



TECHNICAL REPORT

PROPOSED LARGE SCALE RESIDENTIAL DEVELOPMENT (LRD) AT THE SITE OF THE FORMER DELL EMC PREMISES INNISHMORE, BALLINCOLLIG, CORK

For:
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1.0 INTRODUCTION

This Noise & Vibration Impact Assessment has been prepared on behalf of Castle Peak Properties Ltd to accompany a planning application for a large scale residential development (LRD) at the site of the former DELL EMC premises, Innishmore, Ballincollig, Cork. CLV initially provided an inward noise impact assessment for the proposed development which was provided under separate cover (included in Appendix C in this report; note that the minor modifications to the proposed development design do not have any material impact on this assessment report or its conclusions). CLV has now been engaged to carry out an outward noise impact assessment for the proposed development as well.

The purpose of this assessment was to consider the potential for the proposed residential development to impact on identified noise sensitive receptors in the vicinity during both the construction and operational stages and either confirm acceptability or recommend necessary noise and vibration mitigation measures as required.

The following document details the results of this outward noise impact assessment.

2.0 PROPOSED DEVELOPMENT LOCATION & LAYOUT

Castle Peak Properties Ltd intend to apply for planning permission for a Large-Scale Residential Development (LRD) at this c. 1.0 ha site of the former DELL EMC premises, Innishmore, Ballincollig, Cork. The proposed development will consist of the demolition of the existing former 2 no. storey DELL EMC building (c. 3882 sq m) and ancillary plant area, with associated site clearance works. The proposed development will provide for the 130 no. residential units, arranged in 3 no. blocks in a development ranging in height from 3 to 6 no. storeys.

The development will comprise a mix of 108 no. apartments (total apartment blocks area - c. 10,657 sqm), arranged in 2 no. blocks, providing a unit mix of 52 no. 1-bed and 56 no. 2-bed apartment units. In addition, the proposed development will provide 22 no. duplex units (total duplex block area - c. 2,159 sqm), arranged in 1 no. block, providing a unit mix of 4 no. 1-bed, 9 no. 2-bed, and 9 no. 3 beds.

Vehicular, cyclist and pedestrian access to the proposed development will be via 2 no. entrances from Innishmore Lawn (to the north east) and Mechterstadt Road (to the south west) and the development will include for pedestrian and cyclist permeability. Additionally, pedestrian access points are provided to the west of the subject site and to the south, off Mechterstadt Road.

The development will also include the provision of private, communal and public open space (including all balconies); car parking at ground floor level and undercroft; bicycle parking; internal roads and pathways; bin stores; hard and soft landscaping; boundary treatments; the provision of new surface water and foul drainage pipes and any associated pipe diversion works; retaining walls; changes in level; services provision and related ducting, piping and cabling; electric vehicle charging points; attenuation tanks; SUDS; signage; 1 no. ESB substation; wayfinding structures; public realm works including public lighting; and all site development and excavation works above and below ground.

The proposed development site is bordered to the south by residential buildings, to the east by residential buildings and a commercial building (RPS), to the west by West City Retail Park and to the north by a brownfield site which has recently been granted planning permission for residential development under a Part 8 development approved by Cork City Council.

Each of the nearest noise sensitive receptors are listed along with their nearest approximate distances away from the nearest development buildings as follows:

Residential Buildings to South	27 m
Residential Buildings to Northeast	40 m
Cork City Council Inishmore Part 8 Development	14 m
RPS Office Building to East	49 m
West City Retail Park Buildings	50 m

Refer to Figure 1 below.



Figure 1 Proposed Development Location & Nearest Noise Sensitive Receptors

A general layout of the proposed development is provided in Figure 2 on the following page (showing Lower Ground Floor level).

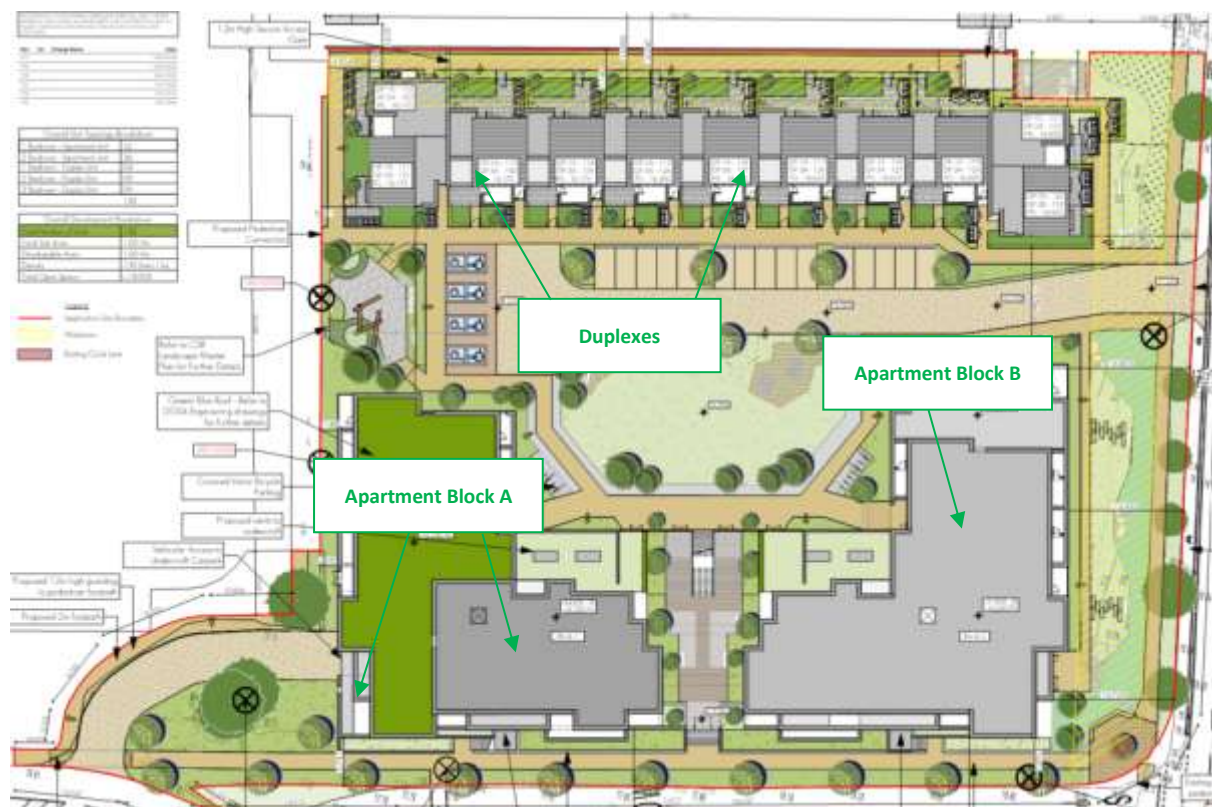


Figure 2 Proposed Development Layout

3.0 RECEIVING ENVIRONMENT

An environmental noise monitoring survey was conducted in order to quantify the ambient external noise environment in the vicinity of the proposed development site. The survey was conducted in general accordance with *ISO 1996-2: 2017: Acoustics - Description, measurement and assessment of environmental noise*. Specific details are set out in the following sections.

3.1 Measurement Locations

Although the proposed development site is large, the noise sensitive receptors located in the vicinity can be grouped into those located either adjacent to or across the street from the north, northeast and south boundaries. The nearest noise sensitive receptors are the residential dwellings located in these areas (the RPS & West City Retail Park buildings are not considered noise sensitive receptors and therefore do not require an ambient noise survey).

Given this situation, three measurement locations were deemed to be appropriate in order to obtain a robust range of the ambient noise levels in the vicinity of the noise sensitive receptors in this instance. They are summarised as follows and shown in Figure 3 below:

- NML 1:** across Innishmore Lawn from the proposed development in the vicinity of the residential buildings to the south.
- NML 2:** across Innishmore Lawn from the proposed development in the vicinity of the residential buildings to the northeast.
- NML 3:** adjacent to the proposed development boundary with the Cork City Council Innishmore Part 8 Development to the north.



Figure 3 Site Layout Showing Approximate Position of Measurement Locations

3.2 Survey Periods

Noise monitoring was conducted over the course of two survey periods as follows:

- Daytime: 14:40 to 17:40 hrs on 19 January 2026
- Night Time: 23:00 to 01:50 hrs on 19 / 20 January 2026

The meteorological conditions that were observed at Cork Airport over the course of the survey periods are detailed in Figure 4 below.

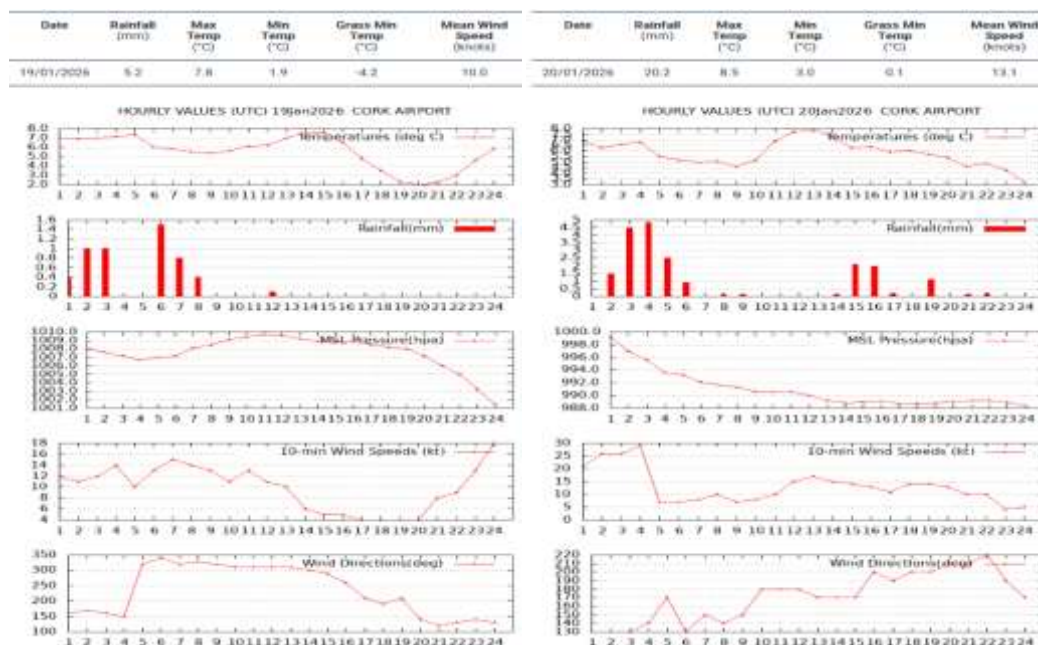


Figure 4 Meteorological Conditions Observed at Cork Airport During the Noise Survey

3.3 Personnel & Instrumentation

Brian S. Johnson (CLV) conducted the noise level measurements during both survey periods. He is an internationally experienced acoustic consultant who has been working in the fields of architectural / building acoustics and noise control since 1994. He has been based in America, Europe, Asia and Australia and is a member of the Institute of Acoustics (IOA). Brian also has extensive knowledge in the field of environmental acoustics and holds a Certificate of Competence in Environmental Noise Measurements from the IOA.

The measurements were conducted using an NTI Audio Type XL2 Sound Level Meter (Serial #A2A-11070-EO). It was fitted with a 90mm windshield the measurement apparatus and was checked calibrated both before and after the survey using a Casella CAL 200 Acoustic Calibrator (Serial #18882). The microphone was positioned approximately 1.4m above the ground at all measurement locations.

The calibration certificates for the sound level meter and calibrator are provided in Appendices A & B respectively of this document.

3.4 Procedure

Measurements were conducted at each location on a cyclical basis. Sample periods for the noise measurements were 15 minutes during both the daytime and night-time periods. The results were saved to the instrument memory for later analysis. All primary noise sources contributing to noise build-up were also noted.

3.5 Measurement Parameters

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

- L_{Aeq}** is the equivalent continuous sound level. It is a type of average used to describe a fluctuating noise in terms of a single noise level over the sample period and is typically used as a descriptor for the ambient noise level.
- 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.
- L_{A10}** is the sound level that is exceeded for 10% of the sample period.
- 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 2×10^{-5} Pa.

Noise characteristics in this report are also considered in respect of the following two aspects:

- Tonal Noise:** Sounds which cover a range of only a few Hz which contain a clearly audible tone, i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being ‘tonal’.
- Impulsive Noise:** A noise that is of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background (pressurised air release, gunshot etc.).

3.6 Measurement Results

NML 1

The survey results for Location 1 are summarised in Table 1 on the following page.

Time		Measured Noise Levels (dB re. 2×10^{-5} Pa)				
		L _{Aeq}	L _{Amax}	L _{Amin}	L _{A10}	L _{A90}
Daytime	14:40 - 14:55 hrs	61	76	44	65	47
	15:45 - 16:00 hrs	63	76	45	67	50
	16:45 - 17:00 hrs	63	84	44	66	49
Night-time	23:00 - 23:15 hrs	40	52	31	43	36
	00:00 - 00:15 hrs	39	52	30	41	33
	00:55 - 01:10 hrs	38	60	29	40	30

Table 1 Summary of Measured Noise Levels at NML 1

During daytime monitoring periods, the dominant sources of noise observed in the area were local traffic events along Innishmore Lawn. There were also occasional significant contributions from pedestrian pass-by events. Daytime noise levels were in the range of 61 to 63dB L_{Aeq} and 47 to 50dB L_{A90}.

The night-time noise measurements at this location were again dominated by local and distant traffic events and as well as urban hum. Noise levels were in the range of 38 to 40dB L_{Aeq} and 30 to 36dB L_{A90}.

No significant source of vibration was noted during the survey periods.

NML 2

The survey results for Location 2 are summarised in Table 2 below.

Time		Measured Noise Levels (dB re. 2×10^{-5} Pa)				
		L _{Aeq}	L _{Amax}	L _{Amin}	L _{A10}	L _{A90}
Daytime	15:00 - 15:15 hrs	52	64	41	55	45
	16:00 - 16:15 hrs	52	68	41	55	45
	17:05 - 17:20 hrs	53	68	41	56	46
Night-time	23:20 - 23:35 hrs	38	52	31	40	33
	00:15 - 00:30 hrs	37	52	29	39	31
	01:15 - 01:30 hrs	35	53	27	37	28

Table 2 Summary of Measured Noise Levels at NML 2

During daytime monitoring periods, the dominant sources of noise observed in the area were local traffic events along Innishmore Lawn. There were also occasional contributions from pedestrian pass-by events. Daytime noise levels were in the range of 52 to 53dB L_{Aeq} and 45 to 46dB L_{A90} .

The night-time noise measurements at this location were again dominated by local and distant traffic events and as well as urban hum. Noise levels were in the range of 35 to 38dB L_{Aeq} and 28 to 33dB L_{A90} .

No significant source of vibration was noted during the survey periods.

NML 3

The survey results for Location 3 are summarised in Table 3 below.

Time		Measured Noise Levels (dB re. 2×10^{-5} Pa)				
		L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
Daytime	15:25 - 15:40 hrs	48	75	40	50	44
	16:25 - 16:40 hrs	49	71	39	51	44
	17:25 - 17:40 hrs	48	73	38	51	45
Night-time	23:40 - 23:55 hrs	35	51	27	37	31
	00:35 - 00:50 hrs	33	48	25	35	30
	01:35 - 01:50 hrs	32	49	25	34	29

Table 3 Summary of Measured Noise Levels at NML 3

During daytime monitoring periods, the dominant sources of noise observed in the area were local traffic events from the various roads in the vicinity. There were also contributions from construction works being carried out at the site of the Cork City Council Inishmore Part 8 Development to the north. Daytime noise levels were in the range of 48 to 49dB L_{Aeq} and 44 to 45dB L_{A90} .

The night-time noise measurements at this location were again dominated by from the various roads in the vicinity as well as urban hum. Noise levels were in the range of 32 to 35dB L_{Aeq} and 29 to 31dB L_{A90} .

No significant source of vibration was noted during the survey periods.

4.0 ASSESSMENT STRATEGY OVERVIEW

In order to assess the potential for noise impacts from the proposed development, the following prediction methodology was adopted in this instance:

- ✓ Noise measurements were conducted in order to quantify the ambient noise level environment in the vicinity of the nearest noise sensitive receptors (refer to Section 3.0).

- ✓ The measured ambient noise levels were used to establish maximum construction noise emission criteria limits (refer to Section 5.1) along with establishing operational noise emission criteria limits from best practice published guidance (refer to Section 5.2).
- ✓ Construction noise emission levels were calculated in accordance with *BS 8233* at each of the nearest noise sensitive receptors based on sound power / pressure levels for expected equipment / processes and estimated utilisation periods along with standard appropriate corrections for attenuation with distance, screening from buildings / perimeter site hoarding and the presence of nearby reflecting surfaces (refer to Section 6.1).
- ✓ Operational noise emission levels were calculated at each of the nearest noise sensitive receptors (in accordance with *BS 8233*) based on all identified operational noise source levels along with standard appropriate corrections for attenuation with distance, screening from buildings and the presence of nearby reflecting surfaces (refer to Section 6.2).
- ✓ The cumulative results of these operational calculations were then used to assess the potential for a noise impact based on a comparison with the criteria limits at the nearest noise sensitive receptors (refer to Section 6.2).

All noise prediction calculations were conducted in general accordance with *ISO 9613: Acoustics - Attenuation of sound outdoors, Part 2: General method of calculation, 1996*.

5.0 NOISE & VIBRATION EMISSION CRITERIA

5.1 Construction Phase

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

In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the British Standard *BS 5228 - 1: 2009+A1: 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 1: Noise*.

The approach adopted in this instance calls for the designation of a noise sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded, indicates a significant noise impact is associated with the construction activities.

Table 4, on the following page, sets out the values which, when exceeded, indicate a significant effect at the facades of residential receptors as recommended by *BS 5228 - 1*. Please note that these are cumulative levels, i.e. the sum of both ambient and construction noise levels.

Assessment Category & Threshold Value Period (L_{Aeq})	Threshold Value, Decibels (dB)		
	Category A ^A	Category B ^B	Category C ^C
Night-Time (23:00 to 07:00hrs)	45	50	55
Evenings & Weekends ^D	55	60	65
Daytime (07:00 - 19:00) & Saturdays (07:00 - 13:00)	65	70	75

Table 4 Example Threshold of Significant Effect at Dwellings

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

For the appropriate period (e.g. daytime), the ambient noise level is determined and rounded to the nearest 5dB. In this instance, the measured daytime ambient noise levels in the vicinity of the proposed development were measured in the range of 48 - 63 dB L_{Aeq} during daytime periods (refer to Section 3.6). The residential dwellings in the vicinity will therefore be considered as Category A receptors.

It should also be considered that the established noise emission criterion detailed above is for residential dwellings. The less acoustically sensitive RPS office building and West City Retail Park buildings would typically be considered as Category C receptors.

The limits in Table 5 below will therefore be applied at the nearest receptors in respect of construction noise emissions from the proposed development.

Adjacent Noise Sensitive Receptor Location	Threshold Value, Decibels (dB L_{Aeq})		
	Daytime Periods (07:00 - 19:00) & Saturdays (07:00 - 13:00)	Evening Periods* 19:00 - 23:00 Weekdays 13:00 - 23:00 Saturdays & 07:00 - 23:00 Sundays	Night Periods* (23:00 to 07:00hrs)
All Residential Buildings	65	55	45
RPS Office Building / West City Retail Park	75	65	55

Table 5 Established Threshold / Maximum Construction Noise Criteria Limits for Proposed Development

If the total noise level (i.e. construction noise plus existing ambient noise level) exceeds the appropriate category value (e.g. 65dB $L_{Aeq,T}$ during daytime periods), then a relative noise impact is deemed to have occurred.

Note also that the levels listed in Table 5 are $L_{Aeq,T}$ noise levels (defined in Section 3.5) which are typically averaged over hourly periods.

5.2 Operational Phase

Due consideration must be given to the nature of the primary noise sources when setting noise emission criteria. In this instance, there are three primary sources of noise associated with the development once operational. Criteria for noise from each of these sources, will be considered in terms of the $L_{Aeq,T}$ parameter (the equivalent continuous sound level).

There is no Irish Standard containing guidance that is applicable to residential developments in this instance. In the absence of such standards, best practice dictates that the potential noise impact of the proposed development is assessed against appropriate best practice British and / or International Standards.

In this instance, appropriate guidance is contained within *BS 8233 (2014): Guidance on Sound Insulation and Noise Reduction for Buildings*. This British Standard sets out recommended noise limits for indoor ambient noise levels in residential buildings as detailed in Table 6 below.

Activity	Room Type	Design Criterion $L_{Aeq,T}$ (dB)	
		Daytime (07:00 - 23:00hrs)	Night Time (23:00 - 07:00hrs)
Resting / Sleeping Conditions	Living Rooms	35dB $L_{Aeq,16hr}$	-
	Bedrooms	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,8hr}$

Table 6 Recommended Indoor Ambient Noise Levels for Residential Buildings from *BS 8233 (2014)*

For the purposes of this assessment, it is necessary to derive external limits based on the internal criteria listed in the table above. This is done by factoring in a degree of noise reduction afforded by an open window, which is defined in the standard as being 15dB.

Applying the 15dB factor to the values from the *BS 8233* table, the following criteria would apply at the façades of all the nearby residential buildings:

- **Daytime (07:00 to 23:00 hours)** **50 dB $L_{Aeq,16hr}$**
- **Night-time (23:00 to 07:00 hours)** **45 dB $L_{Aeq,8hr}$**

In consideration of all the other nearby receptors, there is no specific criteria guidance for retail stores or office buildings in *BS 8233* (as these building typologies are generally not considered to be overly noise sensitive). However, the standard does list 'typical' internal noise level criteria ranges of 50 - 55 and 35 - 40dB $L_{Aeq,T}$ for department stores and executive offices respectively which would both be considered applicable in this instance.

Applying the 15dB factor for the noise reduction afforded by an open window (or an open door in the case of the retail buildings) to the lower criteria range values in each instance, the following criteria would therefore apply at the facades of the nearby receptors:

- **West City Retail Park Bldgs** **65 dB $L_{Aeq,T}$**
- **RPS Office Building** **50 dB $L_{Aeq,T}$**

In summary, the established noise criteria at the various adjacencies to the proposed development is detailed in Table 7 below.

Receptor	Design Criterion $L_{Aeq,T}$ (dB)	
	Daytime	Night Time
All Residential Buildings	50 dB $L_{Aeq,8hr}$	45 dB $L_{Aeq,16hr}$
West City Retail Park Buildings	65 dB $L_{Aeq,T}$	
RPS Office Building	50 dB $L_{Aeq,T}$	

Table 7 Summary of Established Noise Emission Criteria

In order to assist with the interpretation of the noise associated with changes in noise level, Table 8 below offers guidance as to the likely impact associated with any particular relative change.

Change in Sound Level (dB L_{Aeq})	Subjective Perception	Impact
< 3	Inaudible	Imperceptible
3 - 5	Perceptible	Slight
6 - 10	Up to a doubling of loudness	Moderate
11 - 15	Over a doubling of loudness	Significant
> 15		Profound

Table 8 Likely Impact Associated with Change in Noise Level

5.3 Vibration Criteria

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

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

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

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

BS 5228 recommends that for soundly constructed residential property, light commercial buildings 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 particle velocity of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and increasing to 50mm/s at 40Hz and above for intermittent vibration.

For reinforced or framed structures or industrial and heavy commercial buildings 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 particle velocity of 50mm/s at 40Hz and above again for intermittent vibration.

In the case of continuous vibration, it states that these figures may need to be reduced by up to 50%. Below these vibration magnitudes minor damage is unlikely, although where there is existing damage, these limits may be reduced by up to 50%.

6.0 PREDICTED NOISE & VIBRATION IMPACT

6.1 Construction Phase

During the construction phase, a variety of plant items will be in use such as lifting equipment, dumper trucks and general construction plant items. Each of these items will generate significant levels of noise and will need to have noise emissions predictions carried out in respect of same.

The nearest noise sensitive receptors to the proposed development that were identified and detailed in Section 2.0 are reproduced again as follows:

Residential Buildings to South	26 m
Residential Buildings to Northeast	40 m
Cork City Council Inishmore Part 8 Development	14 m
RPS Office Building to East	49 m
West City Retail Park Buildings	50 m

Note that these distances represent the closest distance of the nearest proposed development building to each noise sensitive receptor. A 15m distance separation between the nearest dwelling in the Cork City Council Inishmore Part 8 Development and the closest proposed development building has been considered as a basis of assessment. It must be stated though that, for most of the time, plant and equipment will be at a greater distance than these and, consequently, will have a lesser impact.

The following assumptions have also been made in the preparation of these construction noise prediction calculations:

- utilisation of all equipment of 66% of the 12-hour working day (i.e. 8 hours)
- the site will be surrounded by a 2.4m high solid hoarding

Table 9, on the following page, indicates typical noise levels that would be expected from the proposed construction site during the various phases of the construction project and their predicted level at each of the nearest noise sensitive receptors.

Phase	Plant Item (BS 5228 Ref)	At 10m (dB) ¹	Predicted Noise Level (dB L _{Aeq})				
			Res Building to South	Dwellings to Northeast	Inishmore Part 8 Development	RPS Office Bldg to East	West City Retail Park Bldgs
Excavation / Site Preparation	Tracked Excavator (C2.22)	72	65	62	68	60	60
	Dumper (C3.100)	74					
	Wheeled Loaded Lorry (D3.1)	75					
Demolition	Pulveriser on Tracked Excavator (C1.5)	72	76	72	79	71	71
	Tracked Crusher (C1.14)	82					
	Pulveriser on Tracked Crusher (C1.4)	84					
Foundation Laying	Compressor (C6.19)	72	65	60	67	58	58
	Poker Vibrator (C6.40)	73					
	Cement Mixers (C6.6)	71					
General Construction	Compressor (C7.70)	70	70	65	73	65	64
	Diesel Hoist (C7.97)	73					
	Pneumatic Circular Saw (C.79)	75					
	Generator (C7.51)	72					
	Dumper (C3.100)	74					

Table 9 Predicted Noise Emission Levels at Nearest Noise Sensitive Receptors During Construction Phases

The values presented in Table 9 represent the worst case condition when construction plant / activities will be operational at the nearest proposed development building to the NSRs without provision of noise control measures or mitigation factors.

¹ Sound data from BS5228-1:2009+A1:2014 *Code of practice for noise and vibration on construction and open sites*.

The existing apartment building to the south could experience construction sound emissions levels above 65dB L_{Aeq} during the general construction phase and the Cork City Council Inishmore Part 8 Development dwellings directly adjoining the boundary to the north are likely to experience sound emissions above 65dB L_{Aeq} during all construction phases. All of the nearest noise sensitive receptors in the vicinity are also likely to experience noise emissions levels higher than the 65dB L_{Aeq} criterion during the demolition phase.

The magnitude of the construction phase levels at the NSRs is due to their proximity to their shared site boundary. Although these exceedances will likely be for short durations (when construction works are being carried out near the NSRs located along the proposed development common boundary and during the short term demolition phase), the mitigation measures for construction works outlined in Section 7.1 should still be provided.

Note that noise impacts from construction activities carried out in close vicinity to noise sensitive receptors will always be expected to cause noise impacts. The necessity for these activities to be managed / coordinated with local residents (in conjunction with the other best practice noise reduction measures detailed in Section 7.1) therefore becomes critical for minimising these impacts.

In respect of vibration, the potential for impact at neighbouring sensitive locations during construction will be limited to excavation works and lorry movements on uneven road surfaces. However, lorry movements will be mostly on existing roads which are free of significantly sized speed bumps and other similar impediments, so any potential vibration impact is therefore expected to be negligible.

6.2 Operational Phase

There are three principal sources of noise that are expected to arise during the operational phase of the proposed development in this instance. These sources are as follows:

- Building Services Plant
- Vehicular Traffic on New Access Road
- Additional Vehicular Traffic on Public Roads

Each one of these potential sources of noise is considered in turn in the following sections.

Building Services Plant

As part of the design of the proposed development, there will be a limited number of electrical / mechanical plant operating to service it; most of it will be capable of generating noise to some degree.

Although the MEP design is not sufficiently developed at this stage, it is understood that the only noise producing element of the development building services strategy are expected to be Exhaust Air Heat Pumps (EAHP) in the apartments and Air to Water Heat Pumps (AWHP) with CMEV ventilation in the duplexes.

The EAHP systems for the apartments do not have any external condensers; they are located within the internal unit itself with the ventilation system also integral to each unit. There are only 150mm intake and extract ducts that will connect to atmosphere from each apartment.

The AWHP systems do have external condenser units with the CMEV being located separately internally (and therefore negligible).

Indicative selections for each are summarised in Table 10 below.

Unit	Make / Manufacturer	Location	Noise Level
EAHP	e.VEN H3.5 or H5	Apartments	44dB L _w (Vent)
AWHP	Mitsubishi PUZ-WM60VAA(-BS)	Town Houses	45dB L _p at 1m (Unit)

Table 10 Heat Pump Selections & Manufacturer Listed Noise Levels

Taking into consideration this noise level for each of these units along with appropriate corrections for distance, screening and the presence of nearby reflecting surfaces and assuming that 75% of these units in the vicinity are operating simultaneously, the resultant noise levels at the nearest noise sensitive receptors have been calculated and are predicted to be as follows:

<u>Noise Sensitive Receptor</u>	<u>Noise Level</u>
➤ Residential Buildings to South	26 dB L _{Aeq,T}
➤ Residential Buildings to Northeast	20 dB L _{Aeq,T}
➤ Cork City Council Inishmore Part 8 Development	27 dB L _{Aeq,T}
➤ RPS Office Building to East	14 dB L _{Aeq,T}
➤ West City Retail Park Buildings	24 dB L _{Aeq,T}

All the predicted noise emission levels above are below both the daytime and night time criteria at all nearby noise sensitive receptors.

In respect of tonal noise emission elements, heat pumps typically are not tonal and the predicted noise emissions of these units are predicted to be below the ambient noise level in the vicinity and would therefore not be significant enough to manifest anyway.

No impulsive elements of any significance are expected from heat pump operation.

No further mitigation measures would therefore be required in respect of building services noise emissions from the proposed development (apart from either ensuring heat pumps selections are similar to the selections detailed in Table 10 or ensuring they have a manufacturer listed sound power levels that are similar).

Vehicular Traffic on New Access Road

The proposed development apartment building includes one primary access road entrance which is located at the southwest corner of the site in the same location as the site access entrance road for the existing development. However, the new entrance road will immediately enter an enclosed car park area on the lower ground floor level of the proposed development apartment building and will therefore not contribute any significant noise emissions to the environment (note that the noise emissions from the increase in vehicular traffic due to the additional traffic generated by the development is assessed in the following section).

The proposed development duplexes will also have surface level parking areas located in the central portion of the site that will be accessed from Innishmore Lawn at the eastern boundary of the development using a new internal road.

Refer to Figure 5 below.

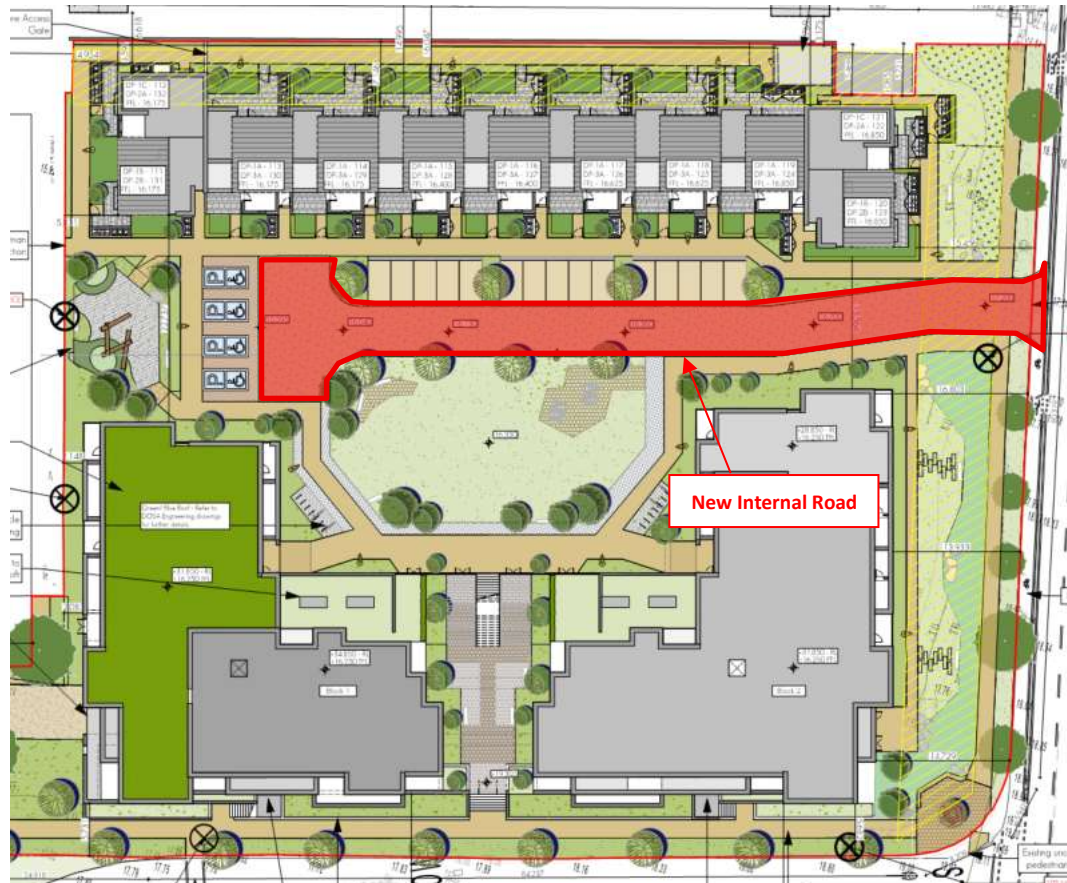


Figure 5 Proposed Development Internal Road

The noise level associated with an event of short duration, such as a vehicle drive-by, may be expressed in terms of its Sound Exposure Level² (SEL). The SEL can be used to calculate the contribution of an event or series of events to the overall noise level in a given period. The appropriate formula is given as follows:

$$L_{Aeq,T} = SEL + 10 \log_{10}(N) - 10 \log_{10}(T) \quad \text{dB}$$

where: $L_{Aeq,T}$ is the equivalent continuous sound level over the time period T (s);

SEL is the “A-weighted” Sound Exposure Level of the event under consideration (dB);

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

The mean value of a Sound Exposure Level for a car movement, at low to moderate speeds, is of the order of 65dB(A) at a distance of 5m from the edge of the road. This figure is based on a series of measurements conducted under controlled conditions.

² Defined as being the “A-weighted” equivalent continuous sound level which, when maintained for one second, contains the same quantity of sound energy as the actual time varying level of one event.

Traffic flow information was provided by MHL & Associates. In order to assess a worst case situation, the number of traffic movements during the PM Peak period for the Design + 15 year scenario was considered for assessment in this instance (which had the highest amount of vehicular movements). Reference to the Traffic & Transport Assessment Report confirms that approximately 82 traffic movements are expected during this hourly period.

Using the method outlined above with the estimated traffic flows, the peak-hour noise levels have been predicted at the noise sensitive receptors accordingly. The results are summarised below.

<u>Noise Sensitive Receptor</u>	<u>Noise Level (PM Peak)</u>
➤ Residential Buildings to South	17 dB $L_{Aeq,1hr}$
➤ Residential Buildings to Northeast	28 dB $L_{Aeq,1hr}$
➤ Cork City Council Inishmore Part 8 Development	19 dB $L_{Aeq,1hr}$
➤ RPS Office Building to East	27 dB $L_{Aeq,1hr}$
➤ West City Retail Park Buildings	20 dB $L_{Aeq,1hr}$

The predicted noise emission levels at the nearest residential receptors for both the peak hour periods are in the range of 17 - 28 dB L_{Aeq} .

All of these daytime peak hour levels are lower than the established criteria of 50dB $L_{Aeq,16hr}$ and 45dB $L_{Aeq,8hr}$ for both daytime and night time periods respectively. They are also lower than the ambient noise levels measured in the vicinity. Note that a significant number of traffic movements is not expected during the night time period and noise emissions are therefore expected to be negligible.

No additional mitigation measures are therefore required in respect of vehicular traffic on the new internal roads.

Additional Vehicular Traffic on Public Roads

The proposed development will introduce some levels of additional traffic onto public roads in the locality of the site. The traffic flow information was provided by MHL & Associates in their Traffic & Transport Assessment Report for the opening and +5 & +15 year design years.

The results of our analysis at the main junctions (detailed in Figure 6 below) for the predicted peak hour traffic volumes based on this information are presented in Tables 11 - 13 on the following page.



Figure 6 Traffic Junction Areas Assessed

Junction	Time Period	Peak Flows		Change in Noise Level (dB)
		Without Development	With Development	
J1	AM Peak	1909	1968	+ 0.1
	PM Peak	1911	1986	+ 0.2
J2	AM Peak	1814	1902	+ 0.2
	PM Peak	1491	1577	+ 0.2
J3	AM Peak	1085	1159	+ 0.3
	PM Peak	655	714	+ 0.4
J4	AM Peak	910	983	+ 0.3
	PM Peak	409	472	+ 0.6

Table 11 Change in Traffic Noise Emission Level for the Opening Year 2027

Junction	Time Period	Peak Flows		Change in Noise Level (dB)
		Without Development	With Development	
J1	AM Peak	2027	2086	+ 0.1
	PM Peak	2029	2104	+ 0.2
J2	AM Peak	1927	2015	+ 0.2
	PM Peak	1584	1670	+ 0.2
J3	AM Peak	1155	1229	+ 0.3
	PM Peak	704	763	+ 0.3
J4	AM Peak	965	1038	+ 0.3
	PM Peak	433	496	+ 0.6

Table 12 Change in Traffic Noise Emission Level for the Opening Year 2032

Junction	Time Period	Peak Flows		Change in Noise Level (dB)
		Without Development	With Development	
J1	AM Peak	2143	2202	+ 0.1
	PM Peak	2145	2220	+ 0.1
J2	AM Peak	2036	2124	+ 0.2
	PM Peak	1674	1760	+ 0.2
J3	AM Peak	1220	1294	+ 0.3
	PM Peak	761	814	+ 0.3
J4	AM Peak	1020	1093	+ 0.3
	PM Peak	458	521	+ 0.6

Table 13 Change in Traffic Noise Emission Level for the Opening Year 2042

The differences between predicted traffic flows with and without the site are such that the resulting increase in noise levels will be < 1dB on the surrounding road networks. Reference to Table 8 confirms that the impact of this relative increase would be considered imperceptible and therefore negligible.

No mitigation measures are therefore required in respect of additional vehicular traffic on public roads.

Cumulative Operational Noise Levels

The total level of combined noise emissions from the proposed development noise sources can be determined by summing together all their individual contributions. The total levels of each are summarised and totalled in Tables 14 & 15 as follows.

Noise Source	Daytime Period Noise Level Emissions (dB L _{Aeq,16hr})				
	Residential Building to South	Dwellings to Northeast	Inishmore Part 8 Development	RPS Office Bldg to East	West City Retail Park Bldgs
Building Services Plant	26	20	27	14	24
Vehicular Traffic Entering Development	17	28	19	27	20
Additional Vehicular Traffic	Negligible.				
Cumulative Noise Level	27	29	28	27	26

Table 14 Proposed Development Cumulative Noise Levels Summary (Daytime Period)

Noise Source	Night Time Period Noise Level Emissions (dB L _{Aeq,8hr})				
	Residential Building to South	Dwellings to Northeast	Inishmore Part 8 Development	RPS Office Bldg to East	West City Retail Park Bldgs
Building Services Plant	26	20	27	14	24

Vehicular Traffic Entering Development	Negligible.				
Additional Vehicular Traffic	Negligible.				
Cumulative Noise Level	26	20	27	14	24

Table 15 Proposed Development Cumulative Noise Levels Summary (Night Time Period)

These cumulative noise levels are compared with the established project noise emission criteria for both daytime and night time periods in Tables 16 & 17 on the following page.

Receptor	Predicted Daytime Period Noise Level	Noise Emission Criteria	Compliant?
Residential Bldg to South	27 dB $L_{Aeq,16hr}$	50 dB $L_{Aeq,16hr}$	✓
Residential Dwellings to Northeast	29 dB $L_{Aeq,16hr}$		✓
Inishmore Part 8 Development	28 dB $L_{Aeq,16hr}$		✓
RPS Office Bldg to East	27 dB $L_{Aeq,T}$	50 dB $L_{Aeq,T}$	✓
West City Retail Park Bldgs	26 dB $L_{Aeq,T}$	65 dB $L_{Aeq,T}$	✓

Table 16 Proposed Development Cumulative Noise Emission Level Comparison with Criteria (Daytime)

Receptor	Predicted Daytime Period Noise Level	Noise Emission Criteria	Compliant?
Residential Bldg to South	26 dB $L_{Aeq,8hr}$	45 dB $L_{Aeq,16hr}$	✓
Residential Dwellings to Northeast	20 dB $L_{Aeq,8hr}$		✓
Inishmore Part 8 Development	27 dB $L_{Aeq,8hr}$		✓
RPS Office Bldg to East	14 dB $L_{Aeq,T}$	50 dB $L_{Aeq,T}$	✓
West City Retail Park Bldgs	24 dB $L_{Aeq,T}$	65 dB $L_{Aeq,T}$	✓

Table 17 Proposed Development Cumulative Noise Emission Level Comparison with Criteria (Night Time)

As confirmed in Tables 16 & 17, the expected levels of noise emissions from the proposed development are within the established criteria at all adjacent noise sensitive receptors during all time periods.

The predicted cumulative noise levels for the proposed development have also been compared with the measured ambient noise levels measured in the vicinity of the nearest

noise sensitive receptors (i.e. residential buildings) in Tables 18 & 19 as follows.

Location	Period	Predicted Noise Level	Measured Ambient Noise Level Range	Noise Level Above or Below Ambient?
Residential Bldg to South	Daytime	27 dB $L_{Aeq,16hr}$	61 - 63 dB L_{Aeq}	Below
Residential Dwellings to Northeast		29 dB $L_{Aeq,16hr}$	52 - 53 dB L_{Aeq}	Below
Inishmore Part 8 Development		28 dB $L_{Aeq,16hr}$	48 - 49 dB L_{Aeq}	Below

Table 18 Noise Emission Level Comparison with Daytime Period Ambient Noise Levels

Location	Period	Predicted Noise Level	Measured Ambient Noise Level Range	Noise Level Above or Below Ambient?
Residential Bldg to South	Night Time	26 dB $L_{Aeq,8hr}$	38 - 40 dB L_{Aeq}	Below
Residential Dwellings to Northeast		20 dB $L_{Aeq,8hr}$	35 - 38 dB L_{Aeq}	Below
Inishmore Part 8 Development		27 dB $L_{Aeq,8hr}$	32 - 35 dB L_{Aeq}	Below

Table 19 Noise Emission Level Comparison with Night Time Period Ambient Noise Levels

As can be seen in the preceding tables, the predicted levels of noise emissions from the proposed development are below the existing ambient noise levels at the nearest noise sensitive receptors in the vicinity and would therefore be expected to be nominally inaudible for the vast majority of the time.

It should also be highlighted that each of the noise level conditions that were assessed would be considered worst case in each instance.

There are therefore no significant operational noise impacts that are expected from the proposed development on any of the identified adjacent noise sensitive receptors.

7.0 AVOIDANCE, REMEDIAL & REDUCTIVE MEASURES

The following measures are recommended to minimise the potential for disturbance due to noise emissions from the proposed development. Proper application of these measures should reduce noise emissions less than those predicted in this report.

Construction Phase

The assessment of the proposed development has identified construction stage noise emissions will be above typical limit values at most NSRs during periods when activities are being carried out during proposed development boundaries. The following measures are

therefore recommended to minimise the potential for disturbance due to noise emissions from the proposed development.

Proper application of these measures should reduce noise emissions less than those predicted in this report:

- Establishing channels of communication between the contractor / developer, Local Authority and residents.
- Appointment of a site representative responsible for matters relating to noise.
- Provision of 2.4m high perimeter hoarding around the site boundary.
- Selection of plant with low inherent potential for generation of noise.
- Erection of barriers as necessary around items such as generators or compressors.
- Placement of noisy plant as far away from sensitive properties as permitted by site constraints.
- Avoiding unnecessary revving of engines and switch off idling engines / equipment when not in use.
- Restricting construction activities to daytime periods only.
- Use of acoustic enclosure for high noise impact activities, such as breaking;
- Turning off / powering down plant when not in use;
- Turning off HGVs when not in use;
- Reduction in drop heights of incoming materials;
- Appointing project liaison officer to communicate with locals regarding noise works, their duration and organising construction phase noise monitoring;
- Strict controls on construction hours to prevent noise works occurring early morning or into the evening period; and,
- Inclusion of response procedure within the CEMP to noise complaints and breaches.

The Contractor will ensure these measures required to control noise emissions will be in place and all workers on the Site are kept aware of them through on-site toolbox talks.

In advance of construction phase commencement, the appointed contractor will also submit a CEMP to the Council for approval. Reference should be made to BS 5228 which provides detailed guidance on the control of noise from demolition and construction activities.

It is also recommended that when construction activities are carried out in the vicinity of the Cork City Council Inishmore Part 8 Development dwellings to the north, that they be managed / coordinated with local residents in order to minimise potential noise impact as far as practicable.

Operational Phase

Building Services Plant

The predicted noise levels from proposed development building services plant are within the adopted criteria for both the daytime and night-time periods. The only mitigation consideration that would be deemed as being required in this instance is as follows:

- ✓ Either ensuring heat pumps selections are similar to the selections detailed in Table 10 or ensuring they have a manufacturer listed sound power levels that are similar to those listed.

Vehicular Traffic on New Internal Roads

The noise impact assessment has demonstrated that ameliorative measures are not required in respect of vehicular traffic on the new proposed development internal roads.

Additional Vehicular Traffic on Public Roads

The noise impact assessment has demonstrated that ameliorative measures are not required in respect of additional vehicular traffic on public roads.

Vibration

There will be no significant levels of vibration associated with the proposed development.

8.0 SUMMARY OF NOISE & VIBRATION IMPACT

This section summarises the likely residual noise and vibration impact associated with the proposed development, taking into account the ameliorative measures described in Section 7.0.

8.1 Construction Phase

As stated in Section 6.1, construction activities are typically expected to impart significant impacts on noise sensitive receptors when carried out in close proximities with receptors such as those that will be immediately adjacent to the proposed development to the north. In this instance, it is worth noting that these noise impacts will only occur when construction works are being carried out on the development buildings located in close proximity to these receptors. Once the buildings in these areas are constructed, construction phase noise emission levels will decrease significantly due to shielding from the other constructed buildings and significantly increased distances from these receptors. However, it is still recommended that when construction activities are carried out in their vicinity that they be managed / coordinated with local residents in order to minimise potential noise impact as far as practicable.

Limiting the hours of noisy operations and implementation of appropriate noise control measures detailed in this report will also serve to minimise noise impact as far as practicable in this instance.

8.2 Operational Phase

Building Services Plant

The predicted noise levels associated with building services are within the 45 / 50dB $L_{Aeq,T}$ night time / daytime criteria at all nearby residential receptors.

Vehicular Traffic on New Internal Roads

The predicted noise levels associated with vehicular traffic on the new internal roads within the development are within the 45 / 50dB $L_{Aeq,T}$ night time / daytime criteria at all nearby residential receptors.

Additional Vehicular Traffic on Public Roads

The predicted noise levels associated with additional vehicular traffic on public roads are negligible.

8.3 Vibration

The predicted vibration emission associated with both the construction and operational phases of the proposed development are expected to be negligible.

APPENDIX A

SOUND LEVEL METER CALIBRATION CERTIFICATE



Manufacturer Calibration Certificate

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3. All tests are traceable in accordance with ISO/IEC 17025.

This model of sound level meter submitted for periodic testing successfully completed the applicable pattern-evaluation tests given in IEC 61672-2. The pattern approval certificate is available at www.nti-audio.com/XL2

Sound Level Meter

Manufacturer	NTi Audio		
Type	XL2-TA	S/N	A2A-11070-E0
Firmware	V4.93		
Microphone Model	M2230		
Preamplifier	MA220	S/N	7417
Microphone Capsule	MC230A	S/N	A14422
Performance class	Class 1		
Customer Inventory Nr.			

Customer

CLV Consulting Ltd
The NSC Campus
Mahon, T12 XY2N CORK

Date 25 September 2025

Certificate DE-25-378

Results **PASSED**
(for detailed report see next pages)

Operator


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AUDIO

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APPENDIX B

ACOUSTIC CALIBRATOR CALIBRATION CERTIFICATE



Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **Class 1 Sound Calibrator CAL200**
- Serial Number: **18882**
- Customer: **CLV Consulting
Cork T12 XY2N
The NSC Campus, Mahon
Ireland**
- Date of Calibration: **25 September 2025**
- Certificate Number: **45928-18882-CAL200**
- Results: **PASSED**
(for detailed report see next page)

Tested by: **Dipl.-Ing. B. Dohmen**

Signature:

Stamp:



APPENDIX C

INWARD NOISE IMPACT ASSESSMENT REPORT



TECHNICAL REPORT

WEST CITY

PROPOSED LARGE SCALE RESIDENTIAL DEVELOPMENT (LRD) AT THE FORMER DELL EMC PREMISES INNISHMORE, BALLINCOLLIG, CORK

For:

**Castle Peak Properties Ltd
21 Lavitt's Quay
Cork**

Report Prepared By:

Brian S. Johnson MIOA

Our Reference:

25/09107R01

Date:

7 October 2025

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1.0 INTRODUCTION

This Inward Noise Impact Assessment has been prepared on behalf of Castle Peak Properties Ltd to accompany a Section 32B Request for a Large Scale Residential Development (LRD), at the site of the former DELL EMC premises, Innishmore, Ballincollig, Cork. CLV was engaged to carry out an inward noise impact assessments for the proposed development.

The purpose of the inward noise impact assessment was to quantify the external noise environment in the vicinity of the development buildings and determine the noise mitigation measures required to be incorporated into the design of the development in order to ensure that any potential noise impacts on the proposed development are minimised in accordance with the established criteria limits.

The following document details the results of this assessment.

2.0 PROPOSED DEVELOPMENT LOCATION & LAYOUT

Castle Peak Properties Ltd intend to apply for planning permission for a Large-Scale Residential Development (LRD) at the site of the former DELL EMC premises, Innishmore, Ballincollig, Cork. The proposed development is for the demolition of the existing DELL EMC building, site clearance, and the construction of 132 no. residential units in a development ranging in height from 3 to 6 storeys.

The proposed development will comprise a mix of 110 no. apartments and 22 no. duplex units as follows:

- 58 no. 1 bedroom units.
- 65 no. 2 bedroom units.
- 9 no. 3 bedroom units.

Vehicular access to the proposed development will be via 2 no. entrances from Innishmore Lawn (to the east) and Mechtersadt Road (to the south) and the development will include for pedestrian and cyclist permeability. The development includes play areas, and open spaces/ amenity areas, car and bicycle parking, bin storage, lighting, and all associated and ancillary services and infrastructure required for the construction and operation of the development.

The proposed development site is bordered to the south by residential buildings, to the east by residential buildings and a commercial building (RPS), to the west by West City Retail Park car park and to the north by a brownfield site which has recently been granted planning permission for residential development under a Part 8 approved by Cork City Council.

The primary area of concern in this instance is the movements of vehicular traffic along Mechtersadt Road and Innishmore Lawn and, to a lesser extent, noise emissions from the LIDL car park.

Refer to Figure 1 on the following page.

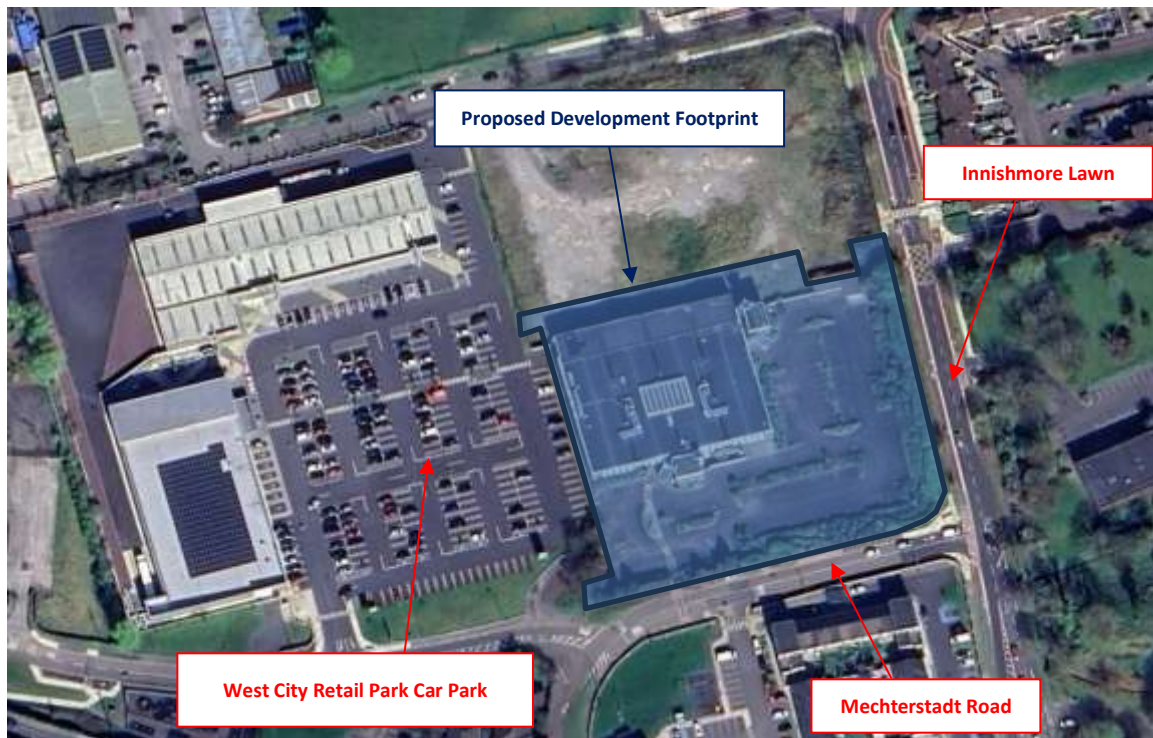


Figure 1 Proposed Development Location

A general layout of the proposed development is provided in Figure 2 below (showing Lower Ground Floor level).

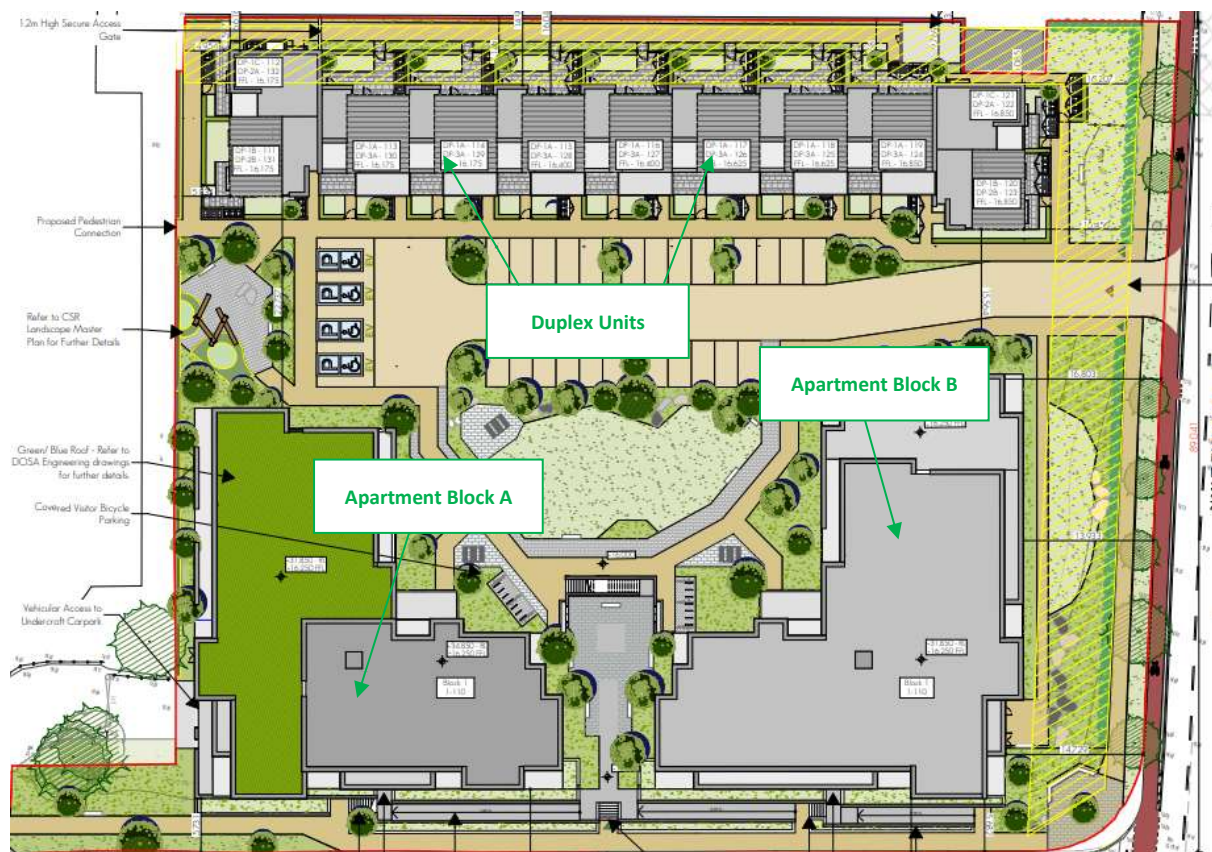


Figure 2 Proposed Development Layout

3.0 INWARD NOISE IMPACT ASSESSMENT STRATEGY OVERVIEW

In order to assess the potential for inward noise impacts from the development, the following prediction methodology was adopted in this instance:

- ✓ An initial survey was conducted of the site, during which it was observed that the ambient noise environment on the site is controlled almost exclusively by traffic noise. Given this situation, noise monitoring was conducted over a 3-day mid-week period to quantify existing levels of noise emissions from the road (refer to Section 4.0).
- ✓ Noise emission criteria for the proposed development were established based on best practice guidance (refer to Section 5.0).
- ✓ A noise model of the site was constructed using iNoise Noise Prediction Software. The results of the model were then 'calibrated' with the results of the noise monitoring survey (refer to Section 6.0).
- ✓ Noise prediction modelling was carried out to determine the predicted external noise emission levels on the various proposed development facades and in amenity areas (refer to Section 6.1 - 6.2).
- ✓ An Initial Site Noise Risk assessment was carried out by comparing the predicted noise levels and with *ProPG 2017* criteria (refer to Section 7.0).
- ✓ The ambient noise levels in the proposed development external private and public amenity areas and external balconies were assessed in accordance with the established criteria (refer to Section 8.0).
- ✓ The ambient noise levels were considered in respect of the proposed development specified building façade elements in order to either confirm that the proposed façade elements design will ensure that the established internal noise levels will comply with the established criteria or recommend upgrade specifications as required (refer to Section 9.0).

All noise prediction calculations were conducted in general accordance with *ISO 9613: Acoustics - Attenuation of sound outdoors, Part 2: General method of calculation, 1996*.

4.0 NOISE MONITORING SURVEY

An environmental noise monitoring survey was conducted in order to quantify the ambient external noise environment in the vicinity of the proposed development site. The survey was conducted in general accordance with *ISO 1996-2: 2017: Acoustics - Description, measurement and assessment of environmental noise*.

Specific details are set out in the following sections.

4.1 Measurement Locations

Given that traffic movements on the surrounding roadways are by far the most dominant noise source in the vicinity of the proposed development site, the monitoring locations selected for noise prediction confirmation purposes was chosen along the eastern and western boundaries of the proposed development.

NML 1: near the northern boundary of the proposed development.

NML 2: near the eastern boundary of the proposed development.

Refer to Figure 3 below.



Figure 3 Site Layout Showing Approximate Position of Measurement Locations

4.2 Survey Periods

Noise monitoring was conducted over the course of the mid-week weekday survey periods as follows:

00:00 hrs on 23 October 2025 - 07:00 hrs on 26 October 2025

The meteorological conditions that were observed at Cork Airport on the days of the survey period are summarised in Figure 4 on the following page.

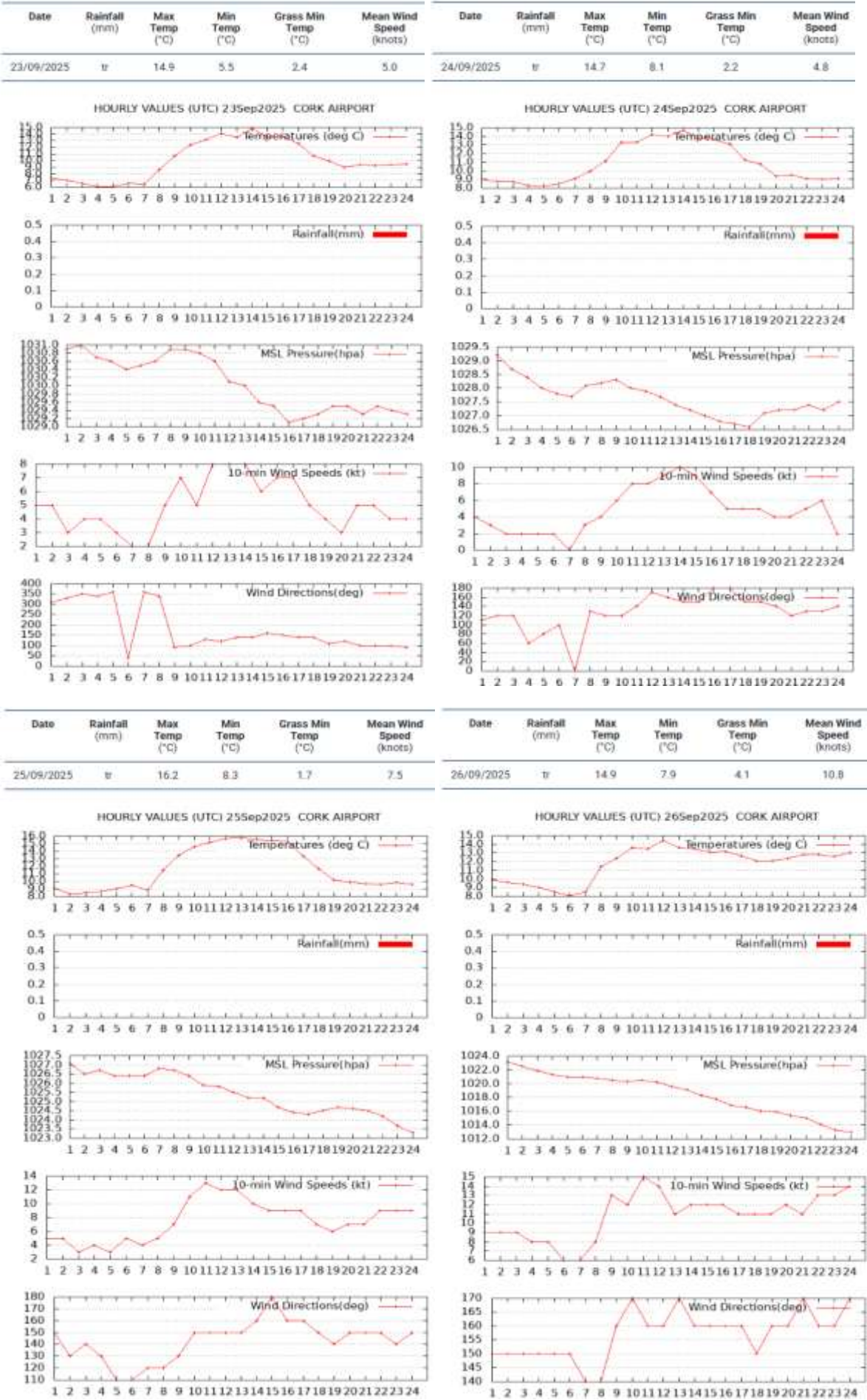


Figure 4 Meteorological Conditions Observed at Cork Airport During Noise Monitoring Survey

4.3 Personnel & Instrumentation

Brian S. Johnson (CLV) carried out the noise monitoring survey. He is an internationally experienced acoustic consultant who has been working in the fields of architectural / building acoustics and noise control since 1994. He has been based in America, Europe, Asia and Australia and is a member of the Institute of Acoustics. Brian also has extensive knowledge in the field of environmental acoustics and holds a Certificate of Competence in Environmental Noise Measurements from the Institute of Acoustics.

The measurements were conducted using NTI Audio Type XL2 & XL3 Sound Level Meters (Serial #A2A-18385-EO & #A3A-01453-F0). The microphones were fitted with 90mm windshields and the measurement apparatuses were checked calibrated both before and after the survey using a Larson Davis CAL200 Acoustic Calibrator (Serial #18882). The microphones were positioned approximately 1.4m above the ground at both locations.

The calibration certificates for the sound level meters and calibrator are provided in Appendices C & D at the rear of this document respectively.

4.4 Procedure

Measurements were conducted continuously over the full extent of the survey period. The sound level meters were set to average over periods that were 15 minutes in duration. The results were saved to the instrument memory for later download and analysis.

4.5 Measurement Parameters

The statistical noise monitoring results are presented in terms of the following five 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. It is typically used as a descriptor for the ambient noise level.
- 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.
- L_{A10}** is the sound level that is exceeded for 10% of the sample period.
- 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.

4.6 Monitoring Results

The full hourly survey results for all quantities are detailed in Appendices A & B at the rear of this document. However, the daytime (dB L_{Aeq,16hr}) and night time (dB L_{Aeq,8hr}) noise levels for each of the days surveyed are summarised in Tables 1 & 2 on the following page.

Weekday	Daytime Period dB L _{Aeq,16hr}	Night Time Period dB L _{Aeq,8hr}
Tuesday	61.3	51.9
Wednesday	61.6	51.6
Thursday	61.5	52.2
Average	61	52

Table 1 Summary of Measured Noise Levels at NML #1 (Southern Boundary Location)

Weekday	Daytime Period dB L _{Aeq,16hr}	Night Time Period dB L _{Aeq,8hr}
Tuesday	52.0	41.8
Wednesday	52.1	42.2
Thursday	52.6	43.7
Average	52	43

Table 2 Summary of Measured Noise Levels at NML #2 (Eastern Boundary Location)

As can be seen from the measurement results above, the ambient noise environment was relatively consistent at both measurement locations across all daytime and night time periods over the three days.

5.0 ADS ACOUSTIC DESIGN CRITERIA

5.1 External Noise Level Criteria

Guideline criteria for external noise levels in the proposed development external amenity area and balcony spaces can be found in both the *BS 8233 Guidance on Sound Insulation and Noise Reduction for Buildings* and *ProPG 2017: Planning & Noise (Professional Guidance on Planning & Noise For New Residential Developments)* guidance documents. Both documents state that ambient noise levels in external residential areas should ideally not be above 50 - 55dB L_{Aeq,16hr}.

This criteria range is reiterated in *ProPG 2017* in 3(ii):

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}.

Although exceedances of this criteria are naturally not desirable, both the *BS 8233* and *ProPG 2017* guidance documents recognize that their stated guideline values are not achievable in all instances and that external noise levels in excess of this criteria would not be prohibitive provided additional considerations are made in relation to the development.

From BS 8233:

It is recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.

From ProPG documents:

These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces.

Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:

- *A relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or*
- *A relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different, protected, location); and/or*
- *A relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- *A relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5-minute walking distance).*

Given the above guidance, the following general approach was developed as the development's external noise level strategy in order to provide an acceptable external ambient noise environment:

- ✓ The 50 - 55dB(A) $L_{Aeq,16hr}$ criteria will be designed for in all development balcony / public amenity areas where it is practically possible to be achieved.
- ✓ A relatively quiet external amenity space will be incorporated into the development.
- ✓ The façade design of the development buildings will incorporate superior sound insulation glazing / façade elements to achieve a quiet internal acoustic environment that will comply with criteria applicable to low level residential bedroom environments.

5.2 Internal Noise Level Criteria

In setting appropriate target internal noise levels, the *ProPG 2017* again refers to *BS 8233*. The *BS 8233* recommended noise limits for indoor ambient noise levels in residential dwellings are summarised in Table 3 below.

Activity	Room Type	Design Criterion $L_{Aeq,T}$ (dB)	
		Daytime (07:00 - 23:00hrs)	Night Time (23:00 - 07:00hrs)
Resting / Sleeping Conditions	Living / Dining Rooms	35dB $L_{Aeq,16hr}$	-
	Bedrooms	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,8hr}$

Table 3 Recommended Indoor Ambient Noise Levels from *BS 8233 (2014)*

In order to demonstrate ADS compliance with the *ProPG 2017* and *BS 8233* internal noise level criteria, the glazing and external façade elements of the proposed development buildings must be designed to ensure that the maximum levels in the above table are achieved throughout.

6.0 NOISE MODELLING RESULTS

In order to assess roadway noise emissions across the full extent of the proposed development facades and external areas, an *iNoise*® acoustic software model was developed based on architectural drawings and geographical information received from Meitheal Architects. Once the geographical and architectural aspects of the modelling were completed, the model was ‘calibrated’ based on the results of the noise monitoring survey and historical noise measurements of LIDL car parks in order to ensure that an accurate representation of external noise level emissions were obtained.

The *iNoise* model was then used to assess the predicted noise emissions from the roadways across the subject site for each of the quantities of interest (i.e. Daytime dB $L_{Aeq,16hr}$ & Night Time dB $L_{Aeq,8hr}$). The results of these modelling assessments are plotted and discussed in the following sections.

6.1 Daytime Noise Emission Prediction Results (dB $L_{Aeq,16hr}$)

The *iNoise* model results for the $L_{Aeq,16hr}$ daytime period noise emissions at each floor of the development facades are labelled in the 1.5m high contour map shown in Figure 5 on the following page (note: the calibration point results are also labelled on the eastern / southern boundaries).



Figure 5 Daytime Period Noise Level Emission Contour Map (1.5m Height)

A summary of the predicted daytime period noise levels at the various development building facades is provided in Table 4 as follows.

Building	Facade	Height (Metres Above Floor Level)	Predicted Daytime Period Noise Level (dB LAeq,16hr)
Duplex Building	Eastern	GF + 1.5	50
		1F + 1.5	50
		2F + 1.5	51
	Northern	GF + 1.5	44 - 50
		1F + 1.5	43 - 50
		2F + 1.5	47 - 52
	Southern	GF + 1.5	50 - 53
		1F + 1.5	49 - 53
		2F + 1.5	50 - 53
	Western	GF + 1.5	55
		1F + 1.5	55
		2F + 1.5	55

Building	Facade	Height (Metres Above Floor Level)	Predicted Daytime Period Noise Level (dB L _{Aeq,16hr})
Apartment Building A	Eastern	LGF + 1.5	46 - 54
		GF + 1.5	47 - 54
		1F + 1.5	47 - 54
		2F + 1.5	47 - 54
		3F + 1.5	46 - 53
		4F + 1.5	53
	Northern	LGF + 1.5	43 - 50
		GF + 1.5	43 - 49
		1F + 1.5	43 - 49
		2F + 1.5	43 - 49
		3F + 1.5	39 - 48
		4F + 1.5	41
	Southern	LGF + 1.5	57
		GF + 1.5	57
		1F + 1.5	56 - 57
		2F + 1.5	56 - 57
		3F + 1.5	56
		4F + 1.5	56
	Western	LGF + 1.5	56 - 57
		GF + 1.5	56 - 57
		1F + 1.5	55 - 56
		2F + 1.5	55 - 56
		3F + 1.5	55 - 56
Apartment Building B	Eastern	GF + 1.5	51 - 56
		1F + 1.5	51 - 56
		2F + 1.5	51 - 56
		3F + 1.5	51 - 56
		4F + 1.5	51 - 55

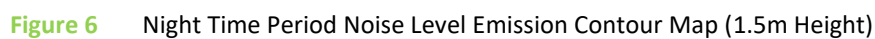
Building	Facade	Height (Metres Above Floor Level)	Predicted Daytime Period Noise Level (dB $L_{Aeq,16hr}$)
	Northern	GF + 1.5	47 - 49
		1F + 1.5	46 - 48
		2F + 1.5	46 - 48
		3F + 1.5	46 - 48
		4F + 1.5	45 - 46
	Southern	GF + 1.5	58
		1F + 1.5	58
		2F + 1.5	58
		3F + 1.5	57
		4F + 1.5	57
	Western	GF + 1.5	50 - 54
		1F + 1.5	49 - 54
		2F + 1.5	49 - 54
		3F + 1.5	49 - 54
		4F + 1.5	49 - 54

Table 4 Predicted Daytime Period Ambient Noise Level Summary

Predicted noise levels at all development building facades ranged between 39 - 58 dB $L_{Aeq,16hr}$.

6.2 Night Time Noise Emission Prediction Results ($L_{Aeq,8hr}$)

The *iNoise* model results for the $L_{Aeq,8hr}$ night time period noise emissions at each floor of the development facades are labelled in the 1.5m high contour map shown in Figure 6 on the following page (note: the calibration point results are also labelled at their locations along the eastern / southern boundaries).



Building	Facade	Height (Metres Above Floor Level)	Predicted Daytime Period Noise Level (dB L _{Aeq,16hr})
Duplex Building	Eastern	GF + 1.5	40
		1F + 1.5	40
		2F + 1.5	41
	Northern	GF + 1.5	27 - 34
		1F + 1.5	26 - 34
		2F + 1.5	35 - 37
Duplex Building	Southern	GF + 1.5	39 - 40
		1F + 1.5	39
		2F + 1.5	39
	Western	GF + 1.5	37
		1F + 1.5	36
		2F + 1.5	38

Building	Facade	Height (Metres Above Floor Level)	Predicted Daytime Period Noise Level (dB L _{Aeq,16hr})
Apartment Building A	Eastern	LGF + 1.5	37 - 44
		GF + 1.5	37 - 44
		1F + 1.5	37 - 44
		2F + 1.5	37 - 44
		3F + 1.5	37 - 44
		4F + 1.5	44
	Northern	LGF + 1.5	32
		GF + 1.5	32
		1F + 1.5	32
		2F + 1.5	32
		3F + 1.5	26 - 32
		4F + 1.5	25 - 29
	Southern	LGF + 1.5	48
		GF + 1.5	47 - 48
		1F + 1.5	47 - 48
		2F + 1.5	47
		3F + 1.5	47
		4F + 1.5	47
	Western	LGF + 1.5	40 - 46
		GF + 1.5	40 - 46
		1F + 1.5	40 - 46
		2F + 1.5	40 - 45
		3F + 1.5	40 - 45
Apartment Building B	Eastern	GF + 1.5	42 - 47
		1F + 1.5	42 - 46
		2F + 1.5	42 - 46
		3F + 1.5	41 - 46
		4F + 1.5	41 - 46

Building	Facade	Height (Metres Above Floor Level)	Predicted Daytime Period Noise Level (dB L _{Aeq,16hr})
	Northern	GF + 1.5	33 - 36
		1F + 1.5	33 - 36
		2F + 1.5	33 - 36
		3F + 1.5	33 - 36
		4F + 1.5	26 - 32
	Southern	GF + 1.5	48
		1F + 1.5	48
		2F + 1.5	48
		3F + 1.5	48
		4F + 1.5	48
	Western	GF + 1.5	38 - 45
		1F + 1.5	38 - 45
		2F + 1.5	38 - 45
		3F + 1.5	38 - 45
		4F + 1.5	37 - 44

Table 5 Predicted Night Time Period Ambient Noise Level Summary

Predicted noise levels at all development building facades ranged between 25 - 48 dB L_{Aeq,8hr}.

7.0 INITIAL SITE NOISE RISK ASSESSMENT (ADS STAGE 1)

In order to provide a preliminary indication of the likely risk of adverse effects from external noise prior to consideration for provision of noise mitigation, a comparison is carried out between the average noise levels predicted during the daytime and night time periods against noise risk assessment indicators detailed in the *ProPG 2017*.

The results of this comparison with the measured noise levels at the proposed development boundary are detailed in Figure 7 on the following page.

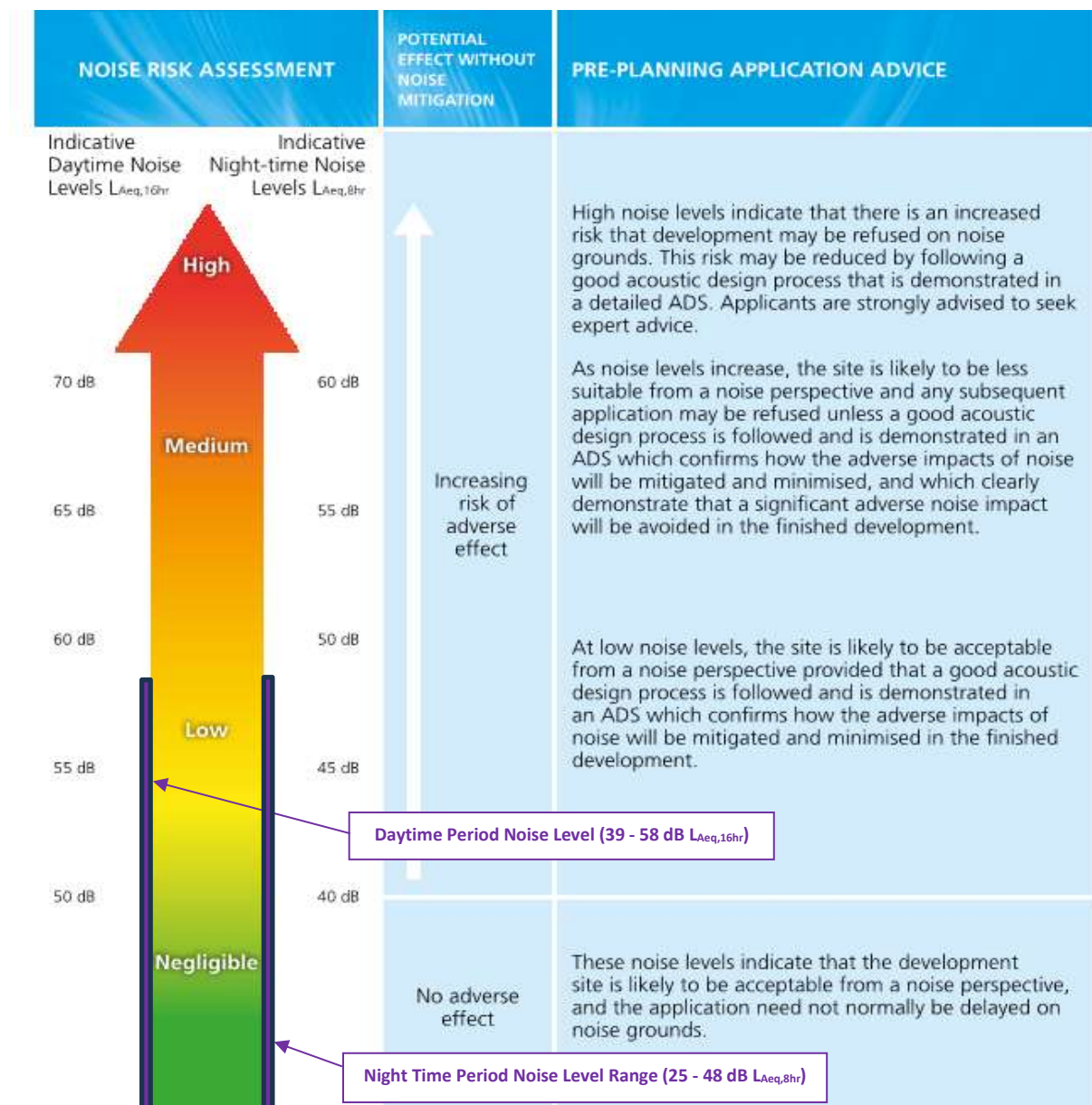


Figure 7 ProPG 2017 - Stage 1 Initial Noise Risk Assessment for Proposed Development

Overall, the noise level ranges of 39 to 58 dB $L_{Aeq,16hr}$ for daytime periods and 25 to 48 dB $L_{Aeq,8hr}$ for night time periods at the facades of the proposed development building would extend across the Magnitude spectrum from Negligible to Low.

The results of this Stage 1 comparison therefore confirms that the site is likely to be acceptable from a noise perspective but that a good acoustic design process still needs to be demonstrated in ADS Stage 2.

Both the acoustic design process and the mitigation measures that were deemed as being required in this instance are therefore discussed in detail in ADS Stage 2. The predicted residual internal and external noise level ranges for the proposed development are also confirmed in the following sections.

8.0 EXTERNAL AREA ACOUSTIC DESIGN ASSESSMENT (ADS STAGE 2)

8.1 Private Amenity Areas

The private amenity areas for the duplex building are located all along the perimeter of the building in both front and rear areas. Most of these private amenity areas are shielded from the surrounding roadways by the development buildings themselves. The areas located along the western façade are directly exposed to the West City Retail Park development car park. The areas along the northern façade are exposed but located well back from Innishmore Lawn to the north. The two amenity areas located along the eastern façade are shielded from Innishmore Lawn by both the road elevation and perimeter landscaping.

Refer to Figure 8 below for a location drawing (and to Figure 5 in Section 6.1 for a contour map).

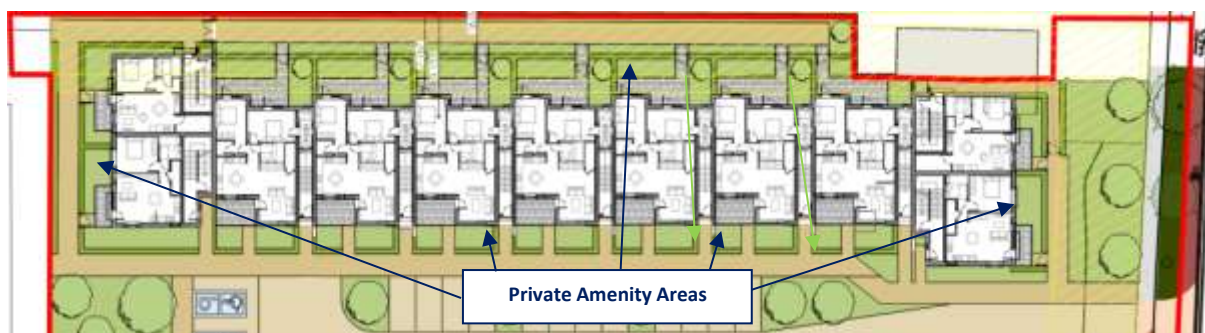


Figure 8 Private Amenity Area Locations

Daytime noise level range predictions for these private amenity areas based on the iNoise acoustic model resulted in estimated noise levels in the range of those detailed in Table 6 below.

Proposed Development External Area Location	Predicted Daytime Noise Level (dB L _{Aeq,16hr})
Northern Façade	44 - 50
Eastern Façade	50
Southern Façade	50 - 53
Western Facade	55

Table 6 Private Amenity Area Predicted Noise Level Range

Ambient noise levels in the range of 44 - 55dB(A) dB L_{Aeq,16hr} which would be compliant with the *ProPG 2017* recommended criteria requirement range of 50 - 55dB(A) dB L_{Aeq,16hr}. Private amenity area ambient noise levels of this order would therefore be considered acceptable in this instance.

No further mitigation measures would therefore be required in respect of the proposed development private amenity areas.

8.2 External Balconies

The external balconies for all development buildings are located along the perimeter of each building. The external balconies for the duplex building have similar orientations / frontages as the external amenity areas below them. The external balconies on the east façade of Apartment Block A, the west façade of Apartment Block B and the balconies on the north façade of both blocks are well shielded from the surrounding roadways by the development buildings themselves. The external balconies on the east façade of Apartment Block B is directly exposed to Innishmore Lawn and the south façade of both blocks are directly exposed to Mechterstadt Road. The balconies on the west façade of Apartment Block A have a direct view of the West City Retail Park development car park.

Refer to Figure 9 below for a location drawing of the apartment block balconies (and to Figure 5 in Section 6.1 for a contour map).

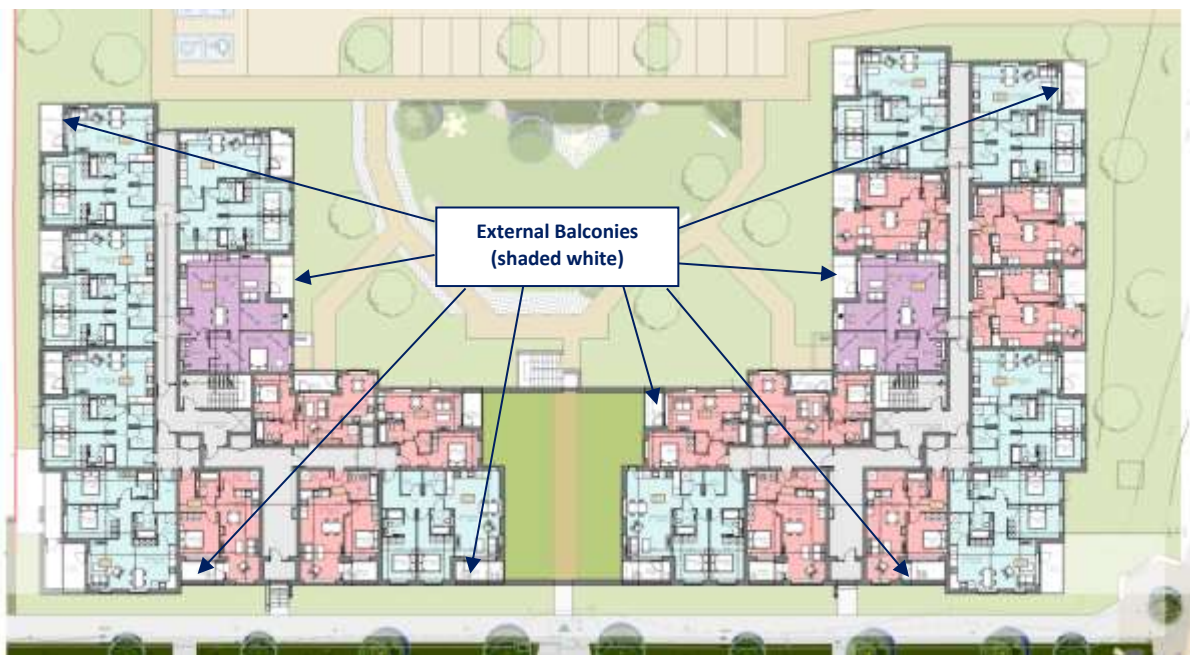


Figure 9 Apartment Block External Balconies

Daytime noise level range predictions for these private amenity areas based on the iNoise acoustic model resulted in estimated noise levels in the range of those detailed in Table 7 as follows.

Development Building	Proposed Development External Area Location	Predicted Daytime Noise Level (dB L _{Aeq,16hr})
Duplex Building	Northern Façade	40 - 49
	Eastern Façade	47 - 48
	Southern Façade	46 - 50
	Western Facade	52

Development Building	Proposed Development External Area Location	Predicted Daytime Noise Level (dB L _{Aeq,16hr})
Apartment Block A	Northern Façade	36 - 46
	Eastern Façade	43 - 51
	Southern Façade	53 - 54
	Western Facade	52 - 54
Apartment Block B	Northern Façade	41 - 45
	Eastern Façade	48 - 53
	Southern Façade	54 - 55
	Western Facade	46 - 52

Table 7 External Balcony Predicted Noise Level Range

Ambient noise levels in the range of 40 - 55 dB L_{Aeq,16hr} would be compliant with the *ProPG 2017* recommended criteria requirement range of 50 - 55 dB(A) dB L_{Aeq,16hr}. Balcony area ambient noise levels of this order would therefore be considered acceptable in this instance.

No further mitigation measures would therefore be required in respect of the proposed external balconies.

8.3 Public Amenity Area

The primary public amenity area planned for the proposed development is a communal open area proposed to locate centrally within the development with the duplex building to the north and the apartment buildings to the east, west and south. It will therefore be significantly shielded from all surrounding external noise sources by the development buildings themselves. There are also open green spaces that are located along the eastern boundary of the proposed development.

Note that there is also a communal play area located adjacent to the West City Retail Park along the proposed development western boundary but play areas are non-noise sensitive and do not require assessment.

Refer to Figure 10 on the following page.

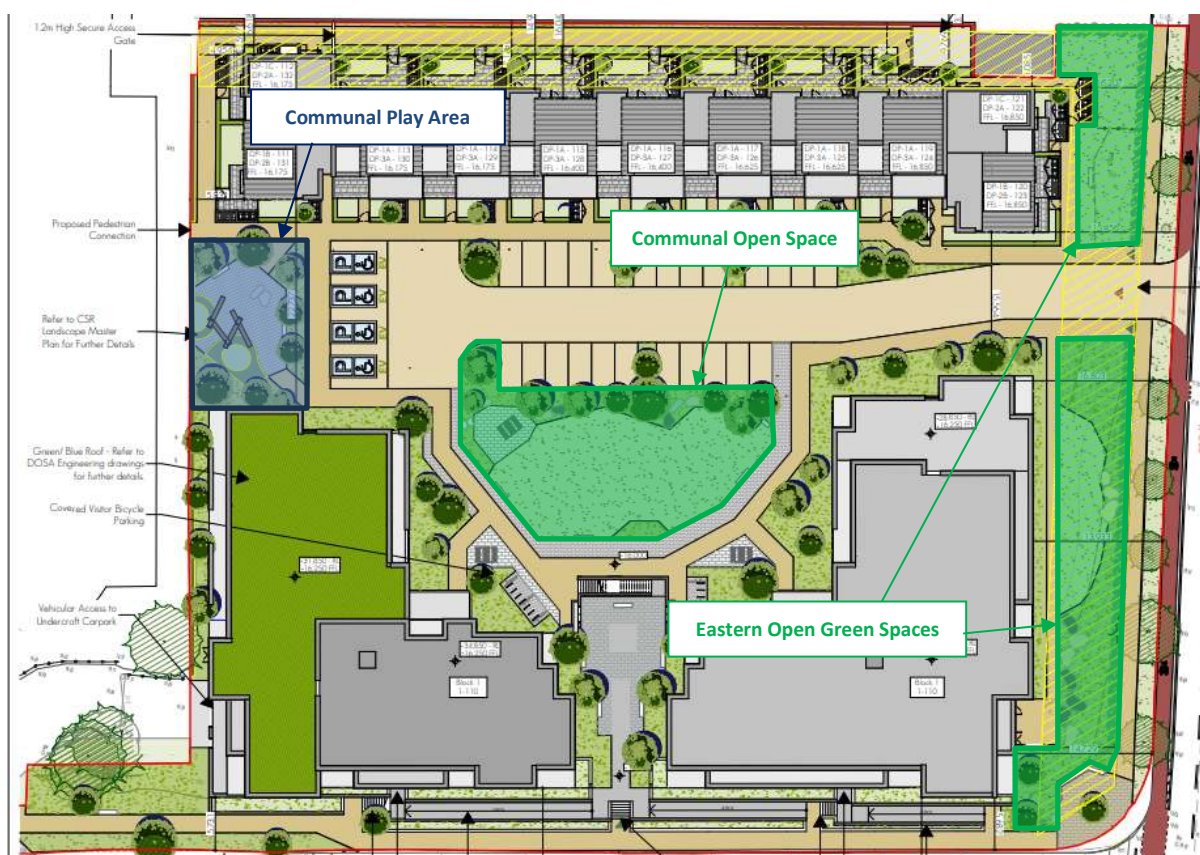


Figure 10 Proposed Development Public Amenity Area Location

The $L_{Aeq,16hr}$ noise level range predictions for the public amenity areas based on the noise modelling results are summarised in Table 8 below (refer to Figure 5 for noise contours).

Proposed Development Amenity Area	Predicted Daytime Noise Level (dB $L_{Aeq,16hr}$)
Communal Open Space	43 - 55
Open Green Spaces	50 - 56

Table 8 Proposed Development Amenity Area Predicted Noise Level Range

The predicted external ambient noise levels in the primary central public open space ranged between 43 - 55 dB $L_{Aeq,16hr}$. Levels of this order would be compliant with the *ProPG 2017* recommended criteria requirement range of 50 - 55 dB $L_{Aeq,16hr}$ and would therefore be both acceptable as well as considered as being a relatively quiet amenity space.

The predicted external ambient noise levels in the eastern open green areas ranged between 50 - 56 dB $L_{Aeq,16hr}$. Levels of this order would also be consistent with the *ProPG 2017* recommended criteria requirement range and would therefore be acceptable.

No further mitigation measures would therefore be required in respect of the proposed public amenity areas.

8.4 Development Boundary Perimeter Area Landscaping Measures

Although not explicitly required, it would be of benefit to future residents of the development to provide perimeter boundary landscaping (i.e. trees, tall hedge / bushes, etc) as possible along its southern and western boundaries.

A review of the proposed landscaping plans confirms that the existing trees are to be retained along the eastern boundary and exotic shrubs / hedges will be planted along the southern boundary.

Whilst these landscaping measures only provide a nominal supplemental degree of road noise absorption / scattering / diffusion, it has been experimentally proven that shielding of roadways with landscaping features provide a significant psychological benefit and reduction in the subjective perception of traffic noise emissions.

8.5 Predicted External Area Residual Noise Levels

The predicted external daytime period noise level ranges in each area of interest are summarised in Table 9 below.

External Area	Predicted External Noise Level Range dB LAeq,16hr
Private Amenity Areas	44 - 55
External Balconies	40 - 55
Communal Open Space	43 - 55
Open Green Spaces	50 - 56

Table 9 Predicted External Noise Levels in Critical Proposed Development Areas

The predicted results in the summary table above confirm that the development would be compliant with the external area ambient noise strategy requirements of *ProPG 2017*.

9.0 INTERNAL AREA ACOUSTIC DESIGN ASSESSMENT (ADS STAGE 2)

The noise attenuation measures that were determined as being required in this instance are detailed in the following sections.

9.1 External Façade / Roof Constructions

The required minimum external wall construction sound insulation performance requirements for each development building were determined and are summarised in Table 10 on the following page.

Proposed Development Building	Minimum Sound Insulation Performance Requirement		
	Roof	Facade	
Duplex Building	$\geq 35 \text{ dB } R_w$	North	$\geq 40 \text{ dB } R_w$
		South	$\geq 43 \text{ dB } R_w$
		East	$\geq 41 \text{ dB } R_w$
		West	$\geq 45 \text{ dB } R_w$
Apartment Block A	$\geq 38 \text{ dB } R_w$	North	$\geq 39 \text{ dB } R_w$
		South	$\geq 47 \text{ dB } R_w$
		East	$\geq 44 \text{ dB } R_w$
		West	$\geq 47 \text{ dB } R_w$
Apartment Block B	$\geq 37 \text{ dB } R_w$	North	$\geq 39 \text{ dB } R_w$
		South	$\geq 48 \text{ dB } R_w$
		East	$\geq 45 \text{ dB } R_w$
		West	$\geq 45 \text{ dB } R_w$

Table 10 External Façade / Roof Minimum Sound Insulation Performance Specifications

The external façade and roof constructions for the development building are proposed as being the following:

Façade Construction

100mm block cavity wall separated by 100mm air space - 70mm metal C-studs - 1 x 12.5mm plasterboard (inner face)

Roof Construction

Insulated Panel - 200mm thick reinforced concrete slab on metal deck - 200mm air space - 1 x 12.5mm plasterboard ceiling

The estimated airborne sound insulation performances for the proposed development roof and façade constructions are summarised in Table 11 on the following page.

Estimated Airborne Sound Insulation Performance (dB R _w)	
Roof Construction	Façade Construction
≈ 60 dB R _w	≈ 58 dB R _w

Table 11 External Roof / Façade Minimum Sound Insulation Performance Specifications

The estimated airborne sound insulation performances for the proposed development roof and façade constructions are compared with the established minimum performance requirements in Table 12 below.

Proposed Development Block	Roof			Façade		
	Minimum Criteria	Estimated Performance	Compliant?	Minimum Criteria Range	Estimated Performance	Compliant?
Duplex Building	35 dB R _w	≈ 60 dB R _w	✓	40 - 45 dB R _w	≈ 58 dB R _w	✓
Apartment Block A	38 dB R _w		✓	39 - 47 dB R _w		✓
Apartment Block B	37 dB R _w		✓	39 - 48 dB R _w		✓

Table 12 External Roof / Façade Minimum Sound Insulation Performance Specifications

As demonstrated in Table 12, the specified building roof and external façade constructions would be sufficient to reduce external noise levels to below the established internal noise level criteria in all development buildings.

9.2 External Glazing Constructions

Given that there will be a range of external noise levels on the various facades of the development buildings due to their orientation to the surrounding roadways, it is therefore prudent to provide a different range of noise reduction specifications for the glazing elements on each façade. Based on the external noise levels predicted at each unit façade with the development in place, two recommended minimum glazing specifications were deemed as being required in this instance.

These specifications are summarised in Table 13 on the following page.

Glazing Spec Type	Octave Band Centre Frequency (Hz)						R _w	Indicative Glazing Configuration
	125	250	500	1k	2k	4k		
A	20	24	31	38	38	38	35	6mm glass - 12mm air space - 8mm glass
B	27	29	36	41	42	45	40	6mm glass - 12mm air space - 10mm laminate glass

Table 13 External Glazing Airborne Sound Insulation Minimum Performance Requirements, SRI (dB)

Figure 11 below, details the locations where the various glazing specifications should be applied for external window locations on all building facades.



Figure 11 Glazing Sound Insulation Minimum Performance Specification Façade Locations (All Floors)

It should be noted that the performance values detailed in Table 13 are the basis of the assessment and that the configurations detailed are merely typical examples which can be expected to afford these performance values. Alternative products with an equivalent or better performance would also provide sufficient sound insulation.

For operable windows, the proposed framing design will need to be acoustically reviewed during the design stage and acoustic treatment may be required. At a minimum, operable windows would need to incorporate compressible gasket seals to the full perimeter of the frame and any sliding windows will need to be installed in a rebated frame and sealed so that no gaps exist around the perimeter when closed.

Acoustic test data should be obtained from the façade supplier to confirm that all primary window constructions to be supplied perform to the required acoustic specification as detailed in Table 13. If acoustic performance data is not available for any of the specific systems, then it must be provided in accordance with the following details:

- The performance requirements shall be obtained from laboratory measurements obtained in accordance with *ISO 140-3: 1995 "Measurement of sound insulation in buildings and of building elements"* and weighted in accordance with *ISO 717-1: 1997 "Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation"*.
- Laboratory measurements shall be obtained from an independent acoustic test laboratory accredited by a recognized body and shall be a fully representative part of the system including associated framing / support systems / seals.
- Ratings / measurements obtained in accordance with other equivalent standards may be permitted but should be submitted to the client representative for approval.
- The Trade Contractor shall provide Tender test certificates demonstrating compliance with the specified acoustic performance for the products offered. Failing this, the Trade Contractor shall allow for the expense of such necessary testing as demonstrating compliance with the specification. The tests shall be carried out at an independent acoustic test laboratory approved by a recognized acoustic institution.

9.3 External Ventilation

It is understood that all the proposed development buildings will be mechanically ventilated so acoustic trickle vents will not be required / provided in this instance.

9.4 External Doors

The other design element consideration is in relation to external façade entry doors. All residential unit entry doors should be selected with the minimum performance specifications listed in Table 14 below (based on the corresponding glazing specification for each facade).

Glazing Specification	Minimum External Door Sound Insulation Performance (dB R _w)
A	25
B	30

Table 14 External Door Minimum Sound Insulation Performance Specifications

9.5 Predicted Internal Area Residual Noise Levels

The predicted external daytime and night time period noise level ranges in each area of interest with all the mitigation measures recommended in place are summarised in Table 15 below.

Internal Area	Predicted Internal Area Noise Level Ranges	
	Daytime Period dB LAeq,16hr	Night Time Period dB LAeq,8hr
All Development Areas	≤ 35	≤ 30

Table 15 Predicted Internal Noise Levels in Proposed Development Buildings

The predicted results in the summary table above confirm that the development would be fully compliant with the internal area ambient noise strategy requirements of *ProPG 2017*.

10.0 SUMMARY OF PROPOSED DEVELOPMENT INWARD NOISE IMPACT

10.1 External Areas - Noise Impact Summary

An inward noise impact consideration approach consistent with the one detailed in the *ProPG 2017* and *BS 8233* guidance documents was adopted in order to ensure an acceptable external ambient noise environment could be achieved.

This approach is summarised as follows:

- ✓ The 50 - 55dB(A) LAeq,16hr criteria will be designed for in all development balcony / public amenity areas where it is practically possible to be achieved.
- ✓ A relatively quiet external amenity space will be incorporated into the development.
- ✓ The façade design of the development buildings will incorporate superior sound insulation glazing / façade elements to achieve a quiet internal acoustic environment that will comply with criteria applicable to low level residential bedroom environments.

Following a comprehensive assessment, the following elements were confirmed:

- The 50 - 55dB(A) LAeq,16hr criteria is predicted to be achieved in all development balcony / public and private amenity areas.
- A relatively quiet external amenity space (the central communal open space) was identified and incorporated into the development.
- The façade design of the development buildings incorporates sufficient sound insulation glazing / façade elements to achieve a quiet internal acoustic environment that will comply with criteria applicable to low level residential bedroom environments.

The only mitigation measure recommended in this instance is to provide perimeter landscaping (i.e. trees, tall hedge / bushes, etc) along the western and southern boundaries which is detailed in the landscape plan.

Based on the above results, the development was determined to be fully compliant with the external area noise requirements detailed within the *ProPG 2017* and *BS 8233* guidance documents.

10.2 Internal Areas - Noise Impact Summary

Appropriate guidance for internal noise levels within residential spaces was taken from *BS 8233 (2014): Guidance on Sound Insulation and Noise Reduction for Buildings* as summarised in the table below.

Activity	Room Type	Design Criterion $L_{Aeq,T}$ (dB)	
		Daytime (07:00 - 23:00hrs)	Night Time (23:00 - 07:00hrs)
Resting / Sleeping Conditions	Living / Dining Rooms	35dB $L_{Aeq,16hr}$	-
	Bedrooms	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,8hr}$ (45dB L_{Amax})

Given the criteria requirements in the table together with the predicted external noise levels with the development in place, the following mitigation measures were developed for the development building:

- Provision of 58 dB R_w external walls.
- Provision of 60 dB R_w roof constructions.
- Provision of glazing with minimum acoustic performance specifications for all development buildings (refer to Table 13).
- Provision of acoustic external entry doors (refer to Table 14).

Provided the above developed mitigation measures are appropriately incorporated into the proposed development design, the development should be fully compliant with the internal area noise requirements contained within the *ProPG 2017* and *BS 8233* guidance documents.

APPENDIX A

NML #1 (SOUTHERN BOUNDARY) - FULL NOISE MONITORING RESULTS

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _{AFmax}	L _{AFmin}	L _{AF10}	L _{AF90}
23/09/2025	00:00	00:15	39.1	56.0	31.6	41.2	33.3
23/09/2025	00:15	00:30	38.5	65.3	32.1	40.7	33.4
23/09/2025	00:30	00:45	39.8	61.0	31.6	39.7	32.8
23/09/2025	00:45	01:00	41.7	64.6	29.3	37.4	31.3
23/09/2025	01:00	01:15	36.4	54.0	30.8	36.5	32.4
23/09/2025	01:15	01:30	36.1	52.0	31.0	38.4	32.4
23/09/2025	01:30	01:45	51.5	77.7	30.7	40.5	32.1
23/09/2025	01:45	02:00	44.5	70.5	30.0	36.5	31.6
23/09/2025	02:00	02:15	52.9	78.1	30.4	41.3	32.1
23/09/2025	02:15	02:30	50.5	74.1	31.3	42.8	33.1
23/09/2025	02:30	02:45	48.1	72.1	31.3	38.3	32.6
23/09/2025	02:45	03:00	55.1	82.2	30.6	40.4	32.3
23/09/2025	03:00	03:15	48.4	69.8	30.2	39.1	31.6
23/09/2025	03:15	03:30	43.6	67.8	31.1	37.6	32.9
23/09/2025	03:30	03:45	44.5	70.6	29.2	36.8	31.1
23/09/2025	03:45	04:00	49.8	74.6	28.7	37.1	30.6
23/09/2025	04:00	04:15	51.5	73.7	29.8	44.8	31.3
23/09/2025	04:15	04:30	49.0	71.5	30.7	39.2	32.5
23/09/2025	04:30	04:45	36.5	46.6	30.4	38.5	32.9
23/09/2025	04:45	05:00	48.7	73.4	31.8	45.5	33.9
23/09/2025	05:00	05:15	51.5	78.0	31.0	44.6	33.6
23/09/2025	05:15	05:30	51.0	76.0	32.3	43.5	35.7
23/09/2025	05:30	05:45	55.4	76.1	34.3	54.8	36.7
23/09/2025	05:45	06:00	53.9	74.0	36.9	55.6	39.3
23/09/2025	06:00	06:15	54.3	73.4	36.6	54.6	40.2
23/09/2025	06:15	06:30	50.6	67.7	38.6	51.2	41.3
23/09/2025	06:30	06:45	54.0	73.8	39.5	52.4	42.7
23/09/2025	06:45	07:00	59.4	77.4	42.3	63.8	45.0
23/09/2025	07:00	07:15	57.2	78.0	43.6	55.9	45.6
23/09/2025	07:15	07:30	56.6	75.1	44.3	58.9	46.7
23/09/2025	07:30	07:45	60.9	81.5	45.3	62.4	47.4
23/09/2025	07:45	08:00	62.4	88.2	46.1	65.1	48.0
23/09/2025	08:00	08:15	60.5	77.0	45.2	64.3	47.8

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _A F _{max}	L _A F _{min}	L _A F ₁₀	L _A F ₉₀
23/09/2025	08:15	08:30	63.1	79.5	45.1	67.1	48.4
23/09/2025	08:30	08:45	63.4	75.1	45.9	67.9	49.6
23/09/2025	08:45	09:00	62.7	76.3	46.5	66.7	49.6
23/09/2025	09:00	09:15	62.3	76.3	44.6	66.5	49.6
23/09/2025	09:15	09:30	63.1	81.2	43.4	66.4	49.1
23/09/2025	09:30	09:45	62.8	80.0	45.9	67.1	51.8
23/09/2025	09:45	10:00	62.0	81.6	46.0	65.8	51.1
23/09/2025	10:00	10:15	60.6	74.5	43.9	65.3	48.3
23/09/2025	10:15	10:30	61.3	74.3	42.6	65.8	48.1
23/09/2025	10:30	10:45	61.1	73.5	43.4	66.0	47.9
23/09/2025	10:45	11:00	62.6	80.5	40.3	66.8	47.6
23/09/2025	11:00	11:15	63.4	88.6	42.1	65.0	46.0
23/09/2025	11:15	11:30	61.6	78.5	42.4	65.5	46.6
23/09/2025	11:30	11:45	61.5	79.1	40.2	65.9	45.2
23/09/2025	11:45	12:00	60.0	75.8	40.8	64.2	44.9
23/09/2025	12:00	12:15	61.9	82.8	41.3	65.8	46.2
23/09/2025	12:15	12:30	62.5	80.0	41.3	66.6	46.2
23/09/2025	12:30	12:45	61.6	76.5	42.6	66.4	46.4
23/09/2025	12:45	13:00	61.2	78.0	41.0	65.5	45.9
23/09/2025	13:00	13:15	61.3	76.7	41.4	65.9	46.3
23/09/2025	13:15	13:30	61.4	74.5	41.4	66.0	46.7
23/09/2025	13:30	13:45	62.5	84.9	41.4	66.7	46.3
23/09/2025	13:45	14:00	61.8	78.4	41.8	65.5	47.1
23/09/2025	14:00	14:15	61.0	78.9	41.4	65.8	46.3
23/09/2025	14:15	14:30	62.1	77.8	42.7	66.3	47.5
23/09/2025	14:30	14:45	61.9	82.7	43.3	65.2	46.7
23/09/2025	14:45	15:00	62.5	84.4	43.5	66.2	47.9
23/09/2025	15:00	15:15	62.6	83.0	44.0	66.2	48.0
23/09/2025	15:15	15:30	61.4	79.1	42.9	65.7	47.3
23/09/2025	15:30	15:45	61.9	82.3	43.4	65.8	46.7
23/09/2025	15:45	16:00	60.3	79.8	43.6	64.3	48.0
23/09/2025	16:00	16:15	58.3	71.8	43.7	62.5	47.6
23/09/2025	16:15	16:30	67.3	96.6	44.8	66.0	47.5
23/09/2025	16:30	16:45	61.1	74.7	43.4	65.6	48.1
23/09/2025	16:45	17:00	61.8	80.6	43.7	65.5	48.6
23/09/2025	17:00	17:15	60.8	75.3	43.2	65.6	47.0
23/09/2025	17:15	17:30	61.1	74.0	44.3	65.6	47.5
23/09/2025	17:30	17:45	61.9	80.0	42.9	65.7	47.5
23/09/2025	17:45	18:00	63.1	82.6	43.8	66.7	48.4

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _{Afmax}	L _{Afmin}	L _{Af10}	L _{Af90}
23/09/2025	18:00	18:15	61.1	74.1	44.2	66.2	48.2
23/09/2025	18:15	18:30	62.6	75.7	45.5	66.9	50.0
23/09/2025	18:30	18:45	61.7	76.7	43.2	66.3	48.1
23/09/2025	18:45	19:00	64.0	89.3	43.4	66.3	49.2
23/09/2025	19:00	19:15	61.4	81.6	42.6	65.4	46.8
23/09/2025	19:15	19:30	61.7	78.1	43.2	66.2	46.5
23/09/2025	19:30	19:45	61.3	76.0	43.6	66.2	46.8
23/09/2025	19:45	20:00	59.6	73.0	42.0	64.8	45.6
23/09/2025	20:00	20:15	59.4	72.5	42.1	64.4	45.3
23/09/2025	20:15	20:30	58.0	75.3	39.8	61.9	43.8
23/09/2025	20:30	20:45	58.9	75.7	41.4	62.8	44.4
23/09/2025	20:45	21:00	56.8	76.7	40.7	59.5	43.0
23/09/2025	21:00	21:15	55.8	74.3	39.9	58.7	43.0
23/09/2025	21:15	21:30	54.6	72.3	41.2	56.2	43.2
23/09/2025	21:30	21:45	56.2	74.4	39.9	58.8	42.4
23/09/2025	21:45	22:00	52.7	71.9	37.5	53.0	41.6
23/09/2025	22:00	22:15	48.7	67.6	37.3	48.0	39.7
23/09/2025	22:15	22:30	49.6	72.2	36.5	44.9	38.8
23/09/2025	22:30	22:45	47.5	68.7	34.1	47.3	37.0
23/09/2025	22:45	23:00	55.5	79.1	34.4	50.7	36.7
23/09/2025	23:00	23:15	52.9	71.2	33.6	50.8	36.4
23/09/2025	23:15	23:30	55.6	80.1	33.2	47.9	35.9
23/09/2025	23:30	23:45	48.6	77.0	32.4	40.1	34.7
23/09/2025	23:45	00:00	37.0	52.7	30.9	39.1	33.5
24/09/2025	00:00	00:15	40.9	61.0	30.1	40.2	32.8
24/09/2025	00:15	00:30	37.7	52.2	30.9	40.2	32.8
24/09/2025	00:30	00:45	45.7	68.6	30.7	41.4	32.3
24/09/2025	00:45	01:00	34.8	51.5	30.4	36.8	31.8
24/09/2025	01:00	01:15	42.7	67.6	30.6	38.0	32.1
24/09/2025	01:15	01:30	47.8	73.1	28.8	40.1	31.6
24/09/2025	01:30	01:45	52.0	78.3	28.1	39.8	30.6
24/09/2025	01:45	02:00	41.6	64.1	26.9	38.0	28.6
24/09/2025	02:00	02:15	53.4	79.8	27.1	36.4	29.0
24/09/2025	02:15	02:30	48.2	73.2	27.0	39.8	29.2
24/09/2025	02:30	02:45	49.6	74.6	27.0	36.8	28.6
24/09/2025	02:45	03:00	41.2	64.5	27.5	39.3	29.4
24/09/2025	03:00	03:15	53.2	73.5	27.3	48.3	30.5
24/09/2025	03:15	03:30	47.5	73.7	27.6	35.7	29.0
24/09/2025	03:30	03:45	41.2	66.1	27.6	36.2	29.7

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _A F _{max}	L _A F _{min}	L _A F ₁₀	L _A F ₉₀
24/09/2025	03:45	04:00	48.0	73.5	28.3	40.7	30.2
24/09/2025	04:00	04:15	52.7	75.7	29.2	48.8	32.0
24/09/2025	04:15	04:30	46.9	70.2	29.3	40.5	31.6
24/09/2025	04:30	04:45	38.9	57.0	30.6	41.2	33.0
24/09/2025	04:45	05:00	46.0	71.5	30.9	41.3	33.6
24/09/2025	05:00	05:15	45.6	68.1	30.4	41.5	33.7
24/09/2025	05:15	05:30	55.2	75.8	31.9	50.9	34.7
24/09/2025	05:30	05:45	55.0	77.5	35.7	55.5	38.3
24/09/2025	05:45	06:00	55.7	75.9	36.8	58.4	39.8
24/09/2025	06:00	06:15	54.4	78.8	36.5	52.4	39.3
24/09/2025	06:15	06:30	55.3	74.9	38.5	57.1	41.6
24/09/2025	06:30	06:45	57.2	79.5	40.4	56.7	43.5
24/09/2025	06:45	07:00	59.0	76.3	43.1	62.5	45.3
24/09/2025	07:00	07:15	52.8	71.4	43.4	50.9	45.5
24/09/2025	07:15	07:30	59.5	80.9	43.4	59.5	46.8
24/09/2025	07:30	07:45	59.1	79.8	43.4	58.9	45.6
24/09/2025	07:45	08:00	61.7	75.2	44.3	66.3	47.7
24/09/2025	08:00	08:15	61.8	84.1	45.4	66.0	47.6
24/09/2025	08:15	08:30	63.0	76.7	46.1	67.9	49.7
24/09/2025	08:30	08:45	64.1	79.0	45.8	68.7	49.7
24/09/2025	08:45	09:00	63.4	80.0	47.4	67.0	50.6
24/09/2025	09:00	09:15	63.0	77.6	46.1	67.1	50.1
24/09/2025	09:15	09:30	61.4	78.3	46.5	65.5	49.1
24/09/2025	09:30	09:45	62.0	81.3	45.8	66.2	49.0
24/09/2025	09:45	10:00	62.8	82.1	45.3	65.9	48.0
24/09/2025	10:00	10:15	60.9	75.6	44.5	65.2	47.2
24/09/2025	10:15	10:30	62.2	82.1	43.9	65.8	46.9
24/09/2025	10:30	10:45	62.0	76.0	43.5	66.6	47.5
24/09/2025	10:45	11:00	61.9	80.0	43.6	65.8	48.7
24/09/2025	11:00	11:15	62.5	80.5	41.6	66.4	46.4
24/09/2025	11:15	11:30	61.3	75.8	40.9	65.7	46.8
24/09/2025	11:30	11:45	60.8	76.7	40.7	65.1	44.9
24/09/2025	11:45	12:00	61.4	79.5	41.9	65.8	46.0
24/09/2025	12:00	12:15	62.4	75.6	48.2	66.5	52.3
24/09/2025	12:15	12:30	61.9	77.8	45.7	66.3	49.3
24/09/2025	12:30	12:45	63.1	84.4	44.3	66.4	48.1
24/09/2025	12:45	13:00	60.8	73.4	45.5	65.2	49.0
24/09/2025	13:00	13:15	63.0	81.0	45.1	67.4	48.8
24/09/2025	13:15	13:30	61.7	79.5	45.7	65.5	50.2
24/09/2025	13:30	13:45	63.4	81.4	43.2	65.3	48.2

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _{Afmax}	L _{Afmin}	L _{Af10}	L _{Af90}
24/09/2025	13:45	14:00	61.7	75.8	45.1	66.4	48.0
24/09/2025	14:00	14:15	62.6	83.3	42.9	65.8	47.1
24/09/2025	14:15	14:30	61.1	76.8	44.1	65.7	48.0
24/09/2025	14:30	14:45	60.7	75.9	44.0	65.2	47.3
24/09/2025	14:45	15:00	61.7	80.0	44.5	65.7	48.0
24/09/2025	15:00	15:15	60.4	73.3	44.5	65.2	47.5
24/09/2025	15:15	15:30	60.6	76.3	44.0	65.0	47.3
24/09/2025	15:30	15:45	62.4	84.6	43.8	66.0	47.1
24/09/2025	15:45	16:00	61.2	74.3	42.6	65.7	46.6
24/09/2025	16:00	16:15	62.3	83.8	45.2	66.3	49.1
24/09/2025	16:15	16:30	63.5	78.7	45.2	67.9	49.2
24/09/2025	16:30	16:45	61.5	77.7	46.1	66.0	49.6
24/09/2025	16:45	17:00	62.5	76.1	44.9	66.7	49.8
24/09/2025	17:00	17:15	61.4	76.7	44.8	65.6	47.9
24/09/2025	17:15	17:30	64.1	81.2	46.3	67.4	49.7
24/09/2025	17:30	17:45	67.5	90.9	43.6	67.3	49.3
24/09/2025	17:45	18:00	63.5	80.2	44.8	67.5	49.4
24/09/2025	18:00	18:15	62.2	77.5	44.9	66.8	49.3
24/09/2025	18:15	18:30	62.7	83.9	44.4	65.7	48.8
24/09/2025	18:30	18:45	61.2	73.1	44.8	65.4	48.2
24/09/2025	18:45	19:00	61.0	74.9	43.9	65.9	47.3
24/09/2025	19:00	19:15	61.5	75.9	44.8	66.1	48.6
24/09/2025	19:15	19:30	60.8	82.9	44.4	65.4	47.7
24/09/2025	19:30	19:45	63.4	89.3	43.3	66.5	48.6
24/09/2025	19:45	20:00	61.2	78.0	45.6	65.8	50.0
24/09/2025	20:00	20:15	59.4	74.7	43.7	64.3	46.7
24/09/2025	20:15	20:30	57.4	75.3	42.0	61.8	45.2
24/09/2025	20:30	20:45	58.6	71.1	41.9	63.5	45.0
24/09/2025	20:45	21:00	60.2	75.3	41.7	65.1	45.1
24/09/2025	21:00	21:15	57.6	77.6	41.2	58.6	44.2
24/09/2025	21:15	21:30	56.8	75.9	38.6	59.6	43.1
24/09/2025	21:30	21:45	55.5	73.3	40.1	56.7	42.8
24/09/2025	21:45	22:00	52.0	71.5	38.7	50.6	42.5
24/09/2025	22:00	22:15	50.4	71.0	39.1	48.3	41.7
24/09/2025	22:15	22:30	52.5	73.9	37.5	51.8	40.9
24/09/2025	22:30	22:45	50.9	71.5	36.4	49.1	40.9
24/09/2025	22:45	23:00	55.2	77.0	37.7	48.9	40.9
24/09/2025	23:00	23:15	52.3	72.1	35.8	50.5	38.6
24/09/2025	23:15	23:30	54.6	78.4	34.6	48.6	37.6
24/09/2025	23:30	23:45	40.1	52.2	30.8	42.6	35.6

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _{Afmax}	L _{Afmin}	L _{Af10}	L _{Af90}
24/09/2025	23:45	00:00	48.0	73.5	31.4	44.4	36.0
25/09/2025	00:00	00:15	42.1	57.0	30.0	45.3	33.2
25/09/2025	00:15	00:30	38.7	52.4	29.8	40.6	33.0
25/09/2025	00:30	00:45	38.9	54.7	30.6	42.1	33.3
25/09/2025	00:45	01:00	37.3	53.7	29.3	39.3	31.3
25/09/2025	01:00	01:15	53.2	79.5	29.3	41.5	31.1
25/09/2025	01:15	01:30	45.0	72.0	28.8	38.6	31.3
25/09/2025	01:30	01:45	38.1	59.7	28.5	39.7	30.3
25/09/2025	01:45	02:00	51.6	77.7	28.7	39.5	30.5
25/09/2025	02:00	02:15	47.6	69.3	29.0	40.1	30.6
25/09/2025	02:15	02:30	50.1	75.2	28.2	40.0	31.0
25/09/2025	02:30	02:45	41.6	65.2	27.1	36.8	28.8
25/09/2025	02:45	03:00	53.9	75.2	29.1	47.6	31.8
25/09/2025	03:00	03:15	47.6	72.9	29.2	37.6	30.5
25/09/2025	03:15	03:30	46.4	71.7	28.4	39.4	30.7
25/09/2025	03:30	03:45	43.2	66.8	29.6	39.6	32.3
25/09/2025	03:45	04:00	49.4	74.8	29.5	40.8	30.8
25/09/2025	04:00	04:15	49.3	72.7	30.4	44.1	34.2
25/09/2025	04:15	04:30	48.5	71.2	32.2	42.3	34.8
25/09/2025	04:30	04:45	49.7	74.2	32.2	41.5	34.1
25/09/2025	04:45	05:00	45.1	66.6	30.7	42.8	33.4
25/09/2025	05:00	05:15	47.7	70.6	30.6	45.8	32.2
25/09/2025	05:15	05:30	54.3	76.5	33.1	48.9	36.0
25/09/2025	05:30	05:45	49.8	73.3	33.8	47.2	36.6
25/09/2025	05:45	06:00	53.5	73.0	37.0	54.0	39.4
25/09/2025	06:00	06:15	54.8	73.8	36.7	55.6	39.7
25/09/2025	06:15	06:30	55.8	75.5	39.8	56.5	42.5
25/09/2025	06:30	06:45	58.1	80.9	41.7	56.3	44.3
25/09/2025	06:45	07:00	59.1	77.0	44.3	63.4	47.3
25/09/2025	07:00	07:15	57.0	83.7	44.7	57.4	47.2
25/09/2025	07:15	07:30	57.6	75.9	46.0	59.9	48.3
25/09/2025	07:30	07:45	61.3	83.9	46.7	63.0	48.8
25/09/2025	07:45	08:00	59.9	75.2	46.7	63.9	49.0
25/09/2025	08:00	08:15	63.9	82.6	49.2	66.7	51.5
25/09/2025	08:15	08:30	63.1	77.4	48.9	67.7	51.6
25/09/2025	08:30	08:45	62.7	76.3	48.5	67.2	51.6
25/09/2025	08:45	09:00	63.2	74.5	49.1	67.2	52.8
25/09/2025	09:00	09:15	62.2	74.0	47.4	66.7	50.7
25/09/2025	09:15	09:30	61.6	73.7	47.4	66.3	50.4
25/09/2025	09:30	09:45	62.4	83.0	45.9	65.7	48.8

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _A F _{max}	L _A F _{min}	L _A F ₁₀	L _A F ₉₀
25/09/2025	09:45	10:00	60.3	75.2	44.7	64.9	48.6
25/09/2025	10:00	10:15	61.8	81.3	46.6	66.0	49.5
25/09/2025	10:15	10:30	62.1	79.0	44.6	66.2	48.4
25/09/2025	10:30	10:45	60.4	76.5	42.1	64.6	46.8
25/09/2025	10:45	11:00	60.7	73.5	43.6	65.6	47.3
25/09/2025	11:00	11:15	62.6	83.3	43.8	66.0	48.9
25/09/2025	11:15	11:30	61.9	75.0	45.6	66.1	48.9
25/09/2025	11:30	11:45	60.2	73.0	44.2	64.7	47.2
25/09/2025	11:45	12:00	61.2	79.0	44.4	65.2	47.7
25/09/2025	12:00	12:15	61.4	73.6	43.2	66.2	47.5
25/09/2025	12:15	12:30	62.2	79.8	44.9	65.8	48.5
25/09/2025	12:30	12:45	60.8	77.7	43.6	64.8	47.1
25/09/2025	12:45	13:00	61.6	80.7	43.6	66.0	46.8
25/09/2025	13:00	13:15	63.3	80.1	43.8	67.5	49.3
25/09/2025	13:15	13:30	62.6	78.1	45.6	66.9	49.6
25/09/2025	13:30	13:45	61.2	75.4	43.8	65.7	47.7
25/09/2025	13:45	14:00	61.5	82.1	44.6	65.1	48.5
25/09/2025	14:00	14:15	61.4	80.8	43.5	65.7	46.9
25/09/2025	14:15	14:30	60.0	73.4	42.5	64.8	47.5
25/09/2025	14:30	14:45	62.2	80.2	43.9	66.0	47.8
25/09/2025	14:45	15:00	61.7	73.9	44.4	66.1	49.5
25/09/2025	15:00	15:15	61.8	75.9	44.7	66.5	48.2
25/09/2025	15:15	15:30	62.8	77.8	45.3	67.0	48.2
25/09/2025	15:30	15:45	62.8	83.5	43.3	66.3	47.5
25/09/2025	15:45	16:00	60.4	73.1	44.9	64.9	49.0
25/09/2025	16:00	16:15	58.5	75.0	46.4	61.3	49.6
25/09/2025	16:15	16:30	61.3	74.8	44.0	65.8	47.2
25/09/2025	16:30	16:45	61.7	73.5	44.8	66.6	48.5
25/09/2025	16:45	17:00	61.6	73.7	45.0	65.8	49.3
25/09/2025	17:00	17:15	61.7	73.4	44.0	66.4	47.0
25/09/2025	17:15	17:30	61.5	78.9	44.6	66.2	48.2
25/09/2025	17:30	17:45	62.1	75.8	45.2	66.5	49.4
25/09/2025	17:45	18:00	62.6	78.9	45.9	66.3	49.7
25/09/2025	18:00	18:15	60.9	72.6	45.7	65.6	49.6
25/09/2025	18:15	18:30	61.7	74.1	45.0	66.4	49.0
25/09/2025	18:30	18:45	62.7	76.5	45.5	66.9	50.0
25/09/2025	18:45	19:00	62.1	75.0	45.3	66.1	49.2
25/09/2025	19:00	19:15	61.9	78.4	43.9	66.1	48.8
25/09/2025	19:15	19:30	69.1	99.4	44.3	66.5	48.1
25/09/2025	19:30	19:45	60.8	77.3	43.3	65.3	48.1

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _{AFmax}	L _{AFmin}	L _{AF10}	L _{AF90}
25/09/2025	19:45	20:00	62.1	75.8	44.6	66.9	49.1
25/09/2025	20:00	20:15	60.8	72.5	44.7	65.4	48.0
25/09/2025	20:15	20:30	59.7	73.4	43.4	64.8	46.6
25/09/2025	20:30	20:45	58.9	74.7	41.8	63.4	46.5
25/09/2025	20:45	21:00	57.8	72.2	43.8	62.2	46.3
25/09/2025	21:00	21:15	59.8	81.6	43.8	63.5	46.3
25/09/2025	21:15	21:30	57.2	72.2	41.7	60.9	45.4
25/09/2025	21:30	21:45	56.0	71.8	41.1	59.7	43.2
25/09/2025	21:45	22:00	53.1	69.3	40.8	55.3	42.7
25/09/2025	22:00	22:15	57.1	91.6	38.9	47.1	41.4
25/09/2025	22:15	22:30	49.8	71.7	39.6	46.4	41.5
25/09/2025	22:30	22:45	45.4	66.3	38.9	45.4	41.4
25/09/2025	22:45	23:00	57.2	81.8	37.7	51.0	41.5
25/09/2025	23:00	23:15	52.2	72.0	37.0	48.0	40.2
25/09/2025	23:15	23:30	47.9	67.7	36.3	45.4	39.4
25/09/2025	23:30	23:45	46.1	70.0	36.4	45.7	39.1
25/09/2025	23:45	00:00	54.9	79.9	36.1	47.7	38.6
26/09/2025	00:00	00:15	43.1	60.8	35.7	44.3	38.9
26/09/2025	00:15	00:30	43.5	64.8	34.2	42.5	36.9
26/09/2025	00:30	00:45	40.0	51.3	32.9	42.5	35.7
26/09/2025	00:45	01:00	47.5	68.8	32.5	45.0	35.2
26/09/2025	01:00	01:15	42.7	64.2	32.6	43.0	35.3
26/09/2025	01:15	01:30	48.9	72.7	31.2	40.2	34.1
26/09/2025	01:30	01:45	36.9	49.2	30.9	39.0	32.5
26/09/2025	01:45	02:00	53.1	78.4	31.2	42.9	32.8
26/09/2025	02:00	02:15	46.3	68.0	31.2	43.2	32.8
26/09/2025	02:15	02:30	50.0	74.1	31.2	43.7	33.9
26/09/2025	02:30	02:45	48.9	71.2	31.0	42.4	33.3
26/09/2025	02:45	03:00	53.7	77.6	30.2	43.7	32.2
26/09/2025	03:00	03:15	52.6	75.2	30.3	44.3	33.8
26/09/2025	03:15	03:30	46.4	72.8	29.9	40.3	31.7
26/09/2025	03:30	03:45	47.9	72.3	30.9	40.1	32.9
26/09/2025	03:45	04:00	49.4	75.3	30.6	40.1	32.0
26/09/2025	04:00	04:15	48.8	70.0	29.2	42.4	32.4
26/09/2025	04:15	04:30	50.2	70.7	30.1	43.3	33.8
26/09/2025	04:30	04:45	50.1	71.7	31.2	45.2	35.2
26/09/2025	04:45	05:00	50.8	76.6	31.2	47.7	35.6
26/09/2025	05:00	05:15	49.9	71.8	30.4	46.4	35.1
26/09/2025	05:15	05:30	52.2	76.9	33.6	46.4	37.4
26/09/2025	05:30	05:45	54.9	74.3	37.3	54.8	42.3

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _{AFmax}	L _{AFmin}	L _{AF10}	L _{AF90}
26/09/2025	05:45	06:00	53.7	70.3	39.7	56.5	42.5
26/09/2025	06:00	06:15	58.8	84.1	38.3	54.8	42.8
26/09/2025	06:15	06:30	54.9	75.7	40.8	56.5	45.2
26/09/2025	06:30	06:45	56.8	73.4	44.0	59.0	47.1
26/09/2025	06:45	07:00	58.5	73.2	46.4	62.5	48.4

APPENDIX B

NML #2 (EASTERN BOUNDARY) - FULL NOISE MONITORING RESULTS

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _{AFmax}	L _{AFmin}	L _{AF10}	L _{AF90}
23/09/2025	00:00	00:15	41.9	62.2	28.1	40.5	30.3
23/09/2025	00:15	00:30	38.6	56.2	28.5	37.9	30.0
23/09/2025	00:30	00:45	36.2	56.9	27.7	36.4	29.3
23/09/2025	00:45	01:00	35.6	55.2	25.0	34.2	27.3
23/09/2025	01:00	01:15	43.7	65.8	26.5	37.6	27.7
23/09/2025	01:15	01:30	36.2	54.0	26.8	35.6	28.2
23/09/2025	01:30	01:45	37.0	54.6	26.8	36.2	27.8
23/09/2025	01:45	02:00	32.6	57.4	26.9	33.3	28.6
23/09/2025	02:00	02:15	34.6	51.1	27.2	34.6	28.5
23/09/2025	02:15	02:30	37.6	56.8	27.1	38.5	29.1
23/09/2025	02:30	02:45	35.3	55.2	28.1	36.6	29.7
23/09/2025	02:45	03:00	43.6	63.5	26.5	42.6	28.2
23/09/2025	03:00	03:15	37.7	58.0	26.4	38.0	27.7
23/09/2025	03:15	03:30	31.8	43.9	26.6	33.4	29.0
23/09/2025	03:30	03:45	31.9	47.9	26.0	33.7	28.2
23/09/2025	03:45	04:00	33.5	50.2	25.9	34.3	27.7
23/09/2025	04:00	04:15	39.8	58.5	26.8	38.9	28.7
23/09/2025	04:15	04:30	32.8	46.2	28.1	33.9	30.1
23/09/2025	04:30	04:45	34.3	46.4	28.9	36.1	31.1
23/09/2025	04:45	05:00	44.1	68.1	29.6	42.2	31.8
23/09/2025	05:00	05:15	38.0	56.1	30.5	38.5	32.2
23/09/2025	05:15	05:30	41.5	57.6	30.7	43.3	33.4
23/09/2025	05:30	05:45	44.8	61.5	31.9	47.5	34.8
23/09/2025	05:45	06:00	52.2	80.3	34.7	43.9	36.9
23/09/2025	06:00	06:15	44.8	59.3	35.4	48.0	38.1
23/09/2025	06:15	06:30	46.4	65.8	37.3	48.0	39.6
23/09/2025	06:30	06:45	45.9	61.7	37.9	48.8	40.8
23/09/2025	06:45	07:00	47.6	60.2	41.0	50.3	42.8
23/09/2025	07:00	07:15	49.9	63.8	43.0	53.3	44.9
23/09/2025	07:15	07:30	49.9	66.0	43.3	53.2	45.3
23/09/2025	07:30	07:45	52.0	69.6	44.2	55.0	46.1
23/09/2025	07:45	08:00	52.8	69.5	45.1	55.6	46.9

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _A F _{max}	L _A F _{min}	L _A F ₁₀	L _A F ₉₀
23/09/2025	08:00	08:15	54.1	66.1	43.5	57.3	47.3
23/09/2025	08:15	08:30	56.1	73.7	44.7	57.8	50.6
23/09/2025	08:30	08:45	54.9	69.9	47.8	57.0	50.7
23/09/2025	08:45	09:00	54.8	68.7	47.7	56.8	50.3
23/09/2025	09:00	09:15	54.8	73.9	46.5	56.9	49.7
23/09/2025	09:15	09:30	54.1	69.0	45.1	56.8	47.9
23/09/2025	09:30	09:45	53.6	70.7	44.9	56.4	47.2
23/09/2025	09:45	10:00	53.1	66.6	43.6	56.0	46.9
23/09/2025	10:00	10:15	51.5	64.0	42.8	55.1	45.2
23/09/2025	10:15	10:30	51.7	70.0	42.6	54.4	45.6
23/09/2025	10:30	10:45	54.7	70.3	41.0	57.7	46.3
23/09/2025	10:45	11:00	53.8	79.6	40.0	55.6	43.3
23/09/2025	11:00	11:15	53.4	71.0	41.7	56.3	45.4
23/09/2025	11:15	11:30	51.0	61.6	42.3	54.4	45.5
23/09/2025	11:30	11:45	52.4	67.6	42.2	55.1	45.2
23/09/2025	11:45	12:00	51.7	64.9	41.6	55.1	45.1
23/09/2025	12:00	12:15	50.6	62.6	41.4	54.3	44.8
23/09/2025	12:15	12:30	51.7	67.3	40.4	54.6	45.2
23/09/2025	12:30	12:45	52.3	70.6	41.1	54.9	44.6
23/09/2025	12:45	13:00	52.0	66.7	40.6	54.5	44.4
23/09/2025	13:00	13:15	51.1	64.9	40.4	54.4	45.2
23/09/2025	13:15	13:30	51.9	64.0	40.8	55.3	44.6
23/09/2025	13:30	13:45	51.2	62.7	41.0	54.5	45.1
23/09/2025	13:45	14:00	51.8	75.2	41.3	54.4	45.7
23/09/2025	14:00	14:15	52.4	68.0	40.9	54.5	44.8
23/09/2025	14:15	14:30	53.3	74.8	42.4	55.4	45.6
23/09/2025	14:30	14:45	51.5	65.3	42.6	54.3	45.4
23/09/2025	14:45	15:00	53.0	64.7	42.6	55.7	46.7
23/09/2025	15:00	15:15	53.0	67.5	41.4	56.0	46.4
23/09/2025	15:15	15:30	52.1	73.0	43.1	55.0	46.1
23/09/2025	15:30	15:45	51.4	61.7	42.0	54.4	45.6
23/09/2025	15:45	16:00	54.0	75.4	44.6	56.0	48.3
23/09/2025	16:00	16:15	51.2	64.1	42.0	54.0	46.1
23/09/2025	16:15	16:30	55.8	76.4	41.2	56.1	46.3
23/09/2025	16:30	16:45	52.6	69.3	40.7	55.1	44.2
23/09/2025	16:45	17:00	51.1	64.7	39.8	54.5	44.2
23/09/2025	17:00	17:15	51.1	66.2	39.8	54.4	43.8
23/09/2025	17:15	17:30	51.1	61.6	40.8	54.5	44.8
23/09/2025	17:30	17:45	50.3	62.4	39.4	54.1	43.0

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _{AFmax}	L _{AFmin}	L _{AF10}	L _{AF90}
23/09/2025	17:45	18:00	52.6	67.5	40.9	55.5	44.1
23/09/2025	18:00	18:15	51.3	63.6	41.5	55.0	44.3
23/09/2025	18:15	18:30	53.2	67.1	42.1	56.0	46.7
23/09/2025	18:30	18:45	52.2	64.8	40.2	55.4	44.7
23/09/2025	18:45	19:00	51.9	69.8	40.3	55.1	45.1
23/09/2025	19:00	19:15	51.4	68.0	40.0	54.4	44.1
23/09/2025	19:15	19:30	50.7	64.6	40.0	54.4	44.1
23/09/2025	19:30	19:45	50.3	61.7	40.5	53.9	44.5
23/09/2025	19:45	20:00	51.8	69.3	39.6	54.6	43.6
23/09/2025	20:00	20:15	49.8	61.9	38.5	53.5	42.5
23/09/2025	20:15	20:30	47.9	58.9	37.7	52.3	40.4
23/09/2025	20:30	20:45	50.1	60.5	38.2	54.0	41.3
23/09/2025	20:45	21:00	48.2	61.7	38.2	52.3	40.3
23/09/2025	21:00	21:15	48.6	58.8	39.1	52.5	42.0
23/09/2025	21:15	21:30	46.5	57.1	39.2	50.5	41.0
23/09/2025	21:30	21:45	46.1	58.4	35.9	48.9	40.1
23/09/2025	21:45	22:00	45.4	58.8	36.1	49.1	38.3
23/09/2025	22:00	22:15	45.1	59.3	35.2	48.6	37.5
23/09/2025	22:15	22:30	42.7	58.5	33.5	45.6	36.6
23/09/2025	22:30	22:45	44.0	61.0	33.1	47.2	35.7
23/09/2025	22:45	23:00	42.6	58.8	31.5	45.5	34.7
23/09/2025	23:00	23:15	44.0	64.9	31.8	44.4	35.3
23/09/2025	23:15	23:30	42.7	59.8	30.6	45.2	33.1
23/09/2025	23:30	23:45	37.9	51.5	31.3	39.9	33.4
23/09/2025	23:45	00:00	38.8	58.2	28.8	37.8	30.7
24/09/2025	00:00	00:15	39.4	54.7	28.6	41.5	31.5
24/09/2025	00:15	00:30	36.9	51.6	28.9	39.3	31.0
24/09/2025	00:30	00:45	33.3	49.9	27.8	35.1	29.7
24/09/2025	00:45	01:00	32.2	46.1	27.6	34.5	29.3
24/09/2025	01:00	01:15	39.9	59.4	27.1	37.0	29.2
24/09/2025	01:15	01:30	34.5	52.9	27.1	36.5	28.4
24/09/2025	01:30	01:45	37.8	56.5	27.0	37.6	29.3
24/09/2025	01:45	02:00	34.1	50.3	25.9	36.2	28.4
24/09/2025	02:00	02:15	34.9	53.7	25.9	35.0	27.0
24/09/2025	02:15	02:30	36.5	53.4	25.9	36.8	28.6
24/09/2025	02:30	02:45	35.8	55.7	26.4	35.3	27.3
24/09/2025	02:45	03:00	32.0	44.4	25.9	34.9	27.9
24/09/2025	03:00	03:15	37.3	56.3	26.9	38.8	29.0
24/09/2025	03:15	03:30	32.0	49.4	25.8	34.1	27.1

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _A F _{max}	L _A F _{min}	L _A F ₁₀	L _A F ₉₀
24/09/2025	03:30	03:45	33.2	64.4	27.0	34.1	28.4
24/09/2025	03:45	04:00	42.1	63.4	27.4	42.3	29.0
24/09/2025	04:00	04:15	38.0	63.1	28.1	39.5	30.2
24/09/2025	04:15	04:30	35.6	53.3	27.5	37.3	29.9
24/09/2025	04:30	04:45	37.7	61.0	28.9	37.8	30.6
24/09/2025	04:45	05:00	44.9	67.6	28.4	38.5	30.4
24/09/2025	05:00	05:15	37.3	56.5	29.0	37.6	31.0
24/09/2025	05:15	05:30	41.3	56.3	30.5	43.8	32.7
24/09/2025	05:30	05:45	43.3	62.8	33.5	43.9	36.1
24/09/2025	05:45	06:00	45.3	63.8	35.3	46.7	37.4
24/09/2025	06:00	06:15	46.0	63.7	35.1	47.7	37.6
24/09/2025	06:15	06:30	45.2	58.5	36.2	48.2	39.1
24/09/2025	06:30	06:45	45.8	61.4	38.4	48.2	41.2
24/09/2025	06:45	07:00	50.7	69.1	41.2	53.7	43.1
24/09/2025	07:00	07:15	47.4	61.2	41.9	49.7	43.5
24/09/2025	07:15	07:30	49.5	69.6	41.3	51.8	43.6
24/09/2025	07:30	07:45	51.6	64.9	43.0	55.1	45.2
24/09/2025	07:45	08:00	52.3	66.6	43.3	55.7	45.9
24/09/2025	08:00	08:15	53.0	66.6	44.4	56.3	47.2
24/09/2025	08:15	08:30	54.8	69.6	45.6	57.0	49.7
24/09/2025	08:30	08:45	53.8	70.4	47.8	56.0	50.1
24/09/2025	08:45	09:00	53.9	62.9	47.7	56.4	50.1
24/09/2025	09:00	09:15	54.1	71.8	45.1	56.6	48.8
24/09/2025	09:15	09:30	55.2	79.2	45.3	56.8	47.4
24/09/2025	09:30	09:45	51.5	59.3	45.6	54.8	47.3
24/09/2025	09:45	10:00	51.5	60.9	44.5	54.4	47.3
24/09/2025	10:00	10:15	50.8	62.6	44.1	54.0	46.6
24/09/2025	10:15	10:30	49.9	60.9	42.4	53.3	44.7
24/09/2025	10:30	10:45	50.0	64.3	42.5	53.4	44.7
24/09/2025	10:45	11:00	51.7	70.5	43.4	54.6	46.8
24/09/2025	11:00	11:15	51.4	67.0	43.2	54.8	45.7
24/09/2025	11:15	11:30	52.1	70.9	43.3	54.6	45.7
24/09/2025	11:30	11:45	51.4	66.9	42.7	54.9	45.0
24/09/2025	11:45	12:00	52.7	69.5	41.4	55.2	44.6
24/09/2025	12:00	12:15	52.8	70.4	42.4	55.4	46.0
24/09/2025	12:15	12:30	53.4	69.5	43.4	55.7	46.3
24/09/2025	12:30	12:45	54.0	70.4	44.4	56.4	47.5
24/09/2025	12:45	13:00	53.0	70.5	44.4	55.7	47.0
24/09/2025	13:00	13:15	52.9	66.2	44.5	55.3	47.5
24/09/2025	13:15	13:30	53.8	73.9	45.5	56.1	48.8

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _{Afmax}	L _{Afmin}	L _{Af10}	L _{Af90}
24/09/2025	13:30	13:45	52.2	66.7	44.9	54.7	47.9
24/09/2025	13:45	14:00	53.7	71.0	44.8	55.9	49.3
24/09/2025	14:00	14:15	54.2	70.0	47.8	56.3	50.3
24/09/2025	14:15	14:30	53.1	70.9	44.0	55.2	48.0
24/09/2025	14:30	14:45	51.8	60.9	43.3	54.7	46.6
24/09/2025	14:45	15:00	53.3	69.5	43.4	55.9	48.5
24/09/2025	15:00	15:15	55.0	69.2	47.6	57.3	51.1
24/09/2025	15:15	15:30	51.7	61.1	44.4	54.7	47.0
24/09/2025	15:30	15:45	51.9	62.2	42.8	54.7	46.8
24/09/2025	15:45	16:00	51.4	61.5	42.7	54.5	45.7
24/09/2025	16:00	16:15	54.3	73.9	42.9	55.8	46.3
24/09/2025	16:15	16:30	53.0	65.5	43.0	55.5	47.0
24/09/2025	16:30	16:45	52.4	69.1	43.1	55.5	46.7
24/09/2025	16:45	17:00	52.0	61.2	41.6	55.2	46.4
24/09/2025	17:00	17:15	50.9	63.2	41.7	54.3	45.0
24/09/2025	17:15	17:30	52.0	65.7	42.9	55.1	46.4
24/09/2025	17:30	17:45	53.8	70.6	43.6	56.5	46.3
24/09/2025	17:45	18:00	51.9	65.4	42.0	55.2	45.0
24/09/2025	18:00	18:15	53.5	69.2	41.3	56.0	46.1
24/09/2025	18:15	18:30	53.7	71.3	40.4	55.5	46.6
24/09/2025	18:30	18:45	50.5	64.7	41.0	54.4	44.3
24/09/2025	18:45	19:00	52.3	68.6	41.3	55.0	45.1
24/09/2025	19:00	19:15	52.2	69.4	42.4	54.8	45.2
24/09/2025	19:15	19:30	51.6	64.1	41.3	54.7	44.7
24/09/2025	19:30	19:45	54.4	78.6	40.2	56.0	45.7
24/09/2025	19:45	20:00	52.8	69.3	42.2	55.7	47.1
24/09/2025	20:00	20:15	49.8	63.1	40.5	53.6	43.5
24/09/2025	20:15	20:30	49.3	60.4	40.8	53.1	43.1
24/09/2025	20:30	20:45	50.0	61.3	39.7	53.5	43.5
24/09/2025	20:45	21:00	48.3	59.6	39.9	52.2	42.5
24/09/2025	21:00	21:15	49.5	63.2	39.1	53.3	42.3
24/09/2025	21:15	21:30	48.6	59.8	36.4	53.0	40.0
24/09/2025	21:30	21:45	47.5	63.0	37.1	51.4	40.1
24/09/2025	21:45	22:00	44.1	55.1	37.5	46.0	40.0
24/09/2025	22:00	22:15	44.0	56.2	36.4	47.1	39.1
24/09/2025	22:15	22:30	44.3	60.7	35.5	47.2	38.4
24/09/2025	22:30	22:45	42.3	56.4	34.8	44.1	38.1
24/09/2025	22:45	23:00	44.6	62.3	33.6	45.2	38.0
24/09/2025	23:00	23:15	43.9	56.9	34.1	47.0	37.2
24/09/2025	23:15	23:30	44.1	60.5	34.1	46.3	37.1

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _A F _{max}	L _A F _{min}	L _A F ₁₀	L _A F ₉₀
24/09/2025	23:30	23:45	39.7	56.0	29.5	41.2	34.7
24/09/2025	23:45	00:00	40.7	58.4	29.9	42.1	33.9
25/09/2025	00:00	00:15	42.0	61.9	28.9	44.2	32.4
25/09/2025	00:15	00:30	37.5	53.8	27.7	39.7	30.0
25/09/2025	00:30	00:45	35.8	48.2	29.1	38.5	31.3
25/09/2025	00:45	01:00	36.4	52.2	26.9	37.6	29.2
25/09/2025	01:00	01:15	38.5	59.1	27.7	38.3	29.8
25/09/2025	01:15	01:30	38.4	57.1	27.6	38.6	29.6
25/09/2025	01:30	01:45	39.5	64.3	27.7	38.7	29.3
25/09/2025	01:45	02:00	36.0	52.2	28.0	38.3	29.6
25/09/2025	02:00	02:15	35.2	60.8	28.1	38.2	29.5
25/09/2025	02:15	02:30	36.3	55.0	27.9	38.3	29.4
25/09/2025	02:30	02:45	32.5	51.3	25.9	34.2	27.4
25/09/2025	02:45	03:00	38.3	55.1	27.1	42.0	29.2
25/09/2025	03:00	03:15	33.0	46.7	27.6	35.0	29.2
25/09/2025	03:15	03:30	36.8	58.4	26.6	36.1	28.7
25/09/2025	03:30	03:45	41.7	59.5	28.7	41.4	31.2
25/09/2025	03:45	04:00	38.3	59.5	27.7	38.0	29.2
25/09/2025	04:00	04:15	39.1	57.4	28.2	41.6	31.8
25/09/2025	04:15	04:30	36.6	48.3	30.6	38.7	33.5
25/09/2025	04:30	04:45	37.3	52.7	30.2	38.5	32.7
25/09/2025	04:45	05:00	40.2	59.2	29.8	40.5	31.8
25/09/2025	05:00	05:15	40.8	58.2	28.5	40.6	30.8
25/09/2025	05:15	05:30	46.0	67.1	32.0	46.2	34.3
25/09/2025	05:30	05:45	45.0	66.9	33.0	45.6	35.4
25/09/2025	05:45	06:00	42.6	59.0	35.4	44.3	37.7
25/09/2025	06:00	06:15	47.2	63.8	35.3	48.6	37.6
25/09/2025	06:15	06:30	46.4	61.4	38.3	49.2	40.4
25/09/2025	06:30	06:45	47.2	62.9	40.0	49.5	42.2
25/09/2025	06:45	07:00	48.7	59.7	41.3	51.2	44.8
25/09/2025	07:00	07:15	50.5	67.4	44.5	53.4	46.1
25/09/2025	07:15	07:30	52.1	69.7	45.6	54.6	47.3
25/09/2025	07:30	07:45	52.5	65.6	46.2	55.6	48.1
25/09/2025	07:45	08:00	52.2	60.8	45.7	55.1	47.9
25/09/2025	08:00	08:15	53.5	62.7	47.0	56.1	48.9
25/09/2025	08:15	08:30	55.1	65.8	47.9	57.3	51.0
25/09/2025	08:30	08:45	57.0	87.2	49.1	55.5	51.0
25/09/2025	08:45	09:00	54.9	64.9	48.0	57.1	52.0
25/09/2025	09:00	09:15	54.1	67.4	46.2	56.7	49.4
25/09/2025	09:15	09:30	53.9	69.4	46.7	56.0	49.0

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _A F _{max}	L _A F _{min}	L _A F ₁₀	L _A F ₉₀
25/09/2025	09:30	09:45	54.0	70.1	44.8	56.4	47.4
25/09/2025	09:45	10:00	51.8	64.8	43.5	55.0	46.8
25/09/2025	10:00	10:15	53.3	68.9	44.4	56.4	47.0
25/09/2025	10:15	10:30	52.8	68.0	42.5	55.3	45.9
25/09/2025	10:30	10:45	49.9	60.3	42.1	53.4	44.5
25/09/2025	10:45	11:00	52.5	68.9	42.4	55.1	45.4
25/09/2025	11:00	11:15	53.5	69.9	43.7	55.6	46.7
25/09/2025	11:15	11:30	52.4	68.9	43.1	55.2	46.5
25/09/2025	11:30	11:45	52.5	69.3	42.4	55.2	45.6
25/09/2025	11:45	12:00	51.2	69.9	42.4	54.1	45.0
25/09/2025	12:00	12:15	52.6	77.2	42.0	55.2	46.5
25/09/2025	12:15	12:30	51.7	70.6	43.1	54.7	46.6
25/09/2025	12:30	12:45	52.3	67.6	42.4	55.1	45.9
25/09/2025	12:45	13:00	52.4	67.3	42.8	55.4	46.2
25/09/2025	13:00	13:15	54.1	68.4	46.9	56.1	50.6
25/09/2025	13:15	13:30	53.2	62.7	47.6	55.6	49.9
25/09/2025	13:30	13:45	53.1	66.3	43.7	55.6	49.1
25/09/2025	13:45	14:00	52.2	65.7	43.6	54.6	46.3
25/09/2025	14:00	14:15	51.9	67.8	43.2	54.3	46.4
25/09/2025	14:15	14:30	52.8	70.1	43.7	55.4	47.9
25/09/2025	14:30	14:45	53.7	67.1	42.4	56.1	47.8
25/09/2025	14:45	15:00	53.2	65.9	44.7	55.7	48.1
25/09/2025	15:00	15:15	52.8	66.2	44.9	55.5	47.7
25/09/2025	15:15	15:30	54.0	72.5	44.1	56.2	47.8
25/09/2025	15:30	15:45	52.4	61.0	43.6	55.2	47.0
25/09/2025	15:45	16:00	54.6	67.2	47.0	56.8	50.0
25/09/2025	16:00	16:15	53.7	72.9	44.7	55.0	47.7
25/09/2025	16:15	16:30	52.9	65.3	43.7	55.7	46.5
25/09/2025	16:30	16:45	51.1	60.2	43.3	54.4	45.7
25/09/2025	16:45	17:00	54.2	73.0	43.3	56.1	47.0
25/09/2025	17:00	17:15	50.8	61.4	41.2	53.9	45.2
25/09/2025	17:15	17:30	51.4	64.2	41.8	54.5	44.8
25/09/2025	17:30	17:45	53.3	71.9	41.8	55.6	45.8
25/09/2025	17:45	18:00	53.4	75.2	42.9	55.4	46.5
25/09/2025	18:00	18:15	54.5	78.1	43.0	56.0	47.0
25/09/2025	18:15	18:30	53.4	70.1	42.8	56.1	47.4
25/09/2025	18:30	18:45	53.7	68.6	44.1	55.9	48.0
25/09/2025	18:45	19:00	53.0	64.2	43.5	55.5	47.2
25/09/2025	19:00	19:15	52.1	63.5	43.0	55.3	46.0
25/09/2025	19:15	19:30	52.8	72.4	42.9	55.2	46.0

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _A F _{max}	L _A F _{min}	L _A F ₁₀	L _A F ₉₀
25/09/2025	19:30	19:45	50.3	65.5	40.8	53.5	44.7
25/09/2025	19:45	20:00	51.2	66.4	41.4	54.3	45.0
25/09/2025	20:00	20:15	51.1	60.1	43.4	54.1	46.0
25/09/2025	20:15	20:30	51.3	66.1	41.7	54.3	45.1
25/09/2025	20:30	20:45	50.9	64.0	40.8	54.0	44.4
25/09/2025	20:45	21:00	51.4	62.1	41.3	54.7	44.7
25/09/2025	21:00	21:15	52.2	65.8	42.5	55.1	46.6
25/09/2025	21:15	21:30	50.5	60.4	40.2	54.3	43.5
25/09/2025	21:30	21:45	47.6	60.3	39.2	51.5	41.5
25/09/2025	21:45	22:00	47.8	68.2	37.9	48.9	40.9
25/09/2025	22:00	22:15	48.5	82.4	36.2	47.3	39.4
25/09/2025	22:15	22:30	45.4	61.0	37.4	48.6	39.4
25/09/2025	22:30	22:45	43.1	57.4	35.0	45.3	38.3
25/09/2025	22:45	23:00	44.5	58.8	34.5	46.9	39.1
25/09/2025	23:00	23:15	44.4	57.1	33.8	47.8	38.2
25/09/2025	23:15	23:30	43.0	57.8	34.5	44.9	37.5
25/09/2025	23:30	23:45	46.2	69.7	31.5	46.1	35.9
25/09/2025	23:45	00:00	42.0	57.9	33.9	43.3	36.7
26/09/2025	00:00	00:15	42.2	55.8	33.8	44.3	36.8
26/09/2025	00:15	00:30	41.8	58.5	32.0	42.6	34.9
26/09/2025	00:30	00:45	38.6	51.6	29.8	40.9	33.4
26/09/2025	00:45	01:00	37.9	52.3	30.0	40.1	32.8
26/09/2025	01:00	01:15	39.0	53.7	30.4	40.9	33.0
26/09/2025	01:15	01:30	36.5	54.5	29.7	38.0	32.2
26/09/2025	01:30	01:45	33.6	43.9	28.5	35.8	30.5
26/09/2025	01:45	02:00	43.0	64.9	29.2	41.2	31.0
26/09/2025	02:00	02:15	35.5	51.6	27.7	38.6	30.3
26/09/2025	02:15	02:30	37.4	51.3	28.3	39.2	31.5
26/09/2025	02:30	02:45	35.3	46.3	27.6	37.7	30.9
26/09/2025	02:45	03:00	36.8	50.5	26.9	39.7	29.3
26/09/2025	03:00	03:15	35.8	50.5	27.6	38.3	30.6
26/09/2025	03:15	03:30	37.9	53.8	26.6	41.1	28.8
26/09/2025	03:30	03:45	36.7	52.8	27.2	38.2	29.6
26/09/2025	03:45	04:00	35.5	51.2	26.7	37.4	28.2
26/09/2025	04:00	04:15	36.4	51.8	26.9	38.8	29.6
26/09/2025	04:15	04:30	38.2	56.1	27.2	40.3	30.9
26/09/2025	04:30	04:45	43.1	65.2	28.2	42.5	32.0
26/09/2025	04:45	05:00	40.4	55.0	28.8	42.2	32.9
26/09/2025	05:00	05:15	38.4	51.0	28.4	40.8	32.4
26/09/2025	05:15	05:30	44.7	62.7	31.5	46.6	35.8

Date	Time Period		Measured Sound Pressure Levels (dB)				
	Start	Finish	L _{Aeq,15min}	L _{AFmax}	L _{AFmin}	L _{AF10}	L _{AF90}
26/09/2025	05:30	05:45	47.1	75.0	35.3	48.0	39.4
26/09/2025	05:45	06:00	47.4	69.1	37.3	48.1	40.8
26/09/2025	06:00	06:15	46.6	61.0	37.7	48.9	41.3
26/09/2025	06:15	06:30	47.4	60.8	40.2	49.6	43.2
26/09/2025	06:30	06:45	48.9	60.0	42.4	51.1	45.2
26/09/2025	06:45	07:00	52.0	74.3	43.8	52.4	46.6

APPENDIX C

SOUND LEVEL METER CALIBRATION CERTIFICATES



NSAI

National Metrology Laboratory

Certificate of Calibration

Issued to

CLV Consulting
The NSC Campus
Mahon
Co. Cork

Certificate Number

244769

Item Calibrated

NTi Audio XL2-TA Sound Level Meter with NTi Audio MC230A Microphone

Serial Number

A2A-18385-ED (SLM) and A19398 (Microphone)

ID Number

None

Order Number

2410107

Date Received

22 Oct 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).

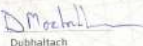
Calibration Standards

Norsonic 1504A Calibration System Incorporating:
SR D5360 Signal Generator, No. 0735 [Cal Due Date: 24 Jan 2025]
Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 24 Jan 2025]
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: 24 Jan 2025]

Calibrated by


David Fleming

Approved by


Dubhaltach
MacLochlainn

Date of Calibration

09 Jan 2025

Date of Issue

13 Jan 2025



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. Under the MRA, all participating institutions 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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NTi
AUDIO

Manufacturer Calibration Certificate

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3. All tests are traceable in accordance with ISO/IEC 17025.
No pattern approval is available for this sound level meter configuration.

Sound Level Meter

Manufacturer

NTi Audio

Type

XL2

Firmware

V1.42

Serial Number

S/N A3A-21453-F0

Microphone Model

M2540

Preamplifier

MA230

Microphone Capsule

MC230A

Performance class

S/N 1813

Customer inventory #

A30130

Customer

CLV Consulting Ltd
The NSC Campus
Mahon
Co. Cork
T12 XYZN

Date

05 January 2025

Certificate

UK-25-600

Results

PASSED
(for detailed report see next pages)

Operator


David Young

NTi Audio UK Ltd • Office (UK) • John's Road • Boreham
Haverham, B07 8ES, UK • sales@nti-audio.com

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APPENDIX D

ACOUSTIC CALIBRATOR CALIBRATION CERTIFICATE



NSAI
National Metrology Laboratory

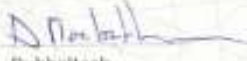
Certificate of Calibration

Issued to **CLV Consulting
The NSC Campus
Mahon
Co. Cork**

Certificate Number	244771
Item Calibrated	Larson Davis CAL200 Acoustic Calibrator
Serial Number	18882
ID Number	None
Order Number	2410107
Date Received	22 Oct 2024
NML Procedure Number	TFAP-NM-11

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 Multimeter, No. 0736 [Cal due date: 24 Jan 2025]
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]

Calibrated by	 David Fleming	Approved by	 Dubhaltach MacLochlainn
Date of Calibration	07 Jan 2025	Date of Issue	07 Jan 2025

 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. 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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