cumulative Night Works		**53**	**55**	**51**	**55**
Road Works/Landscaping	Asphalt Paver & Tipping Lorry (C5.30)	75	58	60	56	58
	Electric Water Pump (C5.40)	68	51	53	49	51
	Vibratory Roller (C5.20)	75	58	60	56	58
	Cumulative Landscaping and Road Works		**62**	**64**	**60**	**64**

Table 9.13 Calculated Construction Noise Levels at Varying Distances

At a distance up to 20m from areas of major construction, representative of NSL2 and NSL4, the predicted construction noise levels associated with breaking, crusher and piling activities are above the 65 dB(A) CNT. The effect of this, assuming plant items occurring at the same time, at the same distance from NSLs is negative, significant to very significant and temporary. Other activities are predicted to be over the CNT and therefore with reference to ***Table 9.2*** it is expected that there will be a negative, significant to very significant and short-term impact associated with general construction. These potential effects are presented in the absence of mitigation measures.

At a distance up to 25m from areas of major construction, representative of NSL1, the predicted construction noise levels associated with breaking, crusher are above the 65 dB(A) CNT. The effect of this, assuming plant items occurring at the same time, at the same distance from NSLs is negative, significant to very significant and temporary. Other activities are predicted to be over the CNT and therefore with reference to ***Table 9.2*** It is expected that there will be a negative, moderate to significant and short-term impact associated with general construction, piling and site clearance/demolition. These potential effects are presented in the absence of mitigation measures.

At a distance of 30m from areas of major construction, representative of NSL3, the predicted construction noise levels, during are above the 65 dB(A) CNT and therefore it is expected that there will be a negative, moderate to significant and short-term effect at this location in the absence of mitigation.

At greater distances than 45m predicted construction noise levels are equal or below CNT, therefore any impact is expected to be negative, slight to moderate and short-term.

Noise mitigation measures will therefore be required on site to reduce construction noise levels along these boundaries to reduce any potential significant effects. Recommended mitigation measures are presented in Section 9.8.

Night-time construction works

During night-time hours at distances up to 20m from powerfloating activities , representative of NSL2 and NSL4, assuming all plant items are operating together at the same time, the predicted construction noise levels are above the 50 dB(A) CNT and therefore it is expected that there will be a negative, significant to very significant and temporary effect at this location in the absence of mitigation.

At distances from 25m to 30m, representative of NSL1 and NSL3, assuming all plant items are operating together at the same time, the predicted construction noise levels are above the 50 dB(A) CNT and it is expected that there will be a negative, moderate to significant and temporary effect at this location in the absence of mitigation.

At greater distances than 35m predicted construction noise levels are equal or below CNT, therefore any impact is expected to be negative, moderate and temporary.

Noise mitigation measures will therefore be required on site to reduce construction noise levels along these boundaries to reduce any potential significant effects. Recommended mitigation measures are presented in Section 9.8.

Construction Traffic

The noise levels associated with mobile plant items such as concrete dump trucks, loaders etc. operational on site have been included as part of the construction noise assessment and calculated noise levels in ***Table 9.13***. Consideration should also be given to the addition of construction traffic along the site access routes. Access to the development site for construction traffic will be via the site entrance on Temple Hill Road to the west of the site.

It is possible to calculate the noise levels associated with the passing vehicle using the following formula.

$$L_{Aeq,T} = L_{AX} + 10\log_{10}(N) - 10\log_{10}(T) + 10\log_{10}(r_1/r_2)\ dB$$

where:

$L_{Aeq,T}$ is the equivalent continuous sound level over the time period T in seconds);

L_{AX} is the "A-weighted" Sound Exposure Level of the event considered(dB);

N is the number of events over the course of time period T;

r_1 is the distance at which L_{AX} is expressed;

r_2 is the distance to the assessment location.

A calculation distance of 5m from the road has been used to assess noise levels at the closest buildings along the construction routes. The mean value of Sound Exposure Level for truck moving at low to moderate speeds (i.e. 15 to 45km/hr) is of the order of 82dB L_{AX} at a distance of 5 metres from the vehicle. This figure is based on a series of measurements conducted under controlled conditions.

Reference has been made to the Construction Management Plan where details of construction traffic numbers have been set out. It is estimated that HGV movements will range from 5 no. per hour over the different construction phases. The construction vehicle numbers for the various construction phases are summarised below. The nearest NSL's at Temple Hill Road/ Newtown

Avenue/ Temple Avenue junction are screened by a masonary wall in excess of 2m high. BS 5228 states the folloing regarding screening;

The construction vehicle numbers for the various construction phases are summarised below:

Construction Phase	No. of Trucks/Peak Hour	Calculated Noise level at nearest NSL's from road edge (5m), dB $L_{Aeq,1hr}$, without screening
Excavation	5	58
General Construction	5	58

Table 9.14: Calculated Construction Traffic Noise Levels at Edge of Road

The predicted noise level associated with construction vehicle traffic numbers above is of the order of 58 dB $L_{Aeq,1hr}$. With reference to baseline noise levels presented in ***Table 9.12*** and ***Table 9.3***, this level is below the construction noise threshold and in line with prevailing noise levels along the Temple Hill Road/ Newtown Avenue/ Temple Avenue junction, and noise adssociated with construction traffic is predicted to be a negative, not significant and short-term effect.

Vibration

During demolition and ground-breaking in the excavation phase, there is potential for vibration to propagate through the ground. Empirical data for this activity is not provided in the BS 5228-2:2009+A1:2014 standard, however the likely levels of vibration from this activity is expected to be below the vibration threshold for building damage on experience from other sites.

AWN have previously conducted vibration measurements under controlled conditions, during trial construction works, on a sample site where concrete slab breaking was carried out. The trial construction works consisted of the use of the following plant and equipment when measured at various distances:

- 3 tonne hydraulic breaker on small CAT tracked excavator
- 6 tonne hydraulic breaker on large Liebherr tracked excavator

Vibration measurements were conducted during various staged activities and at various distances. Peak vibration levels during staged activities using the 3 Tonne Breaker ranged from 0.48 to 0.25 PPV (mm/s) at distances of 10 to 50m respectively from the breaking activities. Using a 6 Tonne Breaker, measured vibration levels ranged between 1.49 to 0.24 PPV (mm/s) at distances of 10 to 50m respectively.

The range of values recorded provides some context in relation typical ranges of vibration generated by construction breaking activity likely required on the proposed site. This range of vibration magnitudes indicate vibration levels at the closest neighbouring buildings are expected to be below the limits set out in ***Table 9.4*** to avoid any cosmetic damage to buildings.

In terms of disturbance to building occupants, works undertaken within close proximity to the residential receptors on the site perimeter have the potential to emit perceptible vibration levels.

Notwithstanding the above, any construction activities undertaken on the site will be required to operate below the recommended vibration threshold set out in ***Table 9.4*** during all activities. Further discussion on mitigation measures during this phase are discussed in Section 9.8.

It is anticipated that excavations will be made using standard excavation machinery, which typically do not generate appreciable levels of vibration close to the source. Taking this into account and considering the distance that these properties are from the works and the

attenuation of vibration levels over distance, the resultant effect of vibration levels at the nearest NSLs are expected to be negative, not significant to slight and short term.

Operational Stage

Noise

Additional Traffic on Adjacent Roads

During the operational phase of the proposed development, there will be an increase in vehicular traffic associated with the site on some surrounding roads.

A traffic impact assessment relating to the proposed development has been prepared by NRB Consulting Engineers, as part of this EIAR. Using this information, the related noise impacts along the relevant road links has been assessed.

Figure 9.2 below outlines the breakdown of sections of road and **Table** 9.15 Predicted Change in **Noise Level associated with** Vehicular **Traffic** (opening year 2025 display the predicted change in noise level at different road links around the site for the year of opening and the design year using the Annual Average Daily Traffic (AADT) flows along the road links under consideration.

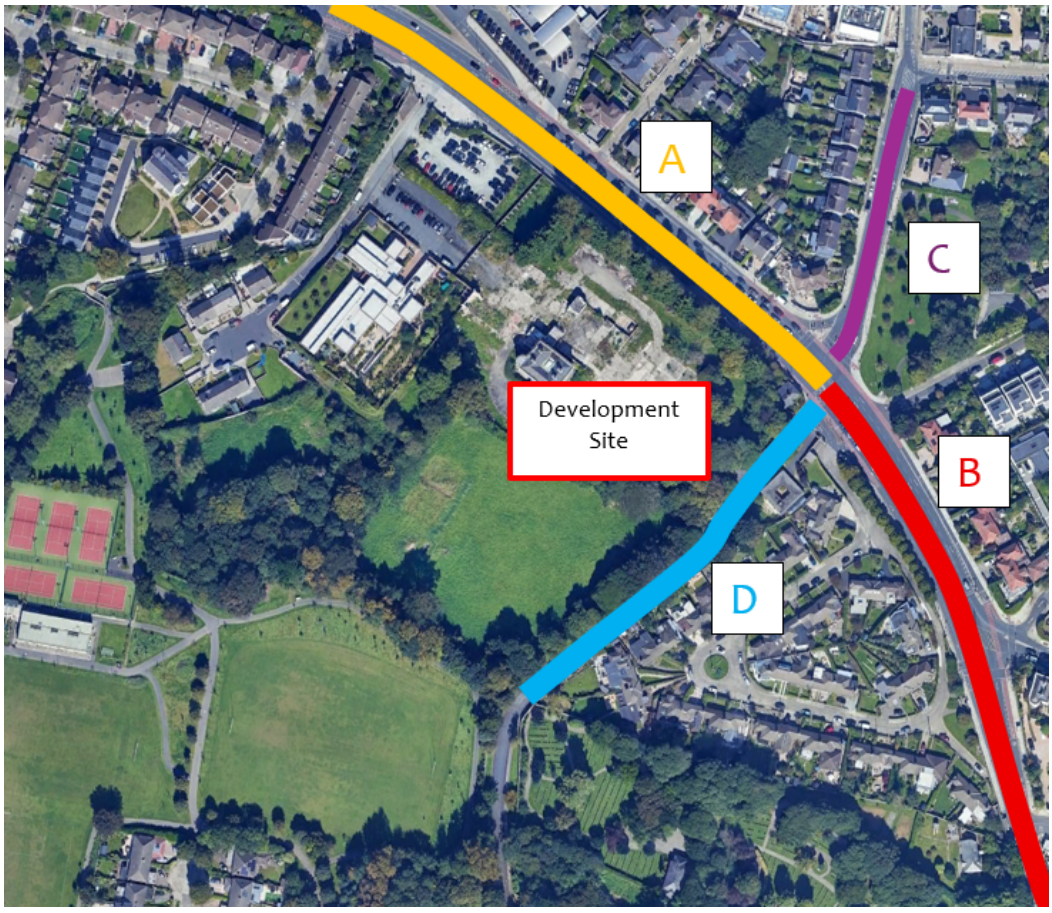

Figure 9.2 Traffic Assessment – Road Links

Road Link	Opening Year (2025)		
	AADT Without Development	AADT With Development	Change in Noise Level (dB)
A	23550	25344	+ 0.3
B	22580	24198	+0.3
C	4179	4362	+ 0.2
D	607	1865	+ 4.9

Table 9.15 Predicted Change in Noise Level associated with Vehicular Traffic (opening year 2025)

Road Link	Design Year (2040)		
	AADT Without Development	AADT With Development	Change in Noise Level (dB)
A	28014	28641	+0.0
B	26908	27359	+0.1
C	4764	4947	+0.2
D	692	1950	+4.5

Table 9.16 Predicted Change in Noise Level associated with Vehicular Traffic (Design year 2040)

For the opening year (2025) traffic flows, the predicted changes in noise level along the road links range from +0.2 to +4.9 dB. For the design year (2040) traffic flows, the predicted changes in noise level along the road links also range from +0.0 to +4.5 dB.

With reference to Table 9.6, the predicted change in noise level associated with additional traffic on the existing road network, is minor in magnitude. The effect is therefore slight to moderate and long term.

Inward Noise Assessment

The development lands in question are bounded to the north and east by the Temple Hill Road. Noise from road traffic has the potential to impact on residential dwellings within the proposed development.

In addition to noise levels measured at the development site, reference has also been made to the noise maps prepared by Transport Infrastructure Ireland (TII). The following noise maps have been referred to when carrying out the desk-top assessment of the baseline noise environment:

- *Round 4 Noise Maps for Roads – Dublin Agglomeration.*

This noise map is provided for the overall day evening night period in terms of L_{den} and for the night-time period in terms of $L_{night.}$ All data has been sourced from the EPA Mapping website.[6]

Figure 9.3 and Figure 9- present the predicted noise levels across the development site for road traffic in terms of L_{den} and L_{night}.

[6] EPA Mapping website http://gis.epa.ie.

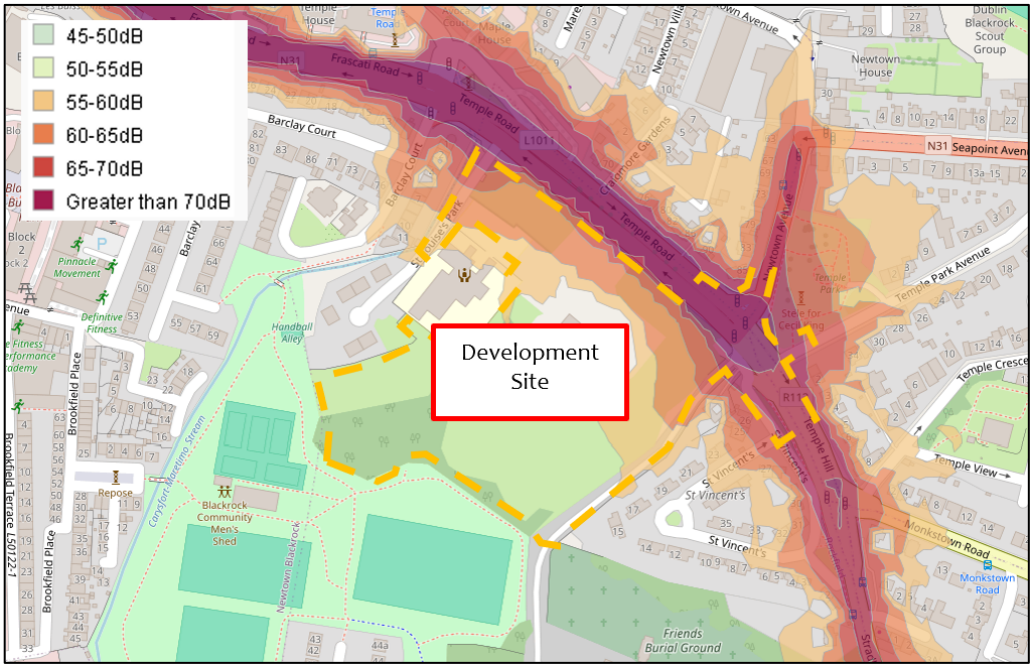

Figure 9.3 L_{den} Road Traffic Noise Levels (approximate site boundary)

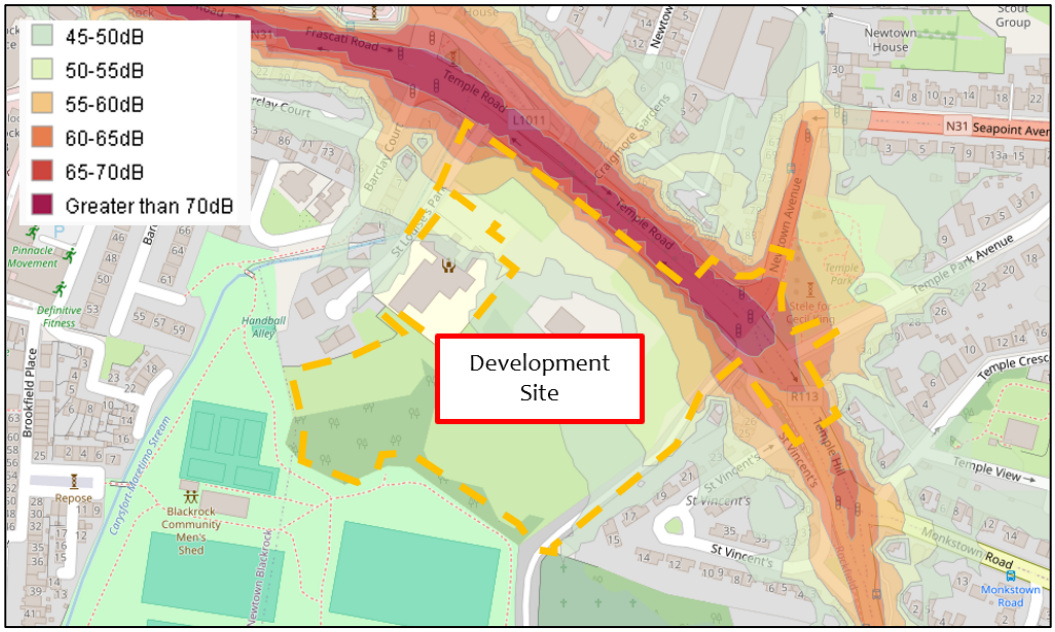

Figure 9.4 L_{Night} Road Traffic Noise Levels (approximate site boundary)

Giving consideration to the noise levels across the development site, the initial site noise risk assessment has concluded that the level of risk across the site lies within the low to medium noise risk, in line with the categories in Figure 9.1.

ProPG states the following with respect to low and medium risks areas:

Low Risk *At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an*

ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.

Medium Risk *As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.*

It should be noted that ProPG states the following with regard to how the initial site noise risk is to be used,

"2.12 It is important that the assessment of noise risk at a proposed residential development site is not the basis for the eventual recommendation to the decision maker. The recommended approach is intended to give the developer, the noise practitioner, and the decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of the acoustic issues that would be faced. Thus, a site considered to be high risk will be recognised as presenting more acoustic challenges than a site considered as low risk. A site considered as negligible risk is likely to be acceptable from a noise perspective and need not normally be delayed on noise grounds. A potentially problematical site will be flagged at the earliest possible stage, with an increasing risk indicating the increasing importance of good acoustic design."

Following the guidance contained in ProPG, therefore, it does not preclude residential development on sites that are identified as having medium or high noise levels. It merely identifies the fact that a more considered approach will be required to ensure the developments on the higher risk sites are suitably designed to mitigate the noise levels. The primary goal of the approach outlined in ProPG is to ensure that the best possible acoustic outcome is achieved for a particular site.

Acoustic Design Statement

Façade Noise Levels

Noise levels have been predicted across the proposed development site during day and night-time periods using the measured survey data from site and EPA noise maps.

Where façade noise levels are less than 55 dB $L_{Aeq,16hr}$ during the day and 50 dB $L_{Aeq,8hr}$ at night it is possible to achieve reasonable internal noise levels while also ventilating the dwellings with open windows. Therefore, for those properties where the façade noise levels are less than 55 dB $L_{Aeq,16hr}$ during the day and 50 dB $L_{Aeq,8hr}$ at night no further mitigation is required.

Where façade levels are above these levels the sound insulation performance of the building façade becomes important and a minimum sound insulation performance specification is required for windows to ensure that when windows are closed the internal noise criteria are achieved.

Facades identified as being exposed to higher levels of noise are:

- Block A1 – north western and north eastern façade;
- Block B1 – north western and north eastern façade;
- Block B2 – north western and north eastern façade;
- Block B3 – north western and north eastern façade; and,
- Block B4 – north western and north eastern façade.

As is the case in most buildings, the glazed elements and ventilation paths in the building envelope are typically the weakest element from a sound insulation perspective. In general, all wall constructions (i.e. block work or concrete and spandrel elements) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal.

In this instance, the facades highlighted in *Figure 9.5* will be provided with glazing and ventilation that achieves the minimum sound insulation performances as set out in *Figure 9.5*. Other facades in the development have no minimum requirement for sound insulation.

Figure 9.5: Façade Acoustic Requirements

External Noise Levels

External noise levels within the vast majority of communal open spaces across the development site are within the recommended range of noise levels from ProPG of between 50 – 55 dB $L_{Aeq,16hr.}$ It is considered that the objectives of achieving suitable external noise levels is achieved within the overall site, therefore no further mitigation is required to control external noise levels across amenity areas.

Entertainment Noise Assessment

Currently it is unknown whether the proposed café will have amplified music within it, however, it is recommended that all commercial units are required to achieve the specified criteria detailed in Section 9.2.2 With these limits in place it is expected that entertainment noise will not cause a negative impact on future residences in the surrounding area.

9.6 Potential Cumulative Impacts

During the construction phase of the proposed development, construction noise on site will be localised and will therefore likely be the primary noise source at the nearest noise sensitive receivers.

The contractor will be required to control noise impacts associated with this development in line with the guidance levels and follow the best practice control measures within BS 5228 -1 set out in Section 9.8 .

Any large scale future projects that are not yet proposed or permitted would also need to be the subject of EIA in turn, to ensure that no significant impacts resulting from noise and vibration will occur as a result of those developments.

9.7 Do Nothing Scenario

In the absence of the proposed development and previously permitted development, under SHD ABP-303804-19 being constructed, the noise environment at the nearest noise sensitive locations and within the development site will remain largely unchanged.

If the current proposal were not developed, then it is likely that the previously permitted under SHD ABP-303804-19 development or one similar in nature would be proposed, in line with previously permitted development and sites zoning designations that support development of the site for residential and mixed uses.

9.8 Mitigation Measures

Construction Stage

The contract documents will clearly specify the construction noise criteria included in this chapter which the construction works must operate within. The Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and comply with the recommendations of *BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise* and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001. These measures will ensure that: -

- No plant used on site will be permitted to cause an ongoing public nuisance due to noise;
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract;

For piling plant, noise reduction can be achieved by enclosing the driving system in an acoustic shroud.

- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;
- Any plant, such as generators or pumps that is required to operate outside of normal permitted working hours will be surrounded by an acoustic enclosure or portable screen;

BS 5228 *-1:2009+A1 2014* includes guidance on several aspects of construction site practices, which include, but are not limited to: -

- Selection of quiet plant
- Control of noise sources
- Screening
- Hours of work
- Liaison with the public

Further comment is offered on these items in the following paragraphs.

Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring. The contractor will be required to conduct construction noise predictions prior to works taking place and put in place the most appropriate noise control measures depending on the level of noise reduction required at any one location.

Selection of Quiet Plant

The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item of plant will be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action will be to identify whether or not said item can be replaced with a quieter alternative.

For static plant such as compressors and generators used at work areas such as construction compounds etc., the units will be supplied with manufacturers' proprietary acoustic enclosures where possible.

General Comments on Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control "at source". This refers to the modification of an item of plant, or the application of improved sound reduction methods in consultation with the supplier or the best practice use of equipment and materials handling to reduce noise.

In practice, a balance may need to be struck between the use of all available techniques and the resulting costs of doing so. It is therefore proposed to adopt the concept of "*Best Available Techniques*". as defined in EC Directive 96/61. In this context "*best*" means "*the most effective in achieving a high general level of protection of the environment as a whole*".

Proposed techniques will also be evaluated in light of their potential effect on occupational health and safety. The following outline guidance relates to practical noise control at source techniques which relate to specific site considerations: -

- For mobile plant items such as cranes, dump trucks, excavators and loaders, the installation of an acoustic exhaust and/or maintaining enclosure panels closed during operation can reduce noise levels by up to 10dB. Mobile plant will be switched off when not in use and not left idling;
- For piling plant, noise reduction can be achieved by enclosing the driving system in an acoustic shroud. For steady continuous noise, such as that generated by diesel engines, it is possible to reduce the noise emitted by fitting a more effective exhaust silencer system or utilising an acoustic canopy to replace the normal engine cover;
- For all materials handling, the contractor will ensure that best practice site noise control measures are implemented including ensuring that materials are not dropped from excessive heights and drop chutes/dump trucks are lined with resilient materials, where relevant.
- Where compressors, generators and pumps are located in areas in close proximity to noise sensitive properties/ areas and have potential to exceed noise criterion, these will be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation;
- Resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can be controlled by fixing resilient materials in between the surfaces in contact;
- Demountable enclosures can also be used to screen operatives using hand tools and may be moved around site as necessary;
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Typically, screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen, its mass, and its position relative to both the source and receiver.

The length of the screen should in practice be at least five times the height, however, if shorter sections are necessary then the ends of the screen will be wrapped around the source. BS 5228 - *1:2009+A1* states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the barrier will be such that there are no gaps or openings at joints in the screen material. In most practical situations the effectiveness of the screen is limited by the sound transmission over the top of the barrier rather than the transmission through the barrier itself. In practice, screens constructed of materials with a mass per unit of surface area greater than 10kg/m^2 will give adequate sound insulation performance.

Construction noise calculations have assumed a partial line of sight (-5dB) is achieved using a solid 2.4m high standard construction site hoarding. It will be a requirement for works occurring immediately in proximity to the closest noise sensitive locations along the Old Dublin Road, that the line of sight is further blocked such that a reduction of at least 10dB is achieved between the noise sensitive façade and construction activities. A reduction of this order can be achieved using a higher perimeter screen or using localised screening around specific items of plant.

Annex B of *BS 5228-1:2009+A1:2014* (Figures B1, B2 and B3) provide typical details for temporary and mobile acoustic screens, sheds and enclosures that can be constructed on site from standard materials.

In addition, careful planning of the site layout will also be considered. The placement of temporary site buildings such as offices and stores between the site and sensitive locations can provide a good level of noise screening during the phasing of works.

Hours of Work

Construction noise impacts will be controlled through strict working hours. Construction activity will take place during daytime hours Monday to Friday and Saturdays.

Consideration will be given to the scheduling of activities in a manner that reflects the location of the site and the nature of neighbouring properties. Each potentially noisy event/activity will be considered on its individual merits and scheduled according to its noise level, proximity to sensitive locations and possible options for noise control.

Where night time works are to take place, prior notice shall be given to the local council and residents or building occupants of noise sensitive aeas in proximity of the development.

Liaison with the Public

Clear forms of communication will be established between the contractor and noise sensitive areas in proximity so that residents or building occupants are aware of the likely duration of activities likely to generate higher noise or vibration.

The duration of piling, excavation and other high noise or vibration activities works is usually short in relation to the length of construction work as a whole, and the amount of time spent working near to sensitive areas can represent only a part of the overall period. Subjective impacts during these phases can be significantly reduced if timelines and potential impacts are known in advance.

Night Works

Relevant mitigation measures for night works are presented above and should be considered in planning any proposed night-time works.

BS5228 makes a number of recommendations in relation to "use and siting of equipment". These are all directly relevant and hence are reproduced in full. These recommendations will be adopted on site.

"Plant should always be used in accordance with manufacturers' instructions. Care should be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading should also be carried out away from such areas. Special care will be necessary when work has to be carried out at night.

Circumstances can arise when night-time working is unavoidable. Bearing in mind the special constraints under which such work has to be carried out, steps should be taken to minimise disturbance to occupants of nearby premises.

Machines such as cranes that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum. Machines should not be left running unnecessarily, as this can be noisy and waste energy.

Plant known to emit noise strongly in one direction should, when possible, be orientated so that the noise is directed away from noise-sensitive areas. Attendant operators of the plant can also benefit from this acoustical phenomenon by sheltering, when possible, in the area with reduced noise levels.

Acoustic covers to engines should be kept closed when the engines are in use and idling. The use of compressors that have effective acoustic enclosures and are designed to operate when their access panels are closed is recommended."

All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Vibration

On review of the likely vibration levels associated with construction activities, it may be concluded that the construction of the proposed development is not expected to give rise to vibration that is either significantly intrusive or capable of giving rise to structural or cosmetic damage to adjacent buildings.

In the case of vibration levels giving rise to human discomfort, in order to minimise such impacts, the following measures shall be implemented during the construction period: -

- A clear communication programme will be established to inform adjacent building occupants in advance of any potential intrusive works which may give rise to vibration levels likely to exceed perceptible levels. The nature and duration of the works will be clearly set out in all communication circulars;
- Appropriate vibration isolation shall be applied to plant, where feasible;
- Monitoring will be undertaken at identified sensitive buildings, where proposed works have the potential to be at or exceed the vibration limit values.

<u>Operational Stage</u>

In order to ensure that acceptable operational noise levels at the nearest noise sensitive locations are achieved, the following mitigation measures should be considered during the detailed design stage.

<u>Building Services Plant</u>

Noise emissions from the basement plant room and roof top plant areas will be designed to ensure that noise levels at the façade of the noise-sensitive locations both within the development and in the surrounding area do not exceed the criteria discussed at Section 3.2.1.

During the detailed design of the development, the selection and location of mechanical and electrical plant will be undertaken in order to ensure the noise emission limits set out above are not exceeded. In addition to selecting plant with suitable noise levels, the following best practice measures are recommended for all plant items in order to minimise potential noise disturbance for adjacent buildings:

- where ventilation is required for plant rooms, consideration will be given to acoustic louvers or attenuated acoustic vents, where required to reduce noise breakout;
- ventilation plant serving plant rooms and car parks will be fitted with effective acoustic attenuators to reduce noise emissions to the external environment;
- the use of perimeter plant screens will be used, where required, for roof top plant areas to screen noise sources;
- the use of attenuators or silencers will be installed on external air handling plant;
- all mechanical plant items e.g. fans, pumps etc. shall be regularly maintained to ensure that excessive noise generated any worn or rattling components is minimised;
- any new or replacement mechanical plant items, including plant located inside new or existing buildings, shall be designed so that all noise emissions from site do not exceed the noise limits outlined in this document, and;
- Installed plant will have no tonal or impulsive characteristics when in operation.

Additional Traffic on Surrounding Roads

As the development itself will not generate large volumes of additional vehicle movements, for the surrounding road network, no mitigation measures are necessary in respect of additional traffic on surrounding roads.

Inward Noise

In this instance, the facades highlighted in ***Figure 9.5*** will be provided with glazing and ventilation that achieves the minimum sound insulation performances as set out in **Table 9.17** and **Table 9.18.** Other facades in the development have no minimum requirement for sound insulation.

Mark-up	Octave Band Centre Frequency (Hz)						Rw
	125	250	500	1000	2000	4000	
RED	23	24	31	33	27	24	31

Table 9.17 Sound Insulation Performance Requirements for Glazing, SRI (dB)

The overall R_w and $D_{ne,w}$ outlined in this section are provided for information purposes only. The over-riding requirement is the Octave Band sound insulation performance values which may also be achieved using alternative glazing and ventilation configurations. Any selected system will be required to provide the same level of sound insulation performance set out in Table 9.17 **Sound Insulation Performance Requirements for Glazing, SRI (dB)**

and **Error! Reference source not found.** or greater.

The following performance requirements apply to all ventilation paths from outside the building. This can be achieved by passive acoustic wall or window vents or via mechanical ventilation systems.

Ventilators in the facades of dual aspect living/dining spaces in areas designated 'red' should provide increased performance as outlined below.

Mark-up	Octave Band Centre Frequency (Hz)						$D_{n,e,w}$
	125	250	500	1000	2000	4000	

RED	24	26	33	38	34	30	35

Table 9.18 Sound Insulation Performance Requirements for Ventilation, $D_{n,e,w}$ (dB)

It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing and ventilation systems. In the context of the acoustic performance specification the 'glazing system' is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements etc.

The assessment has demonstrated that the recommended internal noise criteria can be achieved through consideration of the proposed façade elements at the design stage. The calculated glazing and ventilation specifications are preliminary and are intended to form the basis for noise mitigation at the detailed design stage. Consequently, these may be subject to change as the project progresses.

9.9 Residual Impacts

Construction Stage

During the construction phase of the proposed development, there is the potential for temporary to short-term noise impacts on nearby noise sensitive properties due to noise emissions from site activities. The application of binding noise limits and hours of work, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum as far as practicable. For the duration of the construction period, construction noise impacts will be short-term and negative, depending on the proximity of the works to the site boundary. Along with the 5 dB reduction from partial screening from a suitable site hoarding it would be expected that a further 5 dB reduction would be achieved through on-site control measures, selection of quiet plant etc as per the mitigation described in Section 9.8.

The construction scenario is a robust assumption made for a development of this size, however at the site boundaries directly adjacent to permitted NSLs, it is unlikely 3 no. items of large plant/equipment would be operating simultaneously in such close proximity to each other at all times. In reality items of construction plant and machinery will be operating at varying distances from any one NSL.

During general construction works the residual effect is negative, significant to very significant and short term at distances up to 20m (N2 and N4) if all plant items were assumed to work simultaneously while at the nearest area of construction works to the closest NSL. Note that this is a reasonable worst-case prediction. For the majority of time construction works will take place at distances greater than 35m from the receptors. Hence, the impact can be considered negative, moderate to significant and short term.

During site clearance/demolition works the residual effect is negative, significant to very significant and temporary at distances up to 25m (N1, N2 and N4) if all plant items were assumed to work simultaneously while at the nearest area of construction works to the closest NSL.

During piling works the residual effect is negative, significant to very significant and temporary at distances up to 20m (N2 and N4) if all plant items were assumed to work simultaneously while at the nearest area of construction works to the closest NSL.

In line with DMRB Noise and Vibration (UKHE 2020) document, a significant effect relating to construction noise is deemed to occur where a moderate or major impact is likely to occur for a period of greater that 10 days/nights over 15 consecutive day/nights, or greater than 40 days over 6 consecutive months. In the case of these construction activities during site clearance/demolition and piling works, it is unlikely the durations for significant effects will be exceeded and with utilisation of construction mitigation outlined in section 9.8, hence the overall significance of effects are categorised as negative, moderate and short-term. At NSLs at greater than 45m

distance, the CNT would not be exceeded and the residual significance of effect ***is*** negative, not significant to moderate and short-term***.***

For night works with the potential to create significant noise effects, construction mitigations outlined in Section 9.8 will be utilised. It is unlikely the durations for significant effects will be exceeded and hence the overall significance of effects are categorised as ***negative, moderate and short-term.***

Vibration effects of impact during the construction phase will be ***neutral, imperceptible and short-term.***

Operational Stage

Additional Vehicular Traffic

The change in noise levels associated with additional traffic is predicted to be of imperceptible impact along the existing road network. In the context of the existing noise environment, the overall contribution of induced traffic is considered to be of neutral, imperceptible and long-term ranging to Slight to moderate and long term effect to nearby residential locations.

Mechanical Plant

Assuming the operational noise levels do not exceed the adopted design goals in line with the relevant noise criteria, the resultant residual noise impact from this source will be of ***neutral***, ***imperceptible***, ***long term*** impact.

9.10 Monitoring

Construction Stage

Where required, construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criterion.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise*.

Operational Stage

No operational noise monitoring required applicable the operational phase.

9.11 Reinstatement

Not Applicable.

9.12 Interactions

In compiling this environmental impact assessment, reference has been made to the project description provided by the project co-ordinators, project drawings provided by the project architects and information relating to construction activities provided by the engineers. Noise emission sources from the proposed development during the construction and operational phases will be from construction plant and activity, building services and traffic accessing the development. The noise impact assessment has been prepared in consultation with the design

team and traffic engineers. Reference can be made to the relevant chapters for additional information.

9.13 Difficulties Encountered

No difficulties were encountered during the preparation of the EIAR chapter.

9.14 References

- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – (EPA, 2022);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018);
- BSI (1993). BS 7385: 1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration;
- BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound;
- BSI (2014). BS 5228-1:2009 +A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise;
- BSI (2014). BS 5228-2:2009+A:2014 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration;
- Dublin Agglomeration Noise Action Plan *2024 – 2028*;
- ISO (2016). ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures;
- UK Department of Transport (1998). Calculation of Road Traffic Noise;
- UKHA (2020). Design Manual for Roads and Bridges Sustainability & Environment Appraisal LA 111 Noise and Vibration Revision 2; and
- (IoA, 2017). Professional Practice Guidance on Planning & Noise (ProPG).