WAVE DYNAMICS

ACOUSTICS MONITORING ENVIRONMENTAL

Confey Leixlip

Acoustic Design Statement

23 July 2026

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Executive Summary

Wave Dynamics were engaged by the applicant as the acoustic consultants to undertake an operational and inward noise assessment for the planning application for the proposed new residential development on lands at Confey Leixlip, Confey, Leixlip, Co. Kildare.

The proposed project is a mixed-use, residential-led development on a site at Confey Leixlip, which involves the construction of 125 residential units comprising 81 no. houses, 22 no. duplex units and 22 no. apartments. The development is supported by shared amenities, including a landscaped communal park, private balconies or gardens, parking provisions for vehicles and bicycles, and pedestrian, cyclist and vehicular access points.

A baseline noise survey was undertaken to measure the existing noise levels across the site. The baseline noise survey results are used to characterise the receiving environment for the purposes of the setting of criteria for the operational noise assessment i.e. for the assessment of proposed new plant/equipment; and to establish existing traffic noise levels on the site for the purposes of the inward noise impact assessment and specification of the building façade.

Inward Noise Impact Assessment

A Stage 1 and Stage 2 ProPG assessment has been undertaken. Following a review of the noise levels on the site, including the L_{AFmax} and L_{Aeq} noise levels, the Stage 1 ProPG assessment has characterised the site as low to medium risk for both day and nighttime periods.

Consideration was given to the onset noise levels and the Kildare County Council (KCC) Noise Action Plan 2023 - 2029. The noise levels on the most exposed façade exceed the 57 dB(A) L_{night} criteria in some areas but remains within the 70 dB(A) L_{den} criteria. Consideration was given to noise abatement measures including a noise wall. However given the location of the development, the height of the development and the context of the development, providing a noise wall to mitigate the onset façade noise levels would not be a practical solution. Therefore, the façade has been designed to ensure adequate internal noise levels.

The noise impact assessment included break-in noise calculations to predict the internal noise levels from road traffic noise. Consideration has also been given to the future growth of the roads. Following the assessment, the building envelope performance requirements were determined. The performance specification for the building envelope has been provided in this report which includes the external walls, glazing, roof and ventilation requirements.

The external amenity spaces on the development includes communal outdoor space across the development and private amenity in the form of gardens and balconies. Appropriate amenity has been provided on the development for residents using the both the public and communal outdoor spaces. This is in line with element 3(v) of ProPG.

Based on the measured noise levels at the site it is predicted that the internal and external noise levels will achieve the targeted noise levels in line with BS 8233 and ProPG guidance.

Operational Noise Impact Assessment

An operational noise impact assessment has been conducted in accordance with BS 4142 and NG4 to assess noise generated from proposed new plant equipment. It is predicted that operational noise from the proposed development will give rise to no more than a ‘Low Impact’ on the nearby residential noise sensitive locations during both daytime and nighttime operations.

Based on the assessment outlined in this report, the noise generated from the proposed plant equipment is predicted to have a ‘Low Impact’ on the surrounding residential noise sensitive receptors.

Following consultation with KCC, feedback was received on the draft noise impact assessment. Table 1 summarises the opinion items and refers to the relevant section of the report where response information is provided.

Table 1: LRD Opinion Response

LRD Opinion Item	LRD Requirement Summary	Report Section	Summary of Response
19 Main	Overall Acoustic Design Statement & KCC Noise Action Plan thresholds (70 dB L_{den} / 57 dB L_{night})	Executive Summary Section 3.1 Section 5.1.8	Establishes the KCC Noise Action Plan policy thresholds (70 dB L_{den} and 57 dB L_{night}) and outlines the overall ProPG/BS 8233 assessment strategy.
19(a)	Midweek 5-day noise monitoring survey including Time Run Duration, $L_{AeqT\ (1h)}$, $L_{AeqT\ (15m)}$, L_{AFmax}, L_{AF10}, L_{AF90}, hourly L_{den}, and measured L_{night}	Section 4.1-4.6 Tables 3, 4, & 5	Details the baseline survey conducted over 8 days (12–20 May 2026). Includes attended 15-minute measurements (L_{Aeq}, L_{AFmax}, L_{A90} and L_{A10}) and 24-hour unattended logging (L1 & L2) breaking down daytime $L_{Aeq\ 16hour}$, L_{night} ($L_{Aeq\ 8hour}$), calculated L_{den}, L_{A90}, and nighttime L_{AFmax} levels.
19(b)	Calculated L_{den} and measured L_{night} values at open spaces (≥1.5m) and facades (≥1.5m per floor level); site boundary/mitigation proposals and decibel reduction values	Section 5.1.5 Section 5.1.6 Section 5.1.7 Section 5.1.8	Facade contours: Calculated at 1.5m, 4m, and 6m floor heights for L_{Aeq} daytime (Figs. 10–12), L_{night} (Figs. 13–15), and L_{den} (Figs. 16–18). Open spaces: External amenity space noise assessment at 1.5m (Fig. 20) confirming compliance with 50–55 dB $L_{Aeq\ 16hour}$. Mitigation: Evaluates site boundary/noise wall feasibility vs building envelope sound insulation. Defines exact decibel reductions for glazing (R_w) and trickle vents ($D_{n,e,w}$) in Tables 8 & 9.
19(c)	Internal noise levels per BS 8233, assessment of open windows in summer/daytime, and nighttime L_{AFmax} events (11 pm to 7 am) for sleep disturbance	Section 3.1 Section 4.6.2 (Figs. 7 & 8) Section 5.1.3 & 5.1.6	BS 8233 targets: Defines internal limits (35 dB $L_{Aeq\ 16hour}$ day, 30 dB $L_{Aeq\ 8hour}$ night, 45 dB L_{AFmax} night). L_{AFmax} sleep disturbance: Quantifies recorded nighttime L_{AFmax} event frequencies at loggers L1 and L2. Open windows: Assesses internal noise levels with open/tilted windows and identifies screened facades suitable for daytime natural ventilation via open windows (Fig. 19)
19(d)	Glazing and ventilation strategy proposals	Section 5.1.6 (Tables 8 & 9) Appendix B	Details acoustic performance requirements for glazing (29, 34 and 36 dB R_w) and trickle ventilators (32, 37 and 39 dB $D_{n,e,w}$) alongside full octave-band specifications. Appendix B provides a color-coded site layout map showing façade allocation.

LRD Opinion Item	LRD Requirement Summary	Report Section	Summary of Response
19(e)	Concluding statement on compliance with KCC Noise Action Plan 2019–2023 / 2023–2029 and BS 8233	Section 5.1.9 Section 7	Formal conclusions confirming that the proposed development achieves full compliance with BS 8233, ProPG guidance, and KCC Noise Action Plan criteria subject to the specified building envelope design.

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1 Introduction

Wave Dynamics were engaged by the applicant as the acoustic consultants to undertake an inward and operational noise assessment for the planning application for the proposed new residential development at Confey, Leixlip, Confey, Leixlip, Co. Kildare.

The proposed development will:

> *"Comprise a Large-Scale Residential Development (LRD) on a site at Confey, Leixlip, Co. Kildare.*
>
> *The proposed development provides a total of 125 residential units, comprising 81 no. houses, 22 no. duplex units and 22 no. apartments. The housing element consists of a mix of semi-detached and terraced dwellings, including 56 no. 3-bedroom houses and 25 no. 4-bedroom houses, ranging in height from 2 to 3 storeys. The development includes 22 no. duplex units within 11 duplex blocks, comprising 11 no. 2-bedroom and 11 no. 3-bedroom duplex homes, arranged over 3 storeys. The apartment element comprises 22 no. units within a single apartment block of up to 5 storeys in height, consisting of 5 no. 1-bedroom apartments and 17 no. 2-bedroom apartments.*
>
> *Provision of car, cycle and motorbike parking will be provided throughout the development.*
>
> *Vehicular, pedestrian, and cyclist access points will be provided from the north of the site via R149, with additional pedestrian and cyclist access provided from the south via the Royal Canal Greenway. The development will also provide landscaping, public and communal open spaces and all associated site development works to facilitate the project. These include boundary treatments, plant and waste management areas, and other service provisions."*

Appendix A outlines a glossary of the acoustic terminology used in this report.

1.1 Statement of Competence

This report was completed by Wave Dynamics, an acoustic consultancy that specialises in noise and vibration. Our consultants have completed numerous similar projects in the Ireland the UK and Europe.

This report has been prepared by Jon Maguire BSc (Hons) MIOA, Senior Acoustic Consultant. Jon brings eight years of specialist experience to the project, with a core expertise in environmental acoustics. Throughout his career, he has successfully led a diverse range of noise impact assessments across the energy, commercial and residential sectors. This extensive project history has provided him with a comprehensive understanding of the complex acoustic challenges inherent with residential developments, and a proven track record in designing high-performance mitigation strategies tailored to specific project needs.

The peer review was completed by James Mangan, who is Director (Acoustics) with Wave Dynamics. James has extensive experience in assessing noise and vibration impacts across a variety of sectors, including residential, industrial, commercial and renewable development. James has over 25 years' experience as an acoustic consultant, holds a Pg Diploma in Acoustics and Noise Control (Institute of Acoustics), is a Member of the Institute of Acoustics (MIOA) and is a former Chairman of the Irish Branch of the Institute of Acoustics.

2 Site Description

The site is located in Confey, Leixlip, Confey, Leixlip, Co. Kildare. The site is bounded by the R149 to the north and east, the Royal Canal to the south and Confey GAA Club to the west. There are housing estates located to the south and southwest across the Royal Canal and individual residential properties scattered around the north, east and west of the site. The site is located approximately 470 meters northeast of Confey/Leixlip Train Station. Figure 1 outlines the site location and surrounding area.

Figure 1: Site location and the surrounding area.

3 Project Criteria

The acoustic criterion for the project is set out in this section, the purpose of the criteria is to ensure reasonable:

- Internal noise levels,
- External amenity noise levels.
- Operational noise emissions.

To provide adequate conditions Wave Dynamics have developed the project criteria for:

- Façade sound insulation performance,
- Ventilation requirements,
- External amenity requirements, and
- Operational noise.

Assessment Standards

The criteria for the project have been developed based on the following industry standards:

- ✓ BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings*.
- ✓ BS 4142:2014+A1:2019: *Methods for rating and assessing industrial and commercial sound*.
- ✓ ProPG 2017 *Professional Practice Guidance on Planning & Noise*.
- ✓ EPA NG4: *Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities*.
- ✓ ISO 1996-1:2016 *Acoustics — Description, measurement, and assessment of environmental noise — Part 1: Basic quantities and assessment procedures*.
- ✓ Kildare County Development Plan 2023-2029.
- ✓ Previous experience on similar projects.

3.1 Inward Noise Assessment Criteria

The internal and external ambient noise levels requirements have been developed from the following standards:

ProPG: Professional Practice Guidance on Planning & Noise

ProPG is used to assess airborne noise from transport sources including road, rail and aircraft noise. The aim of the document is to provide a good design process which considers the internal acoustic environment at an early stage in the design process. The guidance was prepared by the Institute of Acoustics, the Association of Noise Consultants and the Chartered Institute of Environmental Health and is based on the findings by the World Health Organisation in relation to noise impact on humans. Its adoption is considered best practice for assessing the potential noise impact on the future occupants for residential developments.

The guidance is primarily designed for residential developments however it can be applied to other development types including developments where people require appropriate noise levels for rest and sleep. This includes residential care homes, hospitals etc. The guidance advocates a holistic design process which considers the site, its location and likely suitability for the development at an early stage.

The two primary stages of the ProPG design approach are summarised as follows:

Stage 1 – The first stage is to undertake an initial high-level noise risk assessment of the proposed site considering the noise levels (measured and or predicted) to identify any noise risks. This would include consideration of the current noise environment, future use and future noise levels ; and,

Stage 2 –The second stage is a full detailed assessment of the proposed development covering the "*Four Key Elements*":

1. *"Good Acoustic Design Process,*
2. *Internal Noise Level Guidelines,*
3. *External Amenity Area Noise Assessment; and*
4. *Assessment of Other Relevant Issues."*

As part of the process an Acoustic Design Statement is produced and submitted to the planning authority. This document sets out the design process used to come to the conclusions and recommendations in the report.

Following the ProPG the following conclusions are recommended by ProPG in relation to the findings of the Acoustic Design Statement based one the recommendations of the Acoustic Consultant:

a. *"Planning consent may be granted without any need for noise conditions;"*
b. *"Planning consent may be granted subject to the inclusion of suitable noise conditions; "*
c. *"Planning consent should be refused on noise grounds in order to avoid significant adverse effects ("avoid"); or, "*
d. *"Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects ("prevent")."*

Section 3 of the ProPG outlines the recommended approach decision makers should following in coming to their conclusions based on the recommendations of the Acoustic Design Statement Figure 2 on the next page illustrates the ProPG approach.

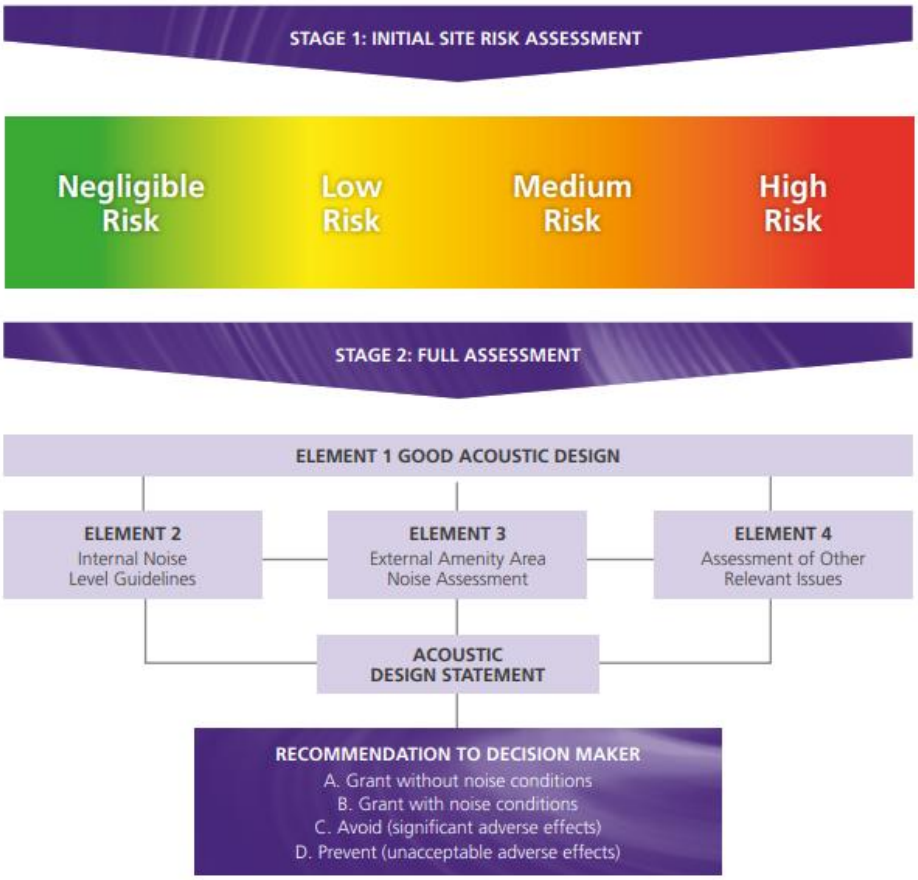


Figure 2: Summary of overall ProPG approach

Internal Noise Levels

Table 2 below outlines the recommended internal noise levels from BS 8233 within living accommodation for residential buildings for dining, resting and sleeping. These limits are in line with the ProPG and the World Health Organisation Guidelines.

Table 2: BS 8233:2014 internal noise criteria –Residential Buildings.

Activity	Location	Daytime 07:00 to 23:00 Hrs	Night-time 23:00 to 07:00 Hrs
Resting	Living Room	35 dB $L_{Aeq,\ 16\ hour}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,\ 16\ hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,\ 16\ hour}$	30 dB $L_{Aeq,\ 8\ hour}$ 45 dB L_{AFmax} (See Note 1)

1: Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB L_{AFmax} more than 10 times a night.

External Amenity Space Noise Levels

With regard to noise levels in external amenity spaces ProPG refers to the BS 8233 guidance which states that:

> "*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 $L_{Aeq,16hr}$".*

It also states that:

> *"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 but should not be prohibited."*
>
> After mitigation/with mitigation if the adverse noise impacts are still above the recommended noise levels they can be offset by providing an alternative amenity space to partially offset the noise impact by providing 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*
> - *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 minutes walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations."*

BS 8233 elaborates on this further, it acknowledges that it may not always be necessary or feasible to ensure that noise levels remain within the guideline values. In respect of gardens and patios, BS 8233 states:

> *"however it is also 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."

Both BS 8233 and ProPG do not advise that development should be restricted in areas with undesirable noise levels. The standards recommend that mitigation measures are put in place where practicable to achieve the recommended noise levels for the external amenity spaces. It notes that this may not be practical in all situations and local or governmental policy should take precedence in these situations.

Kildare County Development Plan 2023-2029

Under Chapter 15 (Development Management Standards), Kildare County Development Plan states any proposal for a residential development near busy roads in urban areas or adjacent to transport corridors is strictly required to demonstrate exactly how the impacts of noise will be avoided, prevented, or mitigated.

Section 8.2.1 of Kildare County Council aligns its assessment of new residential developments with the ProPG framework.:

""Applications for new residential developments in the Kildare County Council administrative area will be assessed in accordance with the policies and goals outlined in the relevant Development Plans. Where applicable, these include adoption of the principles of Professional Planning Guidance (ProPG) on Planning & Noise: New Residential Development, as described in Section 7.2.1".

"Where the assessment outcome determines the likelihood of an adverse noise impact, planning applications should be supplemented by an Acoustic Design Statement carried out by appropriately qualified acousticians and competent persons. The Acoustic Design Statement should demonstrate that all facets of ProPG have been followed"

The noise action plan goes on to say:

"Kildare County Council requires new development to be spatially located or acoustically shielded to achieve the lowest noise levels possible for the particular site and the use of the EPA thresholds to trigger assessment (70dB L_{den} / 57dB L_{night}) is generally regarded as appropriate to infill, legacy and in some cases, common good developments".

3.2 Operational Noise Assessment Criteria

Local authorities can set noise limits from typical residential developments pertaining to noise however there is currently no national policy for operational noise limits from residential developments for planning noise assessments. Noise limits for new developments are typically sought from local council's noise action plan, EPA NG4 or BS 4142. On review of the Kildare Noise Action Plan no specific guidance has been outlined for noise limits from residential premises and therefore the criteria from EPA NG4 and BS 4142 has been adopted for the project.

BS 4142:2014+A1:2019

The standard describes a method for the assessment of commercial, industrial and background noise to quantify its impact on persons outside of a residential dwelling. BS 4142 has become the de facto standard for compliance investigation. In addition to the specified broadband noise levels the standards provide objective and subjective methods for the assessment of the impulsivity and tonality of the noise sources. This allows for a penalty/ correction to be applied to the measured noise level of the source (L_{Aeq}) to give the rating level ($L_{Ar,T}$).

a. *Typically, the greater this difference, the greater the magnitude of the impact.*
b. *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
c. *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
d. *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level*

does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Adverse impacts include, but are not limited to, annoyance and sleep disturbance.

BS 4142 also requires the consideration of "context" and comments that:

> *"An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context"*

Response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact, for example, can depend on such factors as the margin by which a sound exceeds the background sound level, time of day and change in the acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood. The introduction of context to the BS 4142 assessment can include the consideration of the absolute level of sound, the sound emission characteristics and the sensitivity of the receptor.

EPA NG4

EPA NG4 outlines that noise attributable to onsite activities from an EPA licenced premises should not exceed the following limits:

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

During daytime and evening periods rigorous efforts should be made to avoid clearly audible tones and impulsive noise at all sensitive locations. A penalty of 5dB for tonal and/or impulsive elements is to be applied to the daytime and evening measured $L_{Aeq,T}$ values to determine the appropriate rating level ($L_{Ar,T}$). In all cases, an assessment by a competent person will be required.

During the night-time period no tonal or impulsive noise from the facility should be clearly audible or measurable at any NSL.

4 Baseline Noise Survey

An attended and unattended noise survey was conducted to quantify the existing noise environment and current noise levels experienced at the development site and the surrounding existing residential areas. The purpose of the measurements was to quantify the existing noise environment to assess the operational noise from the proposed development.

4.1 Site Description and Measurement Locations

The site is located in Confey, Leixlip, Co. Kildare. The site is bounded by the R149 to the north and east, the Royal Canal to the south and Confey GAA Club to the west. There are housing estates located to the south and southwest across the Royal Canal and individual residential properties scattered around the north, east and west of the site. The site is located approximately 470 meters northeast of Confey/Leixlip Train Station. Figure 3 outlines the site location, measurement positions used for the baseline noise survey and the surrounding area.

Figure 3: Site location, measurement locations L1, L2, A1 & SELs, NSLs and the surrounding area.

4.2 Survey Methodology and Personnel

The attended and unattended survey was completed by Jack Nolan (Field Engineer) between the 12th and 20th of May 2026.

Attended Noise Measurements

Noise measurements were undertaken in general accordance with ISO 1996-1:2016 using ISO Class 1 sound analysers. Attended measurements were taken at locations A1, L1, L2 and SELs as seen in Figure 3. Care was taken to avoid any effect on the measurement of extraneous noise, acoustic vibration, or interference. During the attended noise measurements, the sound level meter was positioned at approximately 1.5m above the ground level. The weather conditions were calm (wind less than 5m/s) with no rain. A wind shield was used for the duration of the attended surveys. The noise logger was calibrated before and after the survey and no significant drift was noted.

Figure 4: Attended Measurement Location A1.

Unattended Noise Measurements

An unattended noise logger was deployed at both location L1 and L2. The monitor was deployed in location L1 on the 12th of May 2026 at 11:30hrs and collected on 20th of May 2026 at 13:29hrs. The logger was secured at the southeastern boundary of the site at a height of 4 meters, adjacent the Confey/Leixlip train tracks. The logger was calibrated before and after the measurements and no significant drift was noted. Measurements were filtered for periods of unsuitable weather conditions (where appropriate).

Figure 5: Logger Location L1

Figure 6: Logger Location L2.

The monitor in location L2 was deployed on the 12th of May 2026 at 10:27hrs and collected on 20th of May 2026 at 13:24hrs. The logger was secured at a height of 4 meters on the northeastern boundary of the site, adjacent the R149. The logger was calibrated before and after the measurements and no significant drift was noted. Measurements were filtered for periods of unsuitable weather conditions (where appropriate).

4.3 Noise Measurement Equipment

Class 1 sound level meter/noise loggers in general accordance with IEC 61672-1:2013 were used for the attended and unattended measurements. Table 3 below summarises the measurement equipment used.

Table 3: Noise Measurement Equipment

Description	WD Asset Number	Model	Serial No.	Calibration Certificate No.	Calibration Due Date
Sound Level Meter	SLM1	Nor140 Sound Level Meter (SLM1)	1405554	TCRT25/1709	17/09/27
Sound Level Meter	SLM 3	Nor140 Sound Level Meter (SLM3)	1403082	50651 / 50650	13/04/27
Calibrator (acoustic)	Cal 7	Cirrus CR:515	107358	AC260323	25/03/27

Description	WD Asset Number	Model	Serial No.	Calibration Certificate No.	Calibration Due Date
Sound Level Meter	SLM 11	NTI XL3	A3A-01753-F0	UCRT25/1878	12/06/27

4.4 Weather Conditions for Monitoring Period

Good weather conditions were noted in general during the deployment and collection during the attended survey, with winds of less than 5 m/s and no rain.

The unattended survey results have been filtered for periods of poor weather conditions where required.

4.5 Subjective Noise Environment

During the attended noise survey, the following noise sources were identified:

- Road traffic noise from the R149 and distant road traffic from the M4,
- Rail traffic noise from adjacent train tracks,
- Birdsong,
- Low wind induced foliage noise.

Discussion of Measurement Results

The baseline noise monitoring survey consists of both weekday and weekend noise data. Measurements were obtained at various locations throughout the proposed development site to establish the existing noise conditions within the boundary of the site. The ambient noise consisted of road and rail traffic noise and nature sounds such as wind induced vegetation noise.

4.6 Noise Measurement Results

Attended and unattended measurements were taken to measure the noise levels across the site. This section outlines the results of the attended and unattended noise measurements.

4.6.1 Attended Measurement Results

Table 4 outlines the results of the attended measurement survey.

Table 4: Attended Noise Measurement Results

Measurement					Measured Noise Levels (re 20µPa)		
Location	Coordinates	Date	Time (hrs)	Duration (mins)	L_{Aeq} dB	L_{AFmax} dB	L_{A90} dB
L2	53.374819,-6.477384	12/05/2026	10:10	15	65	78	45
L1	53.373864,-6.477238	12/05/2026	11:13	15	60	79	48
L2	53.374819,-6.477384	20/05/2026	13:25	15	65	78	45
L1	53.373864,-6.477238	20/05/2026	13:30	15	52	75	45
A1	53.375065,-6.480738	20/05/2026	13:42	15	52	65	44
A1	53.375065,-6.480738	20/05/2026	14:03	15	51	64	43

4.6.2 Unattended Monitoring Results

Table 5 and Table 6 outline the results of noise measurements at the unattended monitoring locations L1 and L2.

Table 5: Unattended Measurement Results at Location L1

Start Date	$L_{Aeq,16hour}$ (07:00 – 23:00) dB	L_{night} ($L_{Aeq,8hour}$ 23:00 – 07:00) dB[1]	L_{den} (00:00 - 00:00) dB	10th highest night-time[1] L_{AFmax} dB	L_{A90} (23:00 - 07:00) dB[1,2]	L_{A90} (07:00 – 23:00) dB[2]	L_{A10} (23:00 – 07:00) dB[2]	L_{A10} (07:00 – 23:00) dB[2]
12/05/2026	57(3)	52	60(3)	72	39	46(3)	47	54(3)
13/05/2026	57(4)	54	61(4)	74	36(4)	46(4)	47	56(4)
14/05/2026	57	52	61	73	36	45	46	55
15/05/2026	56	50	59	69	33	42	46	53
16/05/2026	56(4)	50	59(4)	66	38(4)	43(4)	47	53(4)
17/05/2026	56(4)	53	60(4)	74	37(4)	43(4)	45	53(4)
18/05/2026	57(4)	52	60(4)	71	39(4)	43(4)	47	53(4)
19/05/2026	57(4)	52	61(4)	73	39(4)	45(4)	46	53(4)
20/05/2026	57(3) (4)	N/A	60(3) (4)	N/A	N/A	46(3) (4)	N/A	54(3) (4)

(1) Where nighttime period is referred to - the calculation is made from the date the measurement commenced on at 23:00hrs and finished at 07:00hrs on the following calendar day.

(2) Arithmetic average of L_{AF90}/L_{AF10}.

(3) Shortened measurement duration.

(4) Filtered due to periods of poor weather

Table 6: Unattended Measurement Results at Location L2

Start Date	$L_{Aeq,16hour}$ (07:00 – 23:00) dB	L_{night} ($L_{Aeq,8hour}$ 23:00 – 07:00) dB[1]	L_{den} (00:00 - 00:00) dB	10th highest night-time[1] L_{AFmax} dB	L_{A90} (23:00 - 07:00) dB[1,2]	L_{A90} (07:00 – 23:00) dB[2]	L_{A10} (23:00 – 07:00) dB[2]	L_{A10} (07:00 – 23:00) dB[2]
12/05/2026	65(7)	60	67(8)	78	40	47(7)	53	70(7)
13/05/2026	66(8)	61	69(8)	80	36(8)	46(8)	53	70(8)
14/05/2026	67	60	69	79	36	45	52	71
15/05/2026	66	59	69	78	34	44	52	71
16/05/2026	66(8)	59	68(8)	79	39(8)	44(8)	54	70(8)
17/05/2026	65(8)	61	68(8)	79	38(8)	43(8)	52	68(8)
18/05/2026	66(8)	61	69(8)	79	39(8)	44(8)	51	71(8)
19/05/2026	65(8)	52	68(8)	70	40(8)	47(8)	48	67(8)
20/05/2026	58(7) (8)	N/A	61(7) (8)	N/A	N/A	46(7) (8)	N/A	63(7) (8)

(5) Where nighttime period is referred to - the calculation is made from the date the measurement commenced on at 23:00hrs and finished at 07:00hrs on the following calendar day.

(6) Arithmetic average of L_{AF90}/L_{AF10}.

(7) Shortened measurement duration.

(8) Filtered due to periods of poor weather

4.6.3 L_{AFmax} Noise Levels

Based on the project criteria outlined in Section 3, the internal L_{AFmax} inside the dwelling bedrooms cannot exceed 45 dB(A) more than 10 times per night. With regard to the maximum noise levels ProPG states:

> *"A site should not be regarded as negligible risk if the $L_{Amax,F}$ exceeds, or is likely to exceed 60 dB more than 10 times a night. A site should be regarded as high risk if the $L_{Amax,F}$ exceeds, or is likely to exceed 80 dB more than 20 times a night."*

Figure 7 and Figure 8 below highlight the average number of L_{AFmax} events recorded on the noise logger per night based on a 15min measurement interval. Based on the ProPG risk assessment of the L_{AFmax} noise levels, the site is not considered high risk as there are less than 20 occurrences exceeding 80 dB L_{AFmax}.

The façade specification outlined in Section 5.2.6 below has been determined in accordance with achieving the internal noise levels for both L_{Aeq} and the L_{AFmax} incident noise levels below.

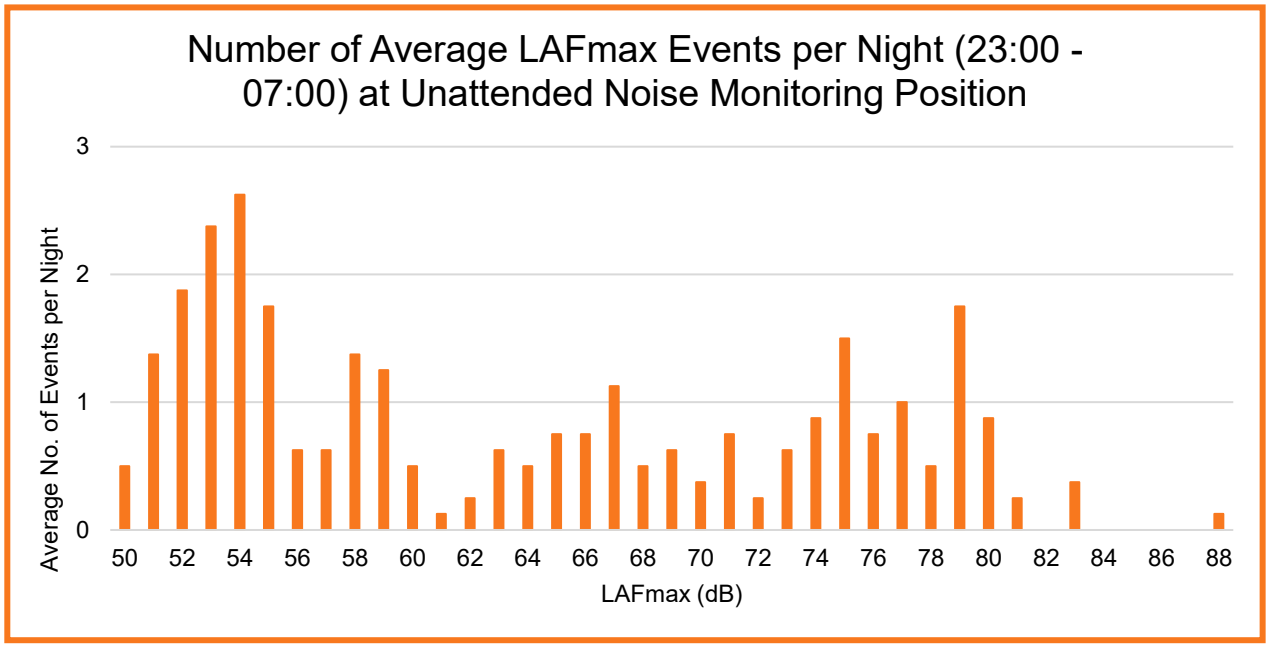


Figure 7: Average recorded L_{AFmax} events per night based on 15min measurement intervals at location L1.

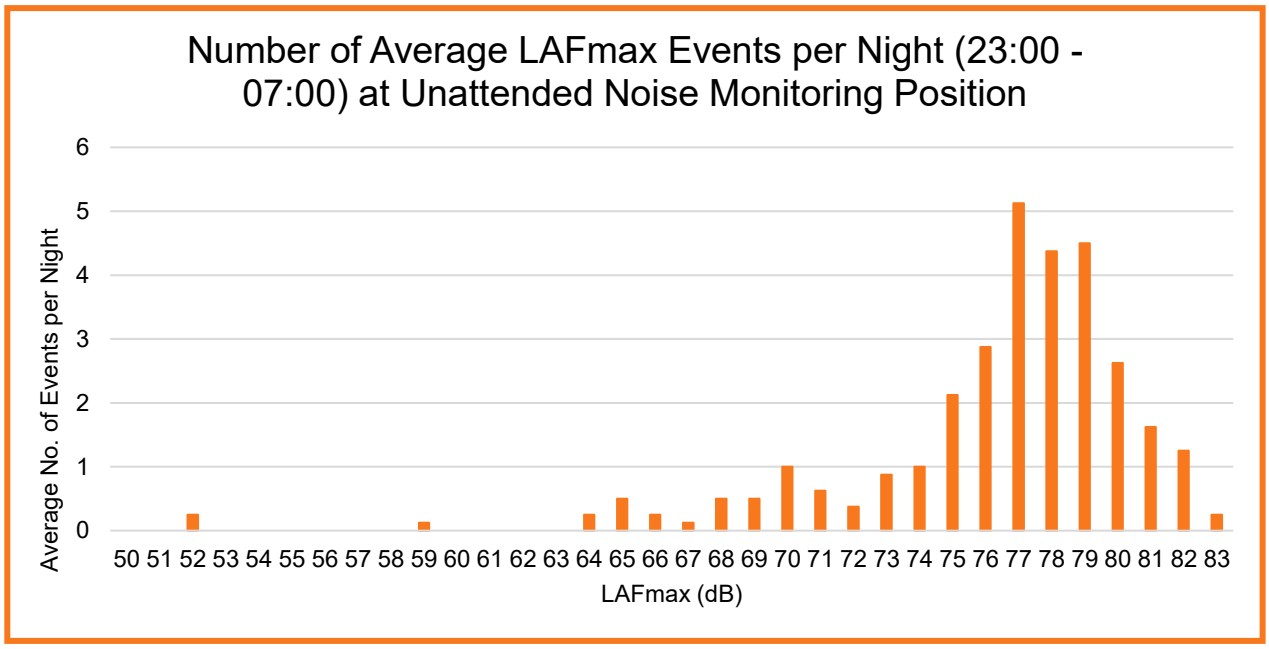


Figure 8: Average recorded L_{AFmax} events per night based on 15min measurement intervals at location L2.

4.6.4 Sound Exposure Level Measurements

This section outlines the instances where there was a train pass on the Dublin-Maynooth/Longford Commuter which runs adjacent the southern boundary of the site in Confey. The measurements were taken at location SEL, opposite the railway line.

Train Passes

Table 7 outlines the sound exposure levels (SEL or L_{AX}) for train passes on the rail line adjacent the proposed development.

Table 7: Measured SEL (LAX) data for train passes

Location	Date	Coordinates	Time	Duration (T, seconds)	L_{Aeq} dB	L_{AFmax} dB	SEL (L_{AX}) dB
SEL	20/05/2026	53.373897,-6.478019	14:49	60	68	77	86
SEL	20/05/2026	53.373897,-6.478019	15:10	60	58	70	76
SEL	20/05/2026	53.373897,-6.478019	15:18	57	51	60	69
SEL	20/05/2026	53.373897,-6.478019	15:38	58	68	77	86

To calculate the impact of the train pass on the façade of the proposed building it is possible to predict the noise impact using the measured L_{Aeq} from the train pass and calculating the sound exposure level using the following equation:

$$L_{Aeq} = L_{Ax} + 10*\log_{10}(N) - 10*\log_{10}(T) + 10*\log_{10}(d1/d2)$$

Where:

L_{Aeq} is the measured level of the event
N number of vehicle movements
T time (seconds)
d1 distance from the source to the receiver
d2 distance from the source to the measurement

Following a review of the information on the rail line regarding number of trains servicing Confey train station, timetables indicate there are approximately 70 total trains carrying passengers per day and 8 total trains carrying passengers per night. This is based on a typical weekday.

Total Movements:

Day (07:00 -23:00hrs): 70 movements

Night (23:00-07:00hrs): 8 movements

Activity	Period	Number of Passbys	Predicted Façade Noise Level from train passes
Train Movements	Day	70	57 dB $L_{Aeq\ 16\ hr}$
	Night	8	52 dB $L_{Aeq\ 8\ hr}$

Based on the ProPG risk assessment of the L_{AFmax} noise levels, the site is considered not high risk as there are less than 20 occurrences exceeding 80 dB L_{AFmax}.

4.7 Future Noise Levels

Based on data from the TII (2017) the average rate of growth on Irish roads is a 3.9%, assuming linear growth of 3.9% over the next 10 years an increase in noise levels from road traffic of 1-2 dB would be expected. WDA have allowed for this growth in our assessment.

The DART+ West project, which received statutory planning approval from An Bord Pleanála in July 2024 and cleared judicial review in June 2025, dictates the baseline service growth. Plans are to transition to a fully electrified network by the early 2030s, and as a result, baseline traffic will potentially double, increasing from the current maximum of 6 trains per hour per direction up to 12 trains per hour per direction, subject to passenger demand. WDA have allowed for this growth in our assessment.

5 ProPG Assessment

5.1 ProPG Stage 1 – Initial Risk Assessment

The stage one risk assessment is used to assess the site for potential risks that may occur in terms of noise impact. The ProPG sets out four categories of risk:1) negligible, 2) low, 3) medium or 4) high risk. Figure 9 below illustrates the ProPG risk assessment and the values associated with each risk category.

The risk assessment also considers the risk based on the number of L_{AFmax} events per night as follows;

- A site should not be considered a negligible risk if more than 10 L_{AFmax} events exceed 60 dB during the night period and;
- A site should be considered a high risk if the L_{AFmax} events exceed 80 dB more than 20 times per night.

Paragraph 2.9 of ProPG states that,

> *"The noise risk assessment may be based on measurements or prediction (or a combination of both) as appropriate and should aim to describe noise levels over a "typical worst case" 24 hour day either now or in the foreseeable future."*

To assess the noise impact with the ProPG risk categories a baseline noise survey was undertaken on the site to quantify the existing noise environment.

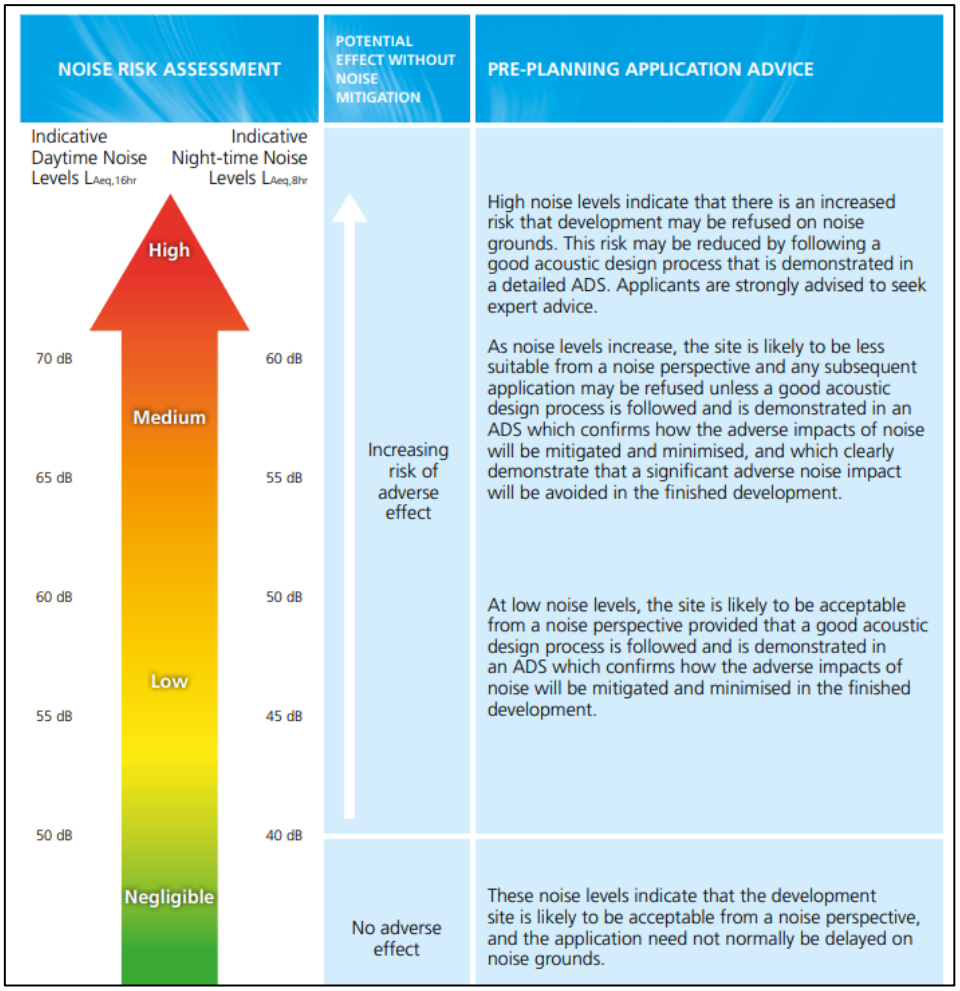


Figure 9: ProPG Risk Analysis

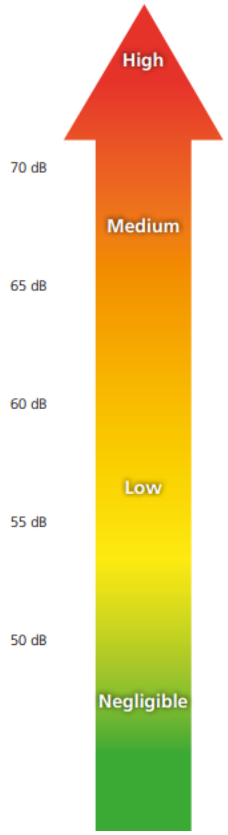
The measured noise levels on the site have been predicted for the existing road traffic noise to assess the probability of an adverse impact.

Table 8 below identifies the Noise Risk Categorisation of the site based on the predicted free field façade noise levels. The site has been categorised as medium risk for the existing noise levels at the site. The glazing and ventilation element specifications to achieve required internal noise levels are outlined in Section 5.2.6.

It should be noted that the ProPG 2017 states the following with regard to how the initial site noise risk is to be used:

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

Table 8: ProPG Stage 1 Risk Assessment of Existing Noise Levels

Noise Risk Assessment		**Risk Assessment Rating**	
Indicative Daytime Noise Levels $L_{Aeq,16hour}$	**Indicative Night-time Noise Levels $L_{Aeq,8hour}$**	**Daytime Noise Levels**	**Night-time Noise Levels**
		**High Risk**	**High Risk**
		N/A.	N/A.
		Medium Risk	**Medium Risk**
		The north side closest to the R149 considered medium risk. Good Acoustic Design should be demonstrated.	The northern boundary of the site adjacent to the R149 is in the medium risk category for the nighttime period. Good Acoustic Design should be demonstrated.
		Low Risk	**Low Risk**
		The majority of the site is in the low-risk category for the daytime period	The majority of the site is in the low-risk category for the nighttime period
		Negligible Risk	**Negligible Risk**
		N/A.	N/A.

5.2 ProPG Stage 2- Full Assessment

This section outlines the full acoustic design assessment in line with ProPG guidance.

5.2.1 Element 1: Good Acoustic Design Process

ProPG States the following in relation to Good Acoustic Design Process:

> *"A good acoustic design process takes a multi-faceted and integrated approach to achieve optimal acoustic conditions, both internally (inside noise-sensitive parts of the building(s)) and externally (in spaces to be used for amenity purposes)."*
>
> *"Good acoustic design should avoid "unreasonable" acoustic conditions and prevent "unacceptable" acoustic conditions (these terms are defined in Element 2). Good acoustic design does not mean overdesign or gold plating of all new development but seeking to deliver the optimum acoustic outcome for a particular site"*

The following considerations are recommended by ProPG:

- *"Check the feasibility of relocating, or reducing noise levels from relevant sources.*
- *Consider options for planning the site or building layout.*
- *Consider the orientation of proposed building(s).*
- *Select construction types and methods for meeting building performance requirements.*
- *Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc.*
- *Assess the viability of alternative solutions.*
- *Assess external amenity area noise."*

5.2.2 Discussion of Good Acoustic Design

Mitigation of Sources

The development is located close to roads and railway noise sources which are not on or part of the development therefore it is not possible to reduce or relocate the relevant noise sources.

Site Layout and Orientation

The northern and southern elevations of the site is currently most exposed to noise with direct line of sight to the R149 and rail tracks.

Construction Methods

Consideration should be given to the construction methods required to meet the building performance control measures. The construction measures should be robust, providing standard external wall and façade details to meet thermal, fire and weathertightness requirements, which will in general provide adequate performance to achieve good levels of sound insulation.

Impact of Noise Control Measures

The effects for noise control measures on other building elements including ventilation are considered in Section 5.2.6. It is generally impractical to provide ventilation via openable windows in urban/built up areas. An open window will provide 10-15 dB of attenuation which in built up urban areas is not practical. In general, the good acoustic design process in these areas is to provide ventilation via attenuated natural vents or mechanical ventilation. This allows the occupants to have adequate ventilation with adequate noise levels.

External Amenity

ProPG states the following with regard to external amenity spaces:

> *"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 $L_{Aeq,16hr}$."*

The external amenity source noise levels are considered in Section 5.2.7.

5.2.3 Element 2 – Assessment of Internal Noise Levels

This section outlines the assessment of the building envelope including the façade noise modelling, and specification of the glazing requirements.

A noise intrusion assessment for the proposed development has been completed in accordance with the methodology outlined International Standard *ISO EN 12354-3:2017 Building acoustics — Estimation of acoustic performance of buildings from the performance of elements — Part 3: Airborne sound insulation against outdoor sound*. The standard provides a method for calculating the indoor noise levels due to for instance Road Traffic Noise.

The calculation method accounts for multiple factors including:

- The external noise level at the affected building façade.
- The frequency characteristics of the specific noise source (i.e. road traffic noise).
- The sound insulation performance of each façade element (i.e. Windows, Walls, Roof…).
- The area of each façade element.
- Direct and flanking transmission paths.

5.2.4 Inward Noise Prediction Modelling

Following the survey a model of the development using SoundPLAN 9.1 modelling software was developed to establish the noise levels from the development in a worst-case scenario. The software implements the algorithms contained in ISO 9613-1 and ISO 9613-2. The noise model considers:

- Distance attenuation,
- Source and receptor locations,
- Barrier effects (buildings, walls etc)
- Topographical elevations,
- Ground effects and absorption,
- Source sound power levels,
- Directivity and orientation of the source,
- Atmospheric attenuation and meteorological effects,

The noise model has been calibrated against the noise measurements for the existing road and rail network in the area. SoundPLAN 9.1 predicts road traffic noise levels in accordance with *Calculation of Road Traffic Noise* (UK Department for Transport, 1998) and railway noise levels in accordance with *Calculation of Railway Noise* (UK Department of Transport, 1995). These are the recognised appropriate standards for railway and road traffic noise prediction in Ireland, in line with Transport Infrastructure Ireland (TII) guidelines for the assessment of national transport infrastructure projects

The following information was input into the model:

- Development layout provided by architect's drawings.
- Google Maps terrain and elevation data of surrounding area.
- Road traffic noise sources.
- Rail noise sources.

5.2.5 Predicted Road Noise Levels

Incident road traffic and rail noise levels have been predicted across all facades of the development for both the day and nighttime period. The proposed site boundary is outlined in red.

Daytime Noise Levels

Figure 10, Figure 11 and Figure 12 below outline the predicted road traffic and rail noise levels across the proposed site for the daytime period at 1.5m, 4m and 6m.

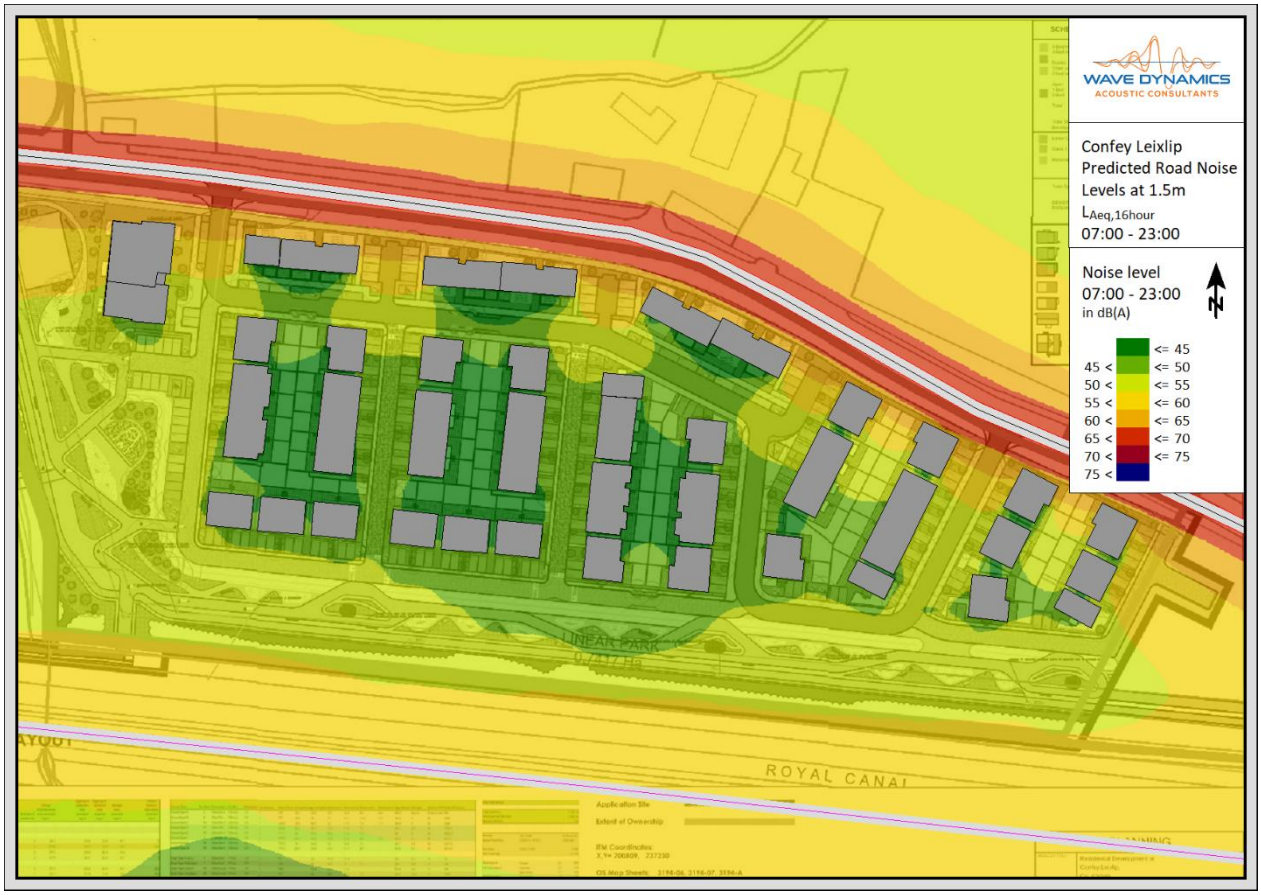


Figure 10: Predicted $L_{Aeq,16hour}$ (07:00hrs – 23:00hrs) at 1.5m height for the future development.

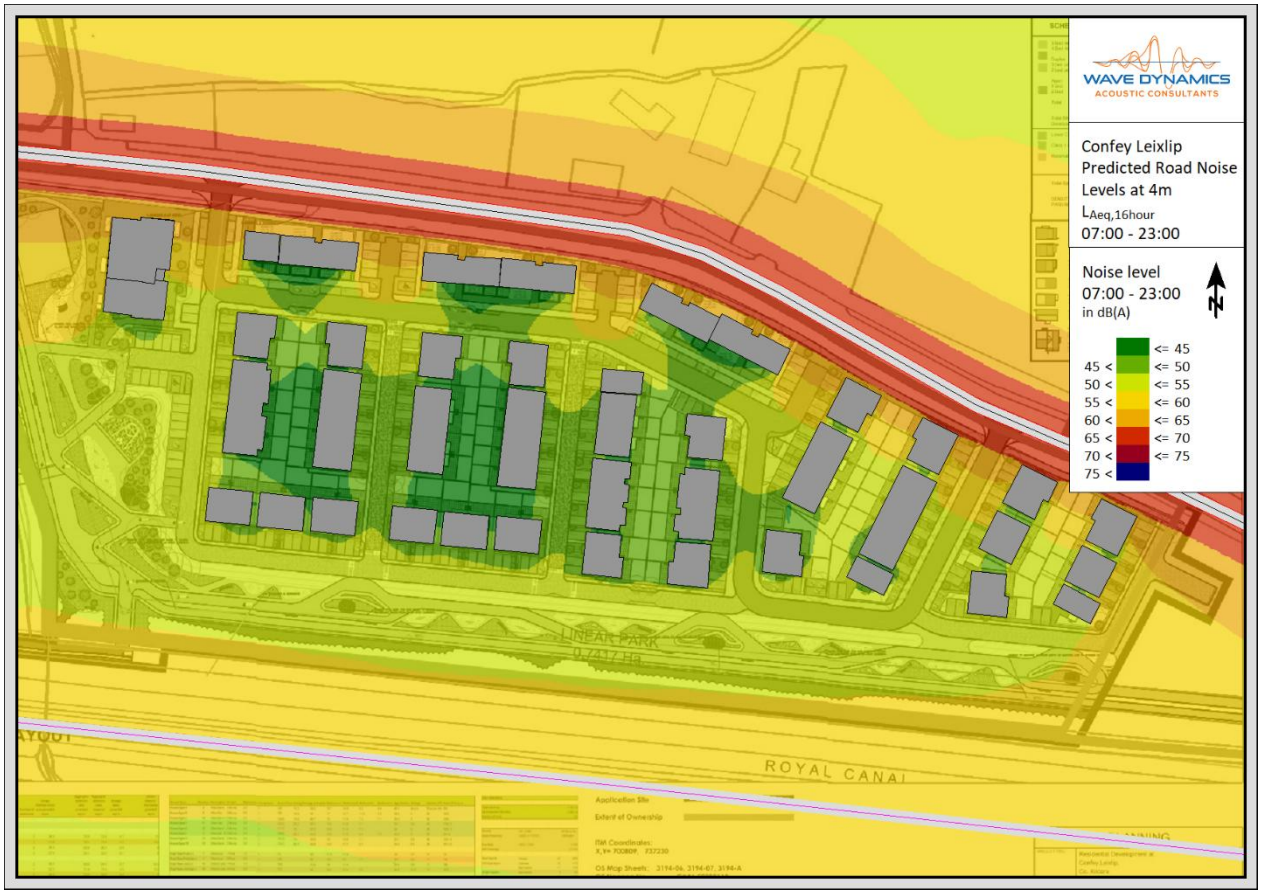


Figure 11: Predicted $L_{Aeq,16hour}$ (07:00hrs – 23:00hrs) at 4m height for the future development.

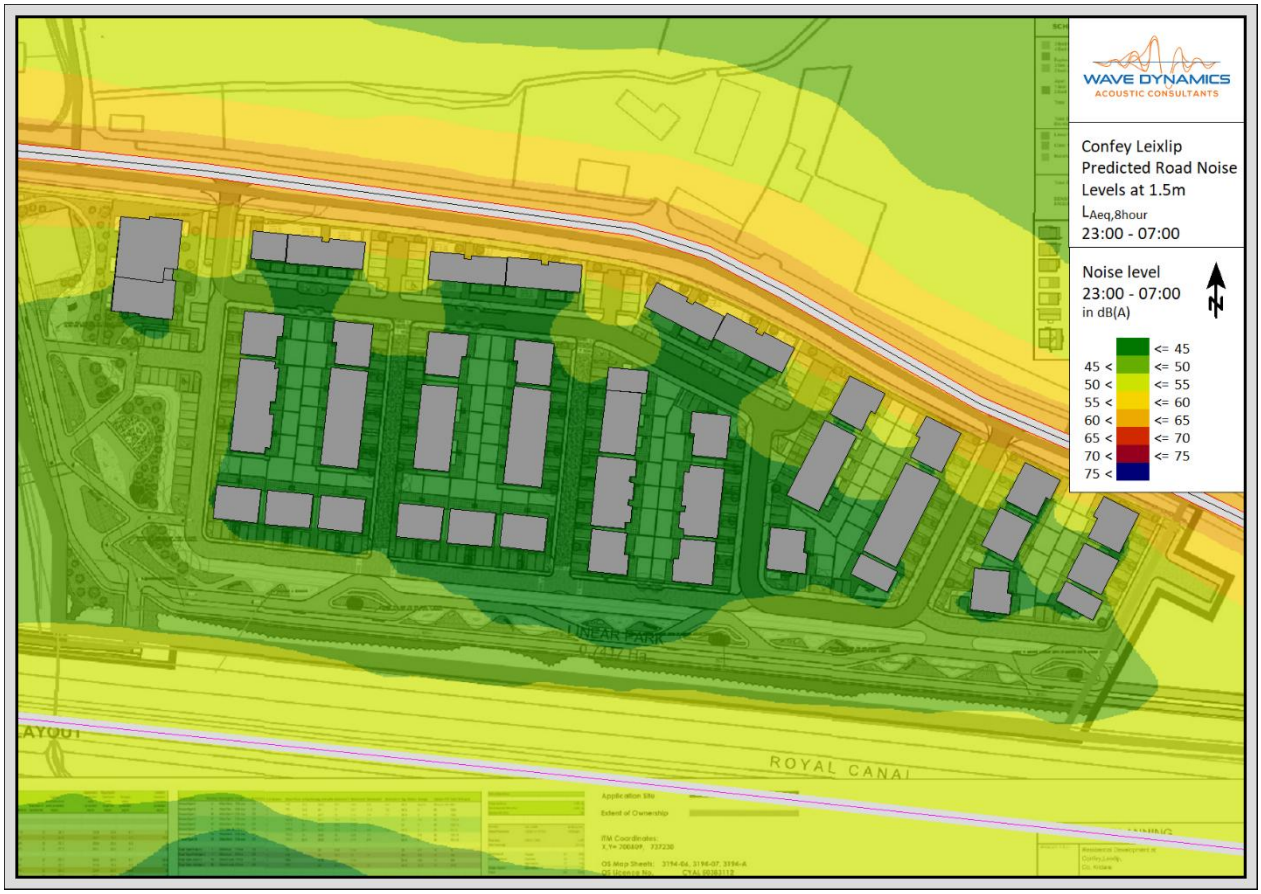


Figure 12: Predicted $L_{Aeq,16hour}$ (07:00hrs – 23:00hrs) at 6m height for the future development.

Nighttime Noise Levels

Figure 13, Figure 14 and Figure 15 below outline the predicted road traffic and rail noise levels across the proposed site for the nighttime period at 1.5m, 4m and 6m.

Figure 13: Predicted $L_{night\ (}$23:00hrs – 07:00hrs) at 1.5m height for the future development.

Figure 14: Predicted $L_{night\ (}$23:00hrs – 07:00hrs) at 4m height for the future development.

Figure 15: Predicted L_{night} (23:00hrs – 07:00hrs) at 6m height for the future development.

L_{den} Noise Levels

Figure 16, Figure 17 and Figure 18 outline the predicted L_{den} calculation for road traffic noise levels across the proposed site at 1.5m, 4m and 6m.

Figure 16: Predicted L_{den} (00:00Hrs – 00:00Hrs) at 1.5m height for the future development

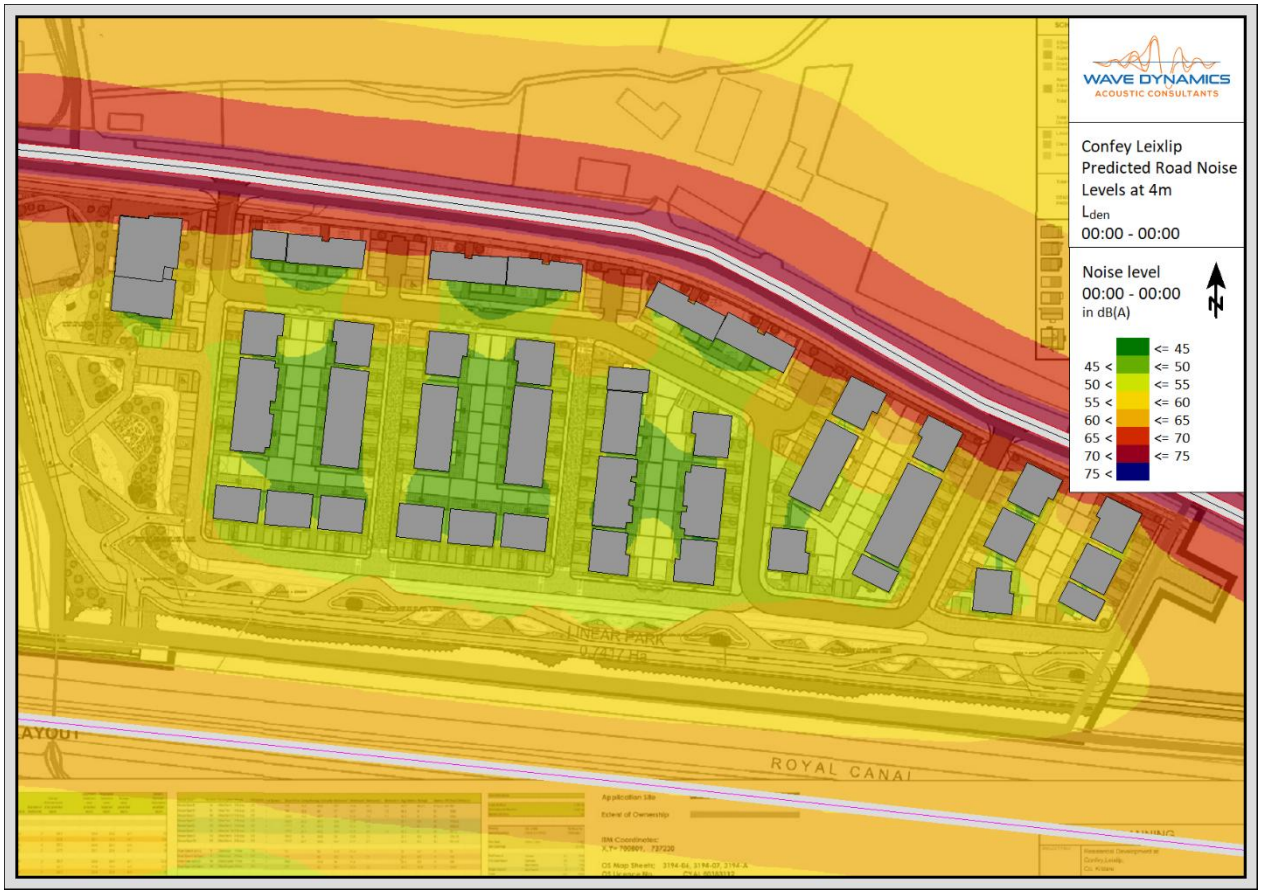


Figure 17: Predicted L_{den} (00:00Hrs – 00:00Hrs) at 4m height for the future development

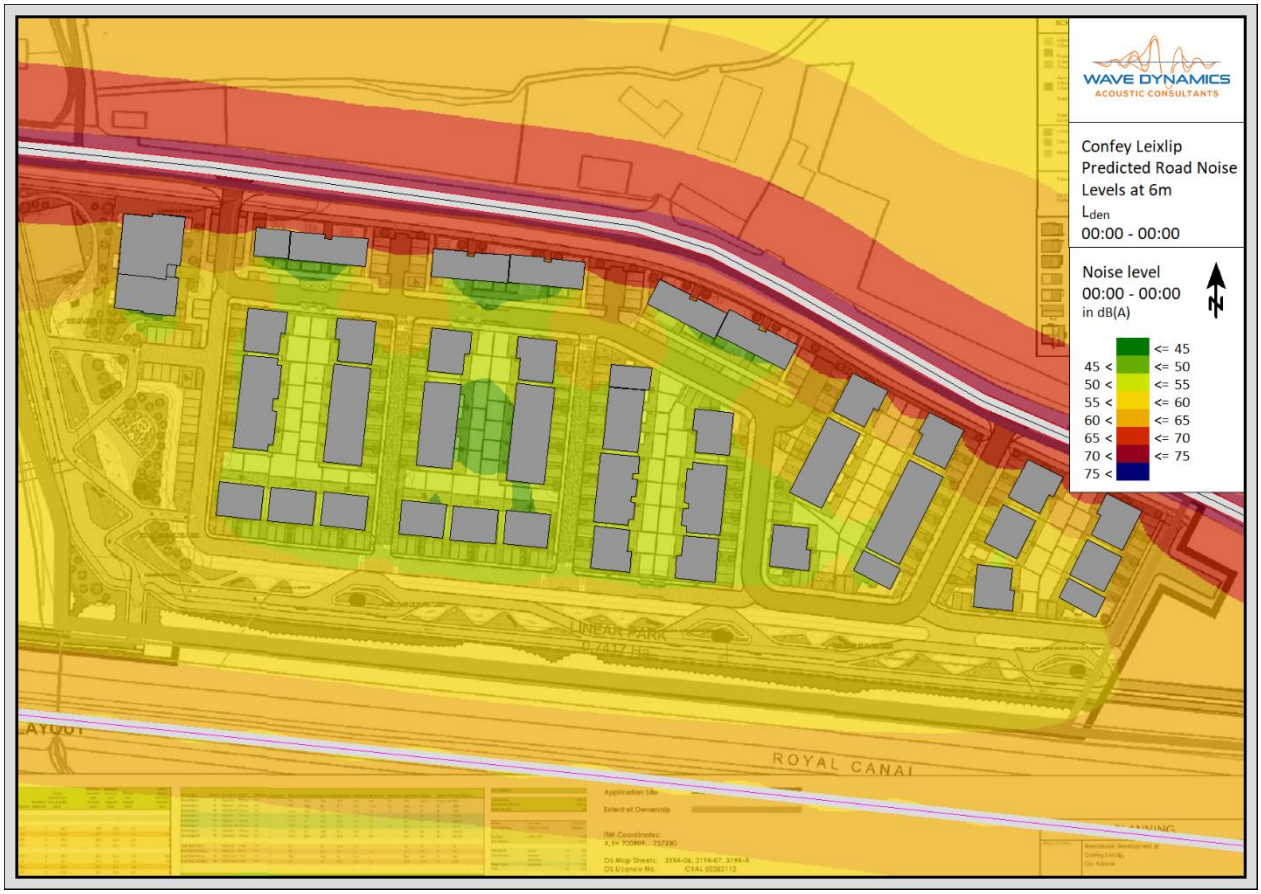


Figure 18: Predicted L_{den} (00:00Hrs – 00:00Hrs) at 6m height for the future development

5.2.6 Building Envelope Specification

This section outlines the building envelope requirements based on the predicted road noise levels across the site. Facade, wall, glazing, roof and ventilation specifications have been determined to achieve the internal noise level criteria for the development. The specification has been determined in accordance with EN ISO 12354-3: 2017 based on the predicted façade day and night noise levels, the room and facade dimensions from the drawings provided.

The building envelope specification should be confirmed by the acoustic consultant at design stage once the internal layouts and building envelope design development has been completed. Any changes to the assumed ventilation strategy and glazing requirement should be considered as part of the review and it should be based on the internal noise levels cited in this report.

Table 9: Sound Insulation performance requirements for glazed elements and ventilation.

Façade	Glazed Elements (Frame & Glazing) Sound Insulation Requirements (Indicative requirements equal or approved)							Façade Ventilation Requirement[2]
	Octave Band Frequency Requirements[1] R dB						Glazing Acoustic Performance dB R_W	
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz		
BLUE	26	18	24	34	40	36	29	32 dB $D_{n,e,w}$ (1) Natural Ventilation or Mechanical Ventilation
YELLOW	23	26	29	35	41	29	34	37 dB $D_{n,e,w}$ (1) Natural Ventilation or

Façade	Glazed Elements (Frame & Glazing) Sound Insulation Requirements (Indicative requirements equal or approved)							Façade Ventilation Requirement[2]
	Octave Band Frequency Requirements[1] R dB						Glazing Acoustic Performance dB R_W	
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz		
								Mechanical Ventilation
RED	28	26	31	42	40	34	36	39 dB $D_{n,e,w}$ (1) Natural Ventilation or Mechanical Ventilation

(1) Natural ventilation assumed throughout, the performance cited for the ventilator is in the open position. Should this change to mechanical ventilation the above specification may be reduced. An acoustic consultant should be engaged to assess the level of reduction appropriate to maintain the internal noise level criteria.

(2) The calculation assumes a maximum of 1 ventilation opening per bedroom at the specification outlined in Table 10.

It is important to note that the requirements outlined above are minimum requirements for the glazed element as a whole. The octave band values are indicative and specific to the assessed glazing type, equal or approved to meet the minimum project requirements is acceptable.

It is recommended that the facade supplier provide laboratory tests confirming the airborne sound insulation performance in the absence of suitable laboratory data a composite sound reduction index calculation undertaken by a suitably qualified acoustic consultant can be used to demonstrate compliance.

The calculations for the glazing performance requirements above are based on the use of basic trickle vents. The performance value, and that used in the calcs is given in Table 10 below.

Table 10: Recommended Ventilation Specification.

Façade	Description	Octave Band Centre Frequency (Hz) Sound Reduction Index $D_{n,e}$ dB					
		125	250	500	1k	2k	4k
BLUE	Acoustically rated trickle ventilator typically ≥ $D_{n,e,w}$ 32 dB	31	31	31	37	28	31
YELLOW	Acoustically rated trickle ventilator typically ≥ $D_{n,e,w}$ 37 dB	36	31	33	35	45	43
RED	Acoustically rated trickle ventilator typically ≥ $D_{n,e,w}$ 39 dB	35	30	35	41	51	49

External Wall Construction

The façade wall construction has been assumed to achieve a minimum sound insulation performance of 56 dB R_W. Typical façade construction such as concrete, blockwork, timber frame and brick offer high levels of sound insulation and will meet this requirement.

Roof Construction

The roof construction has been assumed to achieve a minimum sound insulation performance of 50 dB R_W. If there are any skylights to habitable bedrooms Wave Dynamics should be informed to provide specific guidance in each case.

Consideration of Openable Windows

From a review of predicted noise contours across the site there are a number of facades which benefit from screening from the building layouts. The areas facing into the rear of buildings are provided with natural shading from the proposed buildings themselves. In some locations the screening provided by the proposed buildings is adequate to allow for consideration of openable windows to provide ventilation during the daytime period, whilst still achieving the internal ambient noise level requirements i.e. facades that will not require acoustically rated trickle ventilators.

It should be noted that achieving the internal noise levels with windows open or half-open / tilted is not a requirement of ProPG or the Kildare County Development Plan, however an assessment has been included in this section of the report. The majority of dwellings are predicted to have some facades which are suitable to achieve the internal noise level requirements with the windows in the half-open position.

Figure 19 below shows the facades of the development which have low enough onset noise levels to achieve the internal noise levels with windows in the half-open or tilted position.

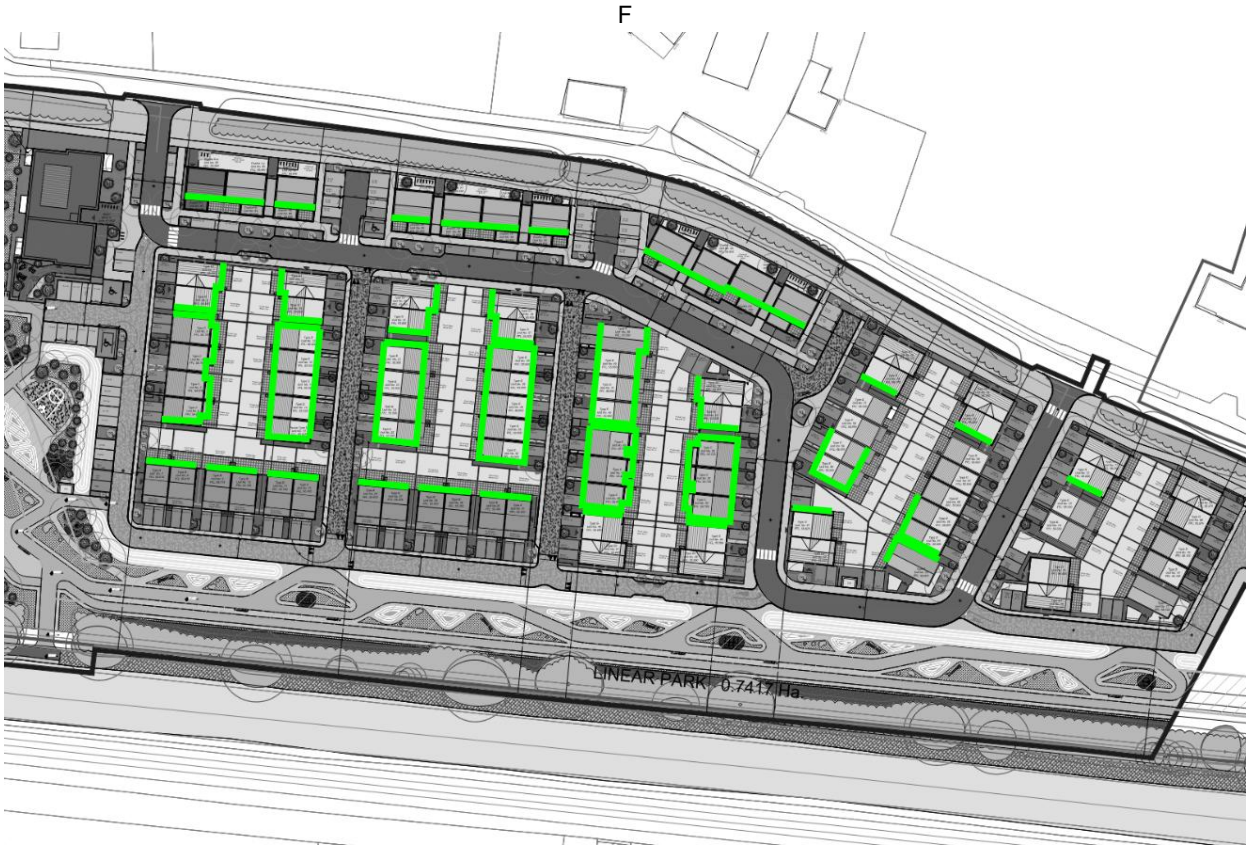


Figure 19: Locations of façades suitable for ventilation via openable windows during daytime hours (green).

5.2.7 Element 3- External Amenity Spaces

The external amenity spaces on the development include private external amenity in the form of balconies in Block A and gardens across various house types. Additionally, there is provision of communal open space across the development including the Linear Park to the south adjacent to the canal.

All external amenity spaces have been assessed, and it can be concluded that the majority of private amenity achieve the criteria for such spaces in accordance with BS 8233 of 55 dB $L_{Aeq\ 16hr}$. Some of the balconies on the north, east and west side of Block A marginally exceed the upper limit of 55 dB $L_{Aeq\ 16hr}$. Communal outdoor amenity across the site is predicted to achieve the criteria for such spaces in accordance with BS 8233 of 55 dB $L_{Aeq\ 16hr}$.

Based on the measured noise levels at the site it is predicted that the external amenities across the development in the form of terraces and balconies and communal gardens will achieve the BS 8233 recommendations for desirable external amenity noise levels of 50-55 dB $L_{Aeq,16hour}$.

Figure 20: External Amenity Space Compliance.

5.2.8 Element 4- Assessment of Other Relevant Issues

This section of the acoustic design report considered the other relevant issues. Element 4 considers other issues which may remain relevant to the assessment, these issues are as follows:

- 4(i) compliance with relevant national and local policy.
- 4(ii) magnitude and extent of compliance with ProPG.
- 4(iii) likely occupants of the development.
- 4(iv) acoustic design v unintended adverse consequences and;
- 4(v) acoustic design v wider planning objectives.

Compliance with Relevant National and Local Policy

The Kildare County Council Noise Action Plan 2023 – 2029 provides additional criteria for this assessment, which recommends that the post mitigation (where required) L_{den} noise levels at 1.5m above all floor levels are below the 70 dB L_{den} threshold. The action plan also requires that the predicted post mitigation L_{night} noise levels at 1.5m above all floor levels is below the 57 dB threshold.

The L_{den} noise levels at 1.5m, 4m and 6m height are shown in Figure 16, Figure 17 and Figure 18. The majority of L_{den} noise levels across the site are predicted to be below the 70 dB L_{den} KCC threshold. North facing facades closest to the R149 may marginally exceed the threshold.

The L_{night} noise levels at 1.5m, 4m and 6m height are shown in Figure 13, Figure 14 and Figure 15 The L_{night} noise levels across the site are compliant with the 57 dB L_{night} KCC threshold for the majority of bedrooms. There are some dwellings on the north, closest to the R149 which have façade noise levels marginally exceeding the KCC threshold.

The use of screening via noise walls etc in addition to the block perimeter wall shown in the drawings was considered, however screening was deemed impractical given the proposed height of the development, particularly Block A (4-5 storeys), where a noise barrier would not be a practical solution. The noise mitigation strategy for the project has been developed to achieve the internal and external amenity noise levels for the developed as required in ProPG. All dwellings are predicted to achieve compliance with the internal noise levels based on the façade specification outlined in Section 5.2.6

Magnitude and Extent of Compliance with ProPG

This report demonstrates that all dwellings will meet the specified internal noise level requirements provided the guidance in this report is followed. External amenity spaces have been provided in line with the guidance set out in ProPG. Based on this the development is in general compliance with the ProPG requirements.

Likely Occupants of The Development

Additional needs of the future occupants are not known at this stage however the needs of all potential occupants have been considered with the assessment of adequate internal noise levels and provision of adequate external amenity spaces to meet the needs of potential occupants.

Acoustic Design v Unintended Adverse Consequences

The design has considered the impact of adverse consequences, mitigation has been provided by specification of the sound insulation and ventilation requirements.

Acoustic Design v Wider Planning Objective

Where possible the wider planning objectives have been considered including the need for residential housing with good transport links. It is assumed that the wider planning objectives have been adhered to by following the ProPG guidance.

5.2.9 Stage 2 Assessment Conclusion

The stage 2 assessment considers all four (4) elements, the principals of good acoustic design have been followed.

The element 2 assessment has considered the measures required to provide an adequate acoustic environment with appropriate noise levels for internal spaces. The sound insulation and ventilation requirements have been specified based on the predicted façade noise levels.

The element 3 assessment of external amenity spaces has considered the noise impact on the development and the external amenity spaces. Appropriate provision of external amenity space has been provided in line with the ProPG guidance.

Other relevant issues have been considered including, local policy, unintended consequences and the wider planning objectives.

6 Operational Noise Impact

The operational noise sources include the proposed plant equipment associated with the development, particularly 81 No. Heat Pumps.

6.1 Noise Sensitive Locations

The operational noise impact assessment of the proposed development considered off-site residential noise sensitive locations. The closest residential properties are to the north and south of the site.

A desk-based review was carried out to identify existing noise sensitive locations within proximity to the proposed development site. Noise sensitive locations relevant to the Proposed Development site are illustrated in Figure 3.

6.2 Operational Noise Prediction Modelling

Following the survey a model of the development using SoundPLAN 9.1 modelling software was developed to establish the noise levels from the development in a worst-case scenario. The software implements the algorithms contained in ISO 9613-1 and ISO 9613-2. The noise model considers:

- Distance attenuation,
- Source and receptor locations,
- Barrier effects (buildings, walls etc)
- Topographical elevations,
- Ground effects and absorption,
- Source sound power levels,
- Directivity and orientation of the source,
- Atmospheric attenuation and meteorological effects.

The following information was input into the model:

- Development layout provided by architect's drawings.
- Google Maps terrain and elevation data of surrounding area.
- Plant noise data provided by Waterman and Moylan.

The acoustic model for the new development has been developed based on the unattended and attended noise survey and the proposed site location and predicted noise sources. As the site has potential to create noise impact at both day and nighttime, a worst-case scenario has been developed for both predicting the noise impact at the nearest off-site residential noise sensitive locations. The assessment considers the noise impact of the proposed plant equipment.

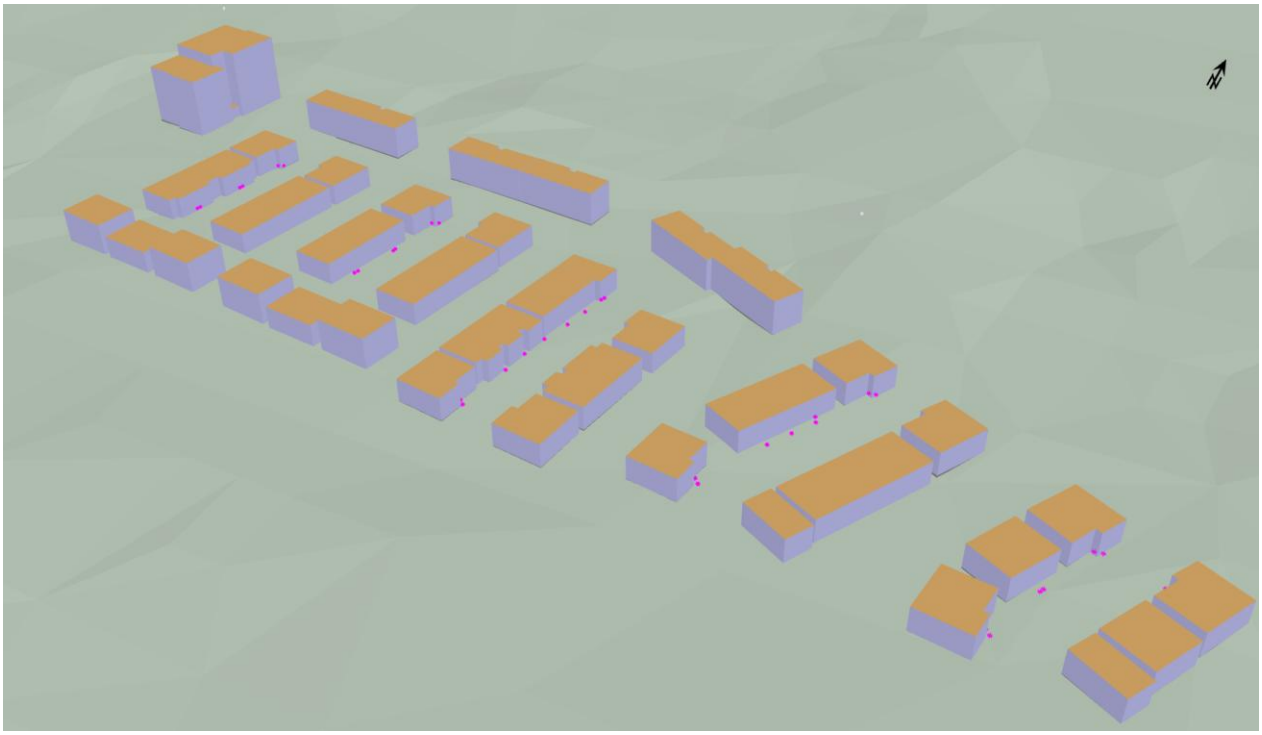


Figure 21: Screenshot from the model showing the proposed development.

Plant and Equipment

Plant and equipment specifications and locations for the proposed development have been provided by Waterman and Moylan, along with sound power levels obtained from manufacturer data specifications. Where spectral data was not available, octave data from a similar unit has been used to calibrate the broadband value. Table 11 below outlines the sound power data used in the assessment.

Mechanical services for Block A of the development are situated within internal store rooms or dedicated ground-floor plant and storage areas. Given the absence of roof-mounted plant, this noise impact assessment focuses exclusively on the heat pumps serving the two storey dwellings. The model has assumed plant is operating 24 hours, simultaneously at 100% capacity.

Table 11: Plant and Equipment sound power data at maximum operating capacity

Description		Source Sound Power Level L_w at Octave Band Centre Frequency, Hz dB								Overall Sound Power dB L_{wA}
		63	125	250	500	1000	2000	4000	8000	
Plant Equipment										
81 no. Heat Pumps	HP290 6 kW	55	55	54	53	52	51	50	49	58

1) Assumed sound power levels, equal or approved are required.

6.3 Assessment of Operational Noise Impact

This section outlines the operational noise impact from the proposed development, which includes the plant noise associated with the development, as outlined in the section above. As the new development has the potential to generate noise during the day and nighttime, a model has been undertaken for both scenarios.

6.3.1 Daytime Scenario

BS 4142 Daytime Assessment

The noise impact at the nearest off-site residential noise sensitive locations (NSL1-NSL6) has been assessed in accordance with BS 4142. The predicted noise from the development is worst case at NSL6 due to its proximity to the development and proposed plant equipment. The BS 4142 assessment at NSL6 is outlined in Table 12 below.

Table 12: BS 4142 Assessment for daytime period

Results		Relevant BS 4142 Clause	Commentary
Predicted specific sound level (daytime)	$L_{Aeq(15min)}$ = 24 dB	7.3.6	As the new development is not yet existing, the noise levels have been predicted using SoundPLAN modelling software. Worst case specific sound predicted at NSL6 as this is most affected by operational noise.
Ambient sound level (daytime)	$L_{Aeq(16hour)}$ = 57 dB	7.3.2	The ambient sound level was dominated by road traffic noise. Measurement location L1 was assessed as this is representative for worst case receptor (NSL6).
Background sound level (daytime)	$L_{A90(1hour)}$ = 42 dB	8.1.2 8.4	The daytime L_{A90} sound level was measured at a location representative of NSL6.
Assessment made during the daytime, so the reference time interval is 1 hour		7.2	
Specific sound level as predicted	$L_{Aeq(1hour)}$ = 24 dB	7.3.6	The specific sound has been predicted by calculation alone as the new development was not existing at the time.
Acoustic feature correction	+0 dB	9.2 9.3.2	It is not anticipated that the specific sound will have any impulsive, tonal or intermittent characteristics. The predicted specific level is significantly below the existing measured ambient noise level; therefore, any acoustic character would be masked.
Rating level	(24 + 0) dB = 24 dB	9.2	
Background sound level	$L_{A90(1hour)}$ = 42 dB	8	
Excess of rating over background sound level	(24 - 42) dB = -18 dB	11	Assessment indicates that no adverse impact is likely on the noise sensitive locations as the specific sound is 18 dB below the background levels and is lower than the ambient sound. Context has also been considered.

Results		Relevant BS 4142 Clause	Commentary
Uncertainty of the assessment	Not significant	10	Some level of uncertainty remains regarding exact location of mechanical plant, this will be addressed at detailed design stage.

Based on the review of the noise sources and the BS 4142 assessment it is predicted that the noise emanating from the proposed development will give rise to no more than a 'Low Impact' on the surrounding residential noise sensitive locations during the daytime.

NG4

NG4 recommends a daytime criteria of (07:00hrs – 19:00hrs) 55 dB $L_{Aeq,T}$, the worst case predicted noise level from the development is 24 dB(A), with no tonality or impulsivity, therefore the NG4 criteria is expected to be achieved. Table 13 below outlines the predicted noise impact at each residential noise sensitive location, the project criteria and compliance with the project criteria.

Table 13: Model results for each NSL during the daytime period.

NSL	Distance from centre of the site to NSL (m)	Criteria (07:00hrs – 19:00hrs) EPA NG4	Predicted Plant Noise Level ($L_{Ar,T}$ dB)	Compliance
NSL1	90	55	19	Compliant
NSL2	170	55	11	Compliant
NSL3	180	55	11	Compliant
NSL4	110	55	19	Compliant
NSL5	145	55	17	Compliant
NSL6	150	55	24	Compliant

Evening Time Scenario

The noise levels for the evening time are predicted to be the same as the daytime noise levels however as per EPA NG4 criteria, a lower noise criteria of 50 dB $L_{Ar,T}$ is applicable. Based on the predicted noise levels outlined in the table above, the evening time criteria is predicted to be achieved at all residential receptor locations.

6.3.2 Nighttime Scenario

BS 4142 Nighttime Assessment

The noise impact at the nearest noise sensitive location (NSL6) has been assessed in accordance with BS 4142.

Table 14: BS 4142 Assessment for nighttime period

Results		Relevant BS 4142 Clause	Commentary
Predicted specific sound level (nighttime)	$L_{Aeq(15min)}$ = 24 dB	7.3.6	As the new development is not yet existing, the noise levels have been predicted using SoundPLAN modelling software. Worst case specific sound predicted at NSL6 as this is most affected by operational noise.
Ambient sound level (nighttime)	$L_{Aeq(15min)}$ = 52 dB	7.3.2	The ambient sound level was dominated by road traffic noise. Measurement location L1 was assessed as this is representative for worst case receptor (NSL6).

Results		Relevant BS 4142 Clause	Commentary
Background sound level (nighttime)	$L_{A90(15min)}$ = 33 dB	8.1.2 8.4	The nighttime L_{A90} sound level was measured at a location representative of NSL6.
Assessment made during the nighttime, so the reference time interval is 15 minutes		7.2	
Specific sound level as predicted	$L_{Aeq(15min)}$ = 24 dB	7.3.6	The specific sound has been predicted by calculation alone as the new development was not existing at the time of the survey.
Acoustic feature correction	+0 dB	9.2 9.3.2	It is not anticipated that the specific sound will have any impulsive, tonal or intermittent characteristics. The predicted specific level is significantly below the existing measured ambient noise level; therefore, any acoustic character would be masked.
Rating level	(24 + 0) dB = 24 dB	9.2	
Background sound level	$L_{A90(15min)}$ = 33 dB	8	
Excess of rating over background sound level	(24 - 33) dB = -9 dB	11	Assessment indicates that no adverse impact is likely on the noise sensitive locations as the specific sound is 9 dB below the background levels and is lower than the ambient sound. Context has also been considered.
Uncertainty of the assessment	Not significant	10	Some level of uncertainty remains regarding exact location of mechanical plant, this will be addressed at detailed design stage.

Based on the review of the noise sources and the BS 4142 assessment it is predicted that the noise emanating from the proposed development will give rise to no more than a 'Low Impact' on the surrounding residential noise sensitive locations during the nighttime.

NG4

NG4 recommends a nighttime criteria of (23:00hrs – 07:00hrs) 45dB $L_{Aeq,T}$, the worst case predicted noise level from the new development is 24 dB(A), with no tonality or impulsivity, therefore the NG4 criteria is expected to be achieved. Table 15 below outlines the predicted noise impact at each residential noise sensitive location, the project criteria and compliance with the project criteria.

Table 15: Model results for each NSL during the nighttime period.

NSL	Distance from centre of the site to NSL (m)	Criteria (23:00hrs – 07:00hrs) EPA NG4	Predicted Plant Noise Level (L_{Aeq} dB)	Compliance
NSL1	90	45	19	Compliant
NSL2	170	45	11	Compliant
NSL3	180	45	11	Compliant
NSL4	110	45	19	Compliant
NSL5	145	45	17	Compliant

NSL	Distance from centre of the site to NSL (m)	Criteria (23:00hrs – 07:00hrs) EPA NG4	Predicted Plant Noise Level (L_{Aeq} dB)	Compliance
NSL6	150	45	24	Compliant

6.3.3 Heat Pump Minimum Set-Back Distance

To ensure a high standard of acoustic amenity for future occupants of the proposed development, the noise impact of the proposed domestic heat pumps on their respective dwellings has been considered. In accordance with BS 8233, the target indoor ambient noise level for resting and sleeping conditions in bedrooms is 30 dB $L_{Aeq,8hour}$.

Assuming an attenuation of 15 dB for a partially open window, the external free-field noise level at the window must not exceed 45 dB $L_{Aeq,T}$ to successfully achieve the 30 dB $L_{Aeq,T}$ internal target. By incorporating a minimum set-back distance of 2m between the 58 dB L_{wA} heat pump and the nearest habitable room window of the dwelling it serves, the indoor ambient noise level criteria for sleeping conditions within a bedroom, as outlined in BS 8233, is predicted to be achieved. Where possible, a minimum 5m setback distance should be designed for.

7 Conclusion

Wave Dynamics were engaged by the applicant as the acoustic consultants to undertake an inward and operational noise assessment for the planning application for the proposed new residential development at Confey, Leixlip, Co. Kildare.

The proposed project is a residential-led development on a site at Confey, Leixlip, Co. Kildare, which involves the construction of 125 residential units comprising 81 no. houses, 22 no. duplex units and 22 no. apartments along with dedicated resident outdoor amenity space. The development is supported by shared amenities, including a landscaped communal park, private balconies or gardens, parking provisions for vehicles and bicycles, and new pedestrian, cyclist and vehicular access points.

The assessment for the proposed development concludes that with recommendations outlined in this report, internal noise and operational noise levels are predicted to meet relevant criteria. Based on a ProPG Stage 1 assessment, the site is categorised as low to medium risk. Predicted internal noise levels and external amenity noise levels meet BS 8233 and ProPG targets, provided the specified building envelope and ventilation strategy are implemented. Furthermore, operational noise from proposed plant equipment is predicted to have a 'Low Impact' on nearby residential receptors in accordance with BS 4142 and is compliant with NG4.

Based on the measured noise levels at the site it is predicted that the internal and external noise levels will achieve the targeted noise levels in line with BS 8233 and ProPG guidance.

Based on the assessment outlined in this report, the noise generated from the proposed plant equipment is predicted to have a 'low impact' on the surrounding residential noise sensitive receptors.

Appendix A- Glossary of Terms

Ambient Noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from all the noise sources in the area.
Background Noise	The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).
dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μPa).
dB(A)	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz	The unit of sound frequency in cycles per second.
L_{A90}	A-weighted, sound level just exceeded for 90% of the measurement period and calculated by statistical analysis. See also the background noise level.
L_{Aeq}	A-weighted, equivalent continuous sound level.
L_{AFmax}	A-weighted, maximum, sound level measured with a fast time-constant - maximum is not peak
R_W	Weighted sound reduction index - a single number quantity which characterises the airborne sound insulation of a material or building element over a range of frequencies, based on laboratory measurements

Appendix B- Façade Mark Ups

Glazed Elements Specification

- 29 dB R_w
- 34 dB R_w
- 36 dB R_w

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