REPORT

# Inward Noise Assessment

Project Title: Sea Gardens Phase 1 Block A

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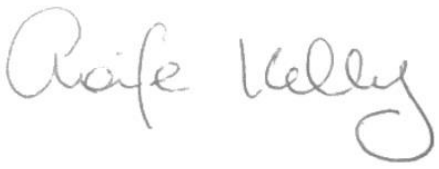
| **Signature** |  |  |
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| **Date** | 20/05/2025 | 20/05/2025 |

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# 1. INTRODUCTION

AWN Consulting has been commissioned to carry out an Inward Noise Impact Assessment at the proposed development at Sea Gardens Phase 1 Block A. As part of the pre-application planning process the Dun Laoghaire Rathdown County Council have requested the following:

> *"Noise Impact Assessment due to the proximity to the rail line and any required acoustic solution provided as part of the proposed design both to the internal and external areas. See Noise Action Plant which was published last year."*

The assessment has been undertaken using the following methodology:

- Previously measured and calculated baseline noise and vibration levels representative of noise levels across the proposed development have been used for the assessment;
- Guidance has been derived from the *Dublin Agglomeration Noise Action Plan* (NAP), *ProPG: Planning & Noise - Professional Practice Guidance on Planning & Noise* (ProPG) and *British Standard 8233: Guidance on sound insulation and noise reduction for buildings* (BS8233)
- An inward assessment of the predicted noise levels associated with the rail line has been undertaken, and;
- Mitigation measures have been set out, to reduce the inward noise and vibration impact, where required.

This report presents those findings.

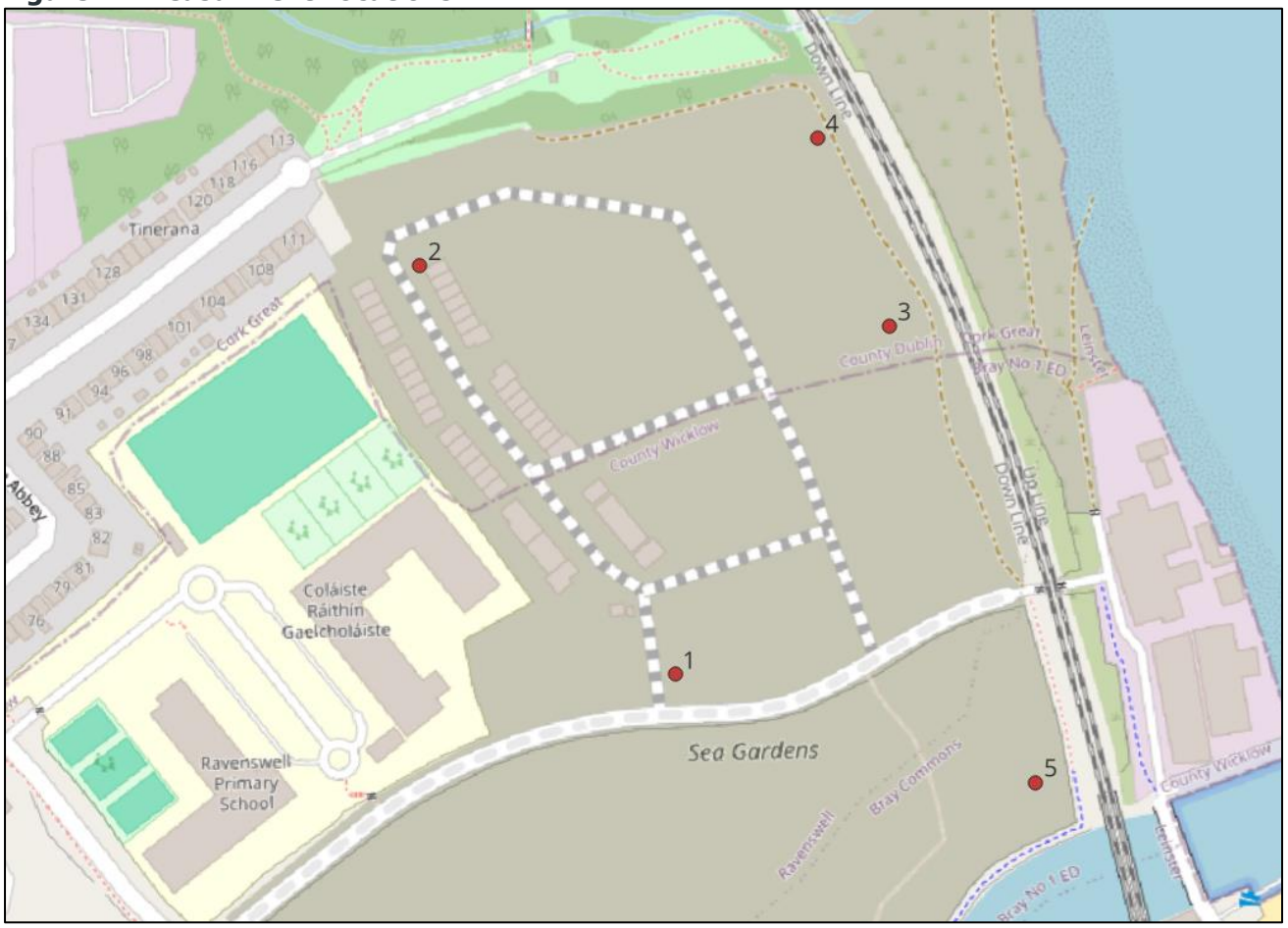
# 2. BASELINE SURVEY

Environmental noise surveys have previously been conducted at the development site during 2020 and 2024. The noise surveys were conducted in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise*. Specific details are set out below.

## 2.1 Measurement Locations

Attended measurements were undertaken at locations 1 to 4 during 2020, with further unattended measurements undertaken at location 5 in 2024. The locations were chosen to gain an understanding of both the level of noise at the location of the proposed facades that are nearest to the rail track, as well as to understand the noise environment across the site. The locations are as indicated in Figure 2.1

**Figure 2.1Measurment Locations**




## 2.2 Survey Periods

Attended noise measurements were conducted at Locations 1 to 3 over the course of the following survey period:

- 11:00hrs to 14:45hrs on 15th December 2020.

Further attended noise measurements were conducted at Location 4 over the course of the following survey period:

- 13:30hrs to 14:35hrs on 20th July 2020.

Unattended noise measurements were conducted at location 5 over the course of the following survey period:

- 10:00hrs on 17th October 2024 to 10:00hrs on the 20th October 2024.

The weather during the survey periods were dry and calm.

## 2.3 Instrumentation

The attended noise measurements were performed using a Brüel & Kjær Type 2250 Precision Sound Level Analyser and a RION NL-52. Before and after the survey the measurement apparatus was check calibrated using a Brüel & Kjær Type 4231 Sound Level Calibrator. Calibration certificates are available on request.

## 2.4 Procedure

Attended noise measurements were conducted with the microphone at a height of 1.5m above ground level. 3no. 15 minute intervals were measured at Locations 1 and 2. At Location 3, 1.5 hrs of logged data at 1 minute intervals was recorded. This was to get an overall measurement of the rail noise impacting on the site, and also to capture noise data at an adequately granular interval so that sound exposure level (SEL) measurements of the train passbys can be derived from the data. At Location 4 SEL measurements were undertaken to capture the noise emissions of train passbys. The results were saved to the instrument memory for later analysis where appropriate. Survey personnel noted all primary noise sources contributing to noise build-up during setup and collection.

An unattended noise monitor was set up at location 5. The microphone was set at a height of 3.8m above ground level. The location of the unattended meter was chosen to obtain an overall measurement of the rail noise impacting on the site, and also to capture noise data at an adequately granular interval so that sound exposure level (SEL) measurements of the train pass-bys can be derived from the data. The results were saved to the instrument memory for later analysis where appropriate. Survey personnel noted all primary noise sources contributing to noise build-up during setup and collection.

## 2.5 Measurement Parameters

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

$L_{Aeq}$ is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

$L_{Amax}$ is the instantaneous maximum sound level measured during 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.

$L_{AE}$ Sound Exposure Level is the A weighted equivalent sound level which, when maintained for one second, contains the same quantity of sound energy as the actual time varying level of one noise event.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to 2x10 5 Pa.

## 2.6 Noise Survey Results

### 2.6.1 Locations 1 & 2

The results of the attended measurements at locations 1 and 2 are presented in Table 2-1.

**Table 2-1. Measured Noise Levels at Locations 1 and 2**

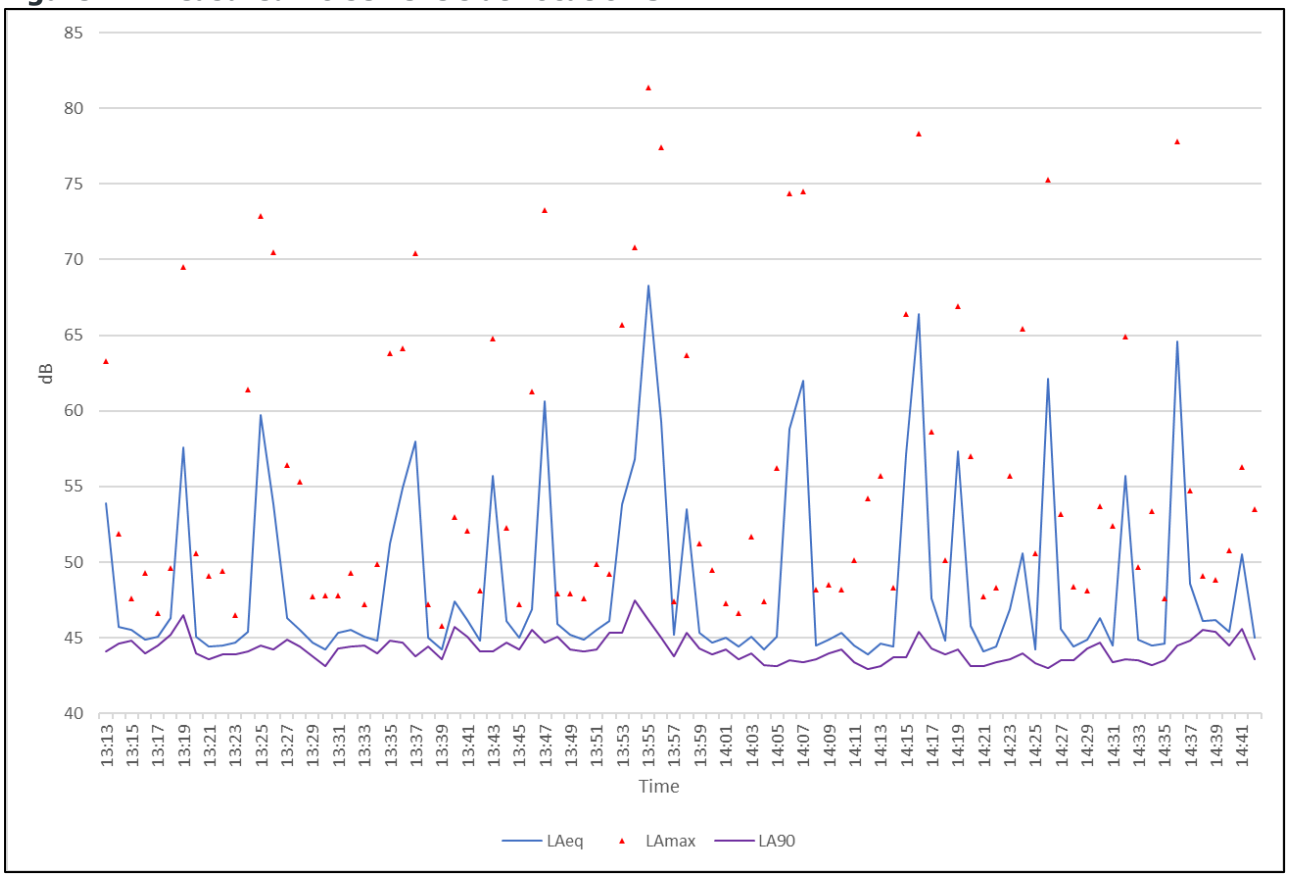
| Location | Time | Measured Noise Levels (dB re. 2x10-5 Pa) | | | |
|---|---|---|---|---|---|
| | | $L_{Aeq}$ | $L_{AFmax}$ | $L_{AF10}$ | $L_{AF90}$ |
| 1 | 11:09 | 50 | 64 | 51 | 47 |
| | 11:51 | 49 | 68 | 51 | 47 |
| | 12:29 | 50 | 68 | 51 | 47 |
| 2 | 11:32 | 48 | 62 | 50 | 45 |
| | 12:10 | 48 | 65 | 50 | 46 |
| | 12:49 | 48 | 71 | 49 | 46 |

At Locations 1 and 2 it was noted that the local noise environment comprised of intermittent train movements and distant road traffic. It was also noted that some reverse alarms and impact noises were audible from a forklift truck in operation nearby.

### 2.6.2 Locations 3 & 4

The results of the noise measurements at locations 3 and 4 are presented in Table 2-2.

**Figure 2.2 Measured Noise Levels at Location 3**



The overall average noise level measured at Location 3 was 55 dB $L_{Aeq}$. The local noise environment was dominated by train movements. Distant road traffic was also noted and some reverse alarms and impact noises were audible from a forklift truck in operation nearby.

In addition, Table 2-2 presents the measured SELs for train passbys at Locations 3 and 4.

**Table 2-2. Measured Sound Exposure Levels of Train Passbys**

| Assessment Category and Threshold Value, per Period | Sound Exposure Measured Noise levels, (dB re 2 x 10-5 Pa) | | |
|---|---|---|---|
| | Lowest | Highest | Logarithmic Average |
| 3 | 68 | 86 | 79 |
| 4 | 75 | 88 | 83 |

The logarithmic averaged SEL for train passby's at Locations 3 and 4 were calculated to be 79 dB and 83 dB, respectively. For the purpose of the inward noise assessment continuous equivalent noise levels have been calculated at Locations 3 and 4 through capture of rail noise with the previously defined $L_{AE}$ parameter, by using the following equation:

$L_{Aeq,T} = L_{AE} + 10 \times \text{Log10}(N) - 10 \times \text{Log10}(T)$

Where: N is the number of events occurring during the period T (in seconds) (i.e. the number of train passbys).

Table 2-3 presents the calculated levels for locations 3 and 4.

**Table 2-3. Calculated Continuous Equivalent Noise Levels**

| Date | Calculated Equivalent Continuous Sound Level | |
|---|---|---|
| | Location 3 | Location 4 |
| Daytime Period (07:00 to 23:00 hours) | 55 dB $L_{Aeq,\ 16\ hr}$ | 59 dB $L_{Aeq,\ 16\ hr}$ |
| Night-time Period (23:00 to 07:00 hours)* | 52 dB $L_{Aeq,\ 1\ hr}$ | 56 dB $L_{Aeq,\ 1\ hr}$ |

*Note that the worst one hour period has been used to calculate the night-time noise level.

### 2.6.3 Location 5

Measured noise levels are summarised in Table 2-4 and Table 2-5. On review of the measured data, it is confirmed that the noise levels were as follows:

- Daytime ambient noise levels range between 54 and 57 dB $L_{Aeq,T}$;
- Daytime background noise levels range between 42 and 47 dB $L_{A90,T}$;
- Night time ambient noise levels range between 48 and 53 dB $L_{Aeq,T}$; and,
- Night time background noise levels range between 37 and 49 dB $L_{A90,T}$.

**Table 2-4. Daytime Measured Noise Levels**

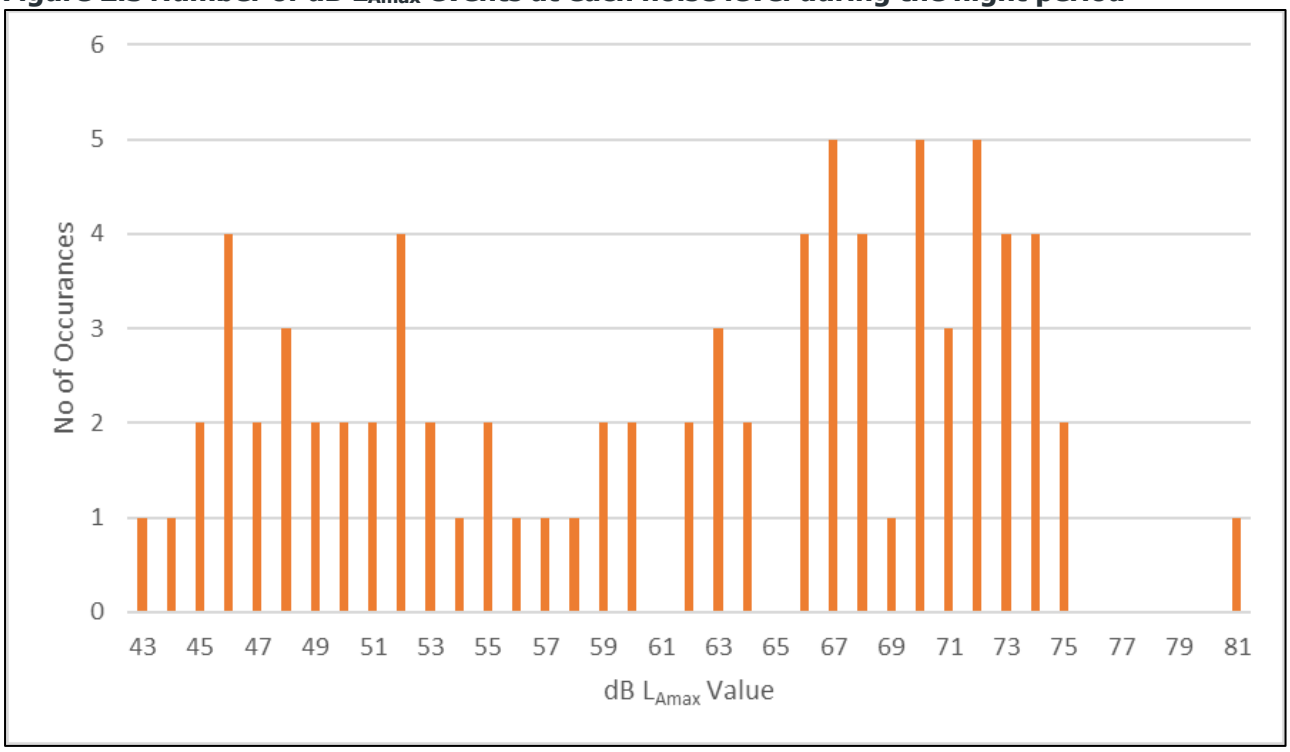
| Date | dB $L_{Aeq,16hr}$ | dB $L_{A90}$ (Arithmetic Average) |
|---|---|---|
| Thursday 17 October 2024 | 57 | 45 |
| Friday 18 October 2024 | 57 | 47 |
| Saturday 19 October 2024 | 54 | 42 |
| Overall | 56 | 45 |

**Table 2-5. Night-time Measured Noise Levels**

| Date | dB $L_{Aeq,16hr}$ | dB $L_{A90}$ (Arithmetic Average) |
|---|---|---|
| Thursday 17 to Friday 18 October 2024 | 49 | 39 |
| Friday 18 to Saturday 19 October 2024 | 48 | 37 |
| Saturday 19 to Sunday 20 October 2024 | 53 | 49 |
| Overall | 51 | 41 |

Additionally, a review of $L_{Amax}$ events has been undertaken for the night period. The measured data indicates that a noise level of 75 dB $L_{Amax}$ is not typically exceeded at Location 5, which corresponds to the location of the closest façade of the proposed development to the rail line.

**Figure 2.3 Number of dB $L_{Amax}$ events at each noise level during the night period**



# 3. GUIDANCE AND CRITERIA

## 3.1 Dublin Agglomeration Noise Action Plan 2024 – 2028

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

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

The action plan outlines various guidance to minimise the impact in relation to noise on new developments. Both ProPG and BS 8233 are recommended as guidance to be employed in areas where people are being brought to noise in the form of existing road and rail noise.

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

## 3.2 ProPG : Planning and Noise

The ProPG: Planning and Noise (Professional Practice Guidance on Planning and Noise) document (ProPG. 2017) document was prepared by a working group comprising members of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH). Although not a UK or Irish government document, since its publication it has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.

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

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

A key component of the evaluation process is the preparation and delivery of an Acoustic Design Statement (ADS) which is intended for submission to the planning authority. This document outlines the methodology and findings of the Stage 1 assessment to define the noise category of the site based on the measured noise environment and to determine if an ADS is required.

## 3.3 BS 8233 (2014)

### 3.3.1 Internal Noise Guidelines

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 (2014) *Guidance on sound insulation and noise reduction for buildings*.

BS 8233 sets out recommended internal noise levels for several different building types from external noise sources such as traffic. The recommended indoor ambient noise levels for residential dwellings are set out in Table 3-1.

**Table 3-1. Indoor Ambient Noise Levels for Dwellings from BS8233:2014**

| Activity | Location | Day (07:00 to 23:00hrs) dB $L_{Aeq,16hr}$ | Night (23:00 to 07:00hrs) dB $L_{Aeq,8hr}$ |
|---|---|---|---|
| Resting | Living room | 35 | - |
| Dining | Dining room/area | 40 | - |
| Sleeping (daytime resting) | Bedroom | 35 | 30 |

BS 8233 also provides some guidance on individual noise events, it states:

> *"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 $L_{AFmax}$, depending on the character and number of events per night. Sporadic noise events could require separate values."*

### 3.3.2 External Noise Guidelines

BS 8233 also provides desirable noise levels for external amenity areas such as gardens, patios and balconies. It states:

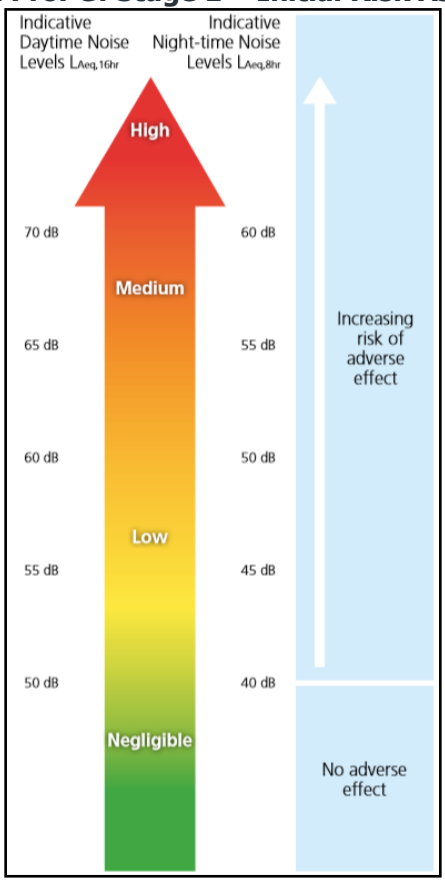
> *"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized 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."*

# 4. PROPG STAGE 1 – NOISE RISK ASSESSMENT

## 4.1 Methodology

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk based on the pre-existing noise environment. Figure 4.1 presents the basis of the initial noise risk assessment, it provides appropriate risk categories for a range of continuous noise levels either measured and/or predicted on site.

**Figure 4.1 ProPG: Stage 1 – Initial Risk Assessment**




It should be noted that a site should not be considered a negligible risk if more than 10 $L_{AFmax}$ events exceed 60 dB during the night period and the site should be considered a high risk if the $L_{AFmax}$ events exceed 80 dB more than 20 times a night.

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."

In this instance a 3D computer noise model of the development site has been developed to predict the noise levels across the entire site in order to investigate the initial noise risk. Noise levels measured on site will be used to validate the model.

## 4.2 Noise Model

Noise levels recorded or calculated from the baseline noise survey were used to calibrate the noise model. It is considered that a strong correlation in respect of predicted noise levels has been achieved. Noise levels are calculated over daytime periods, (07:00 to 23:00 hrs) and night-time periods (23:00 to 07:00 hrs).

Table 7-13 details the results of the noise model predictions and compares them to the measured values at the survey location.

**Table 4-1. Noise Model Validation**

| Location | Period | Measured or Calculated (dB $L_{Aeq}$) | Predicted in Model (dB $L_{Aeq}$) |
|---|---|---|---|
| 1 | Day | 50 | 49 |
| 2 | Day | 48 | 47 |
| 3 | Day | 55 | 56 |
| | Night | 52 | 53 |
| 4 | Day | 59 | 59 |
| | Night | 56 | 56 |
| 5 | Day | 57 | 58 |
| | Night | 53 | 53 |

**Figure 4.2 Daytime Noise Levels Across Undeveloped Site (dB $L_{Aeq,16hr}$)**

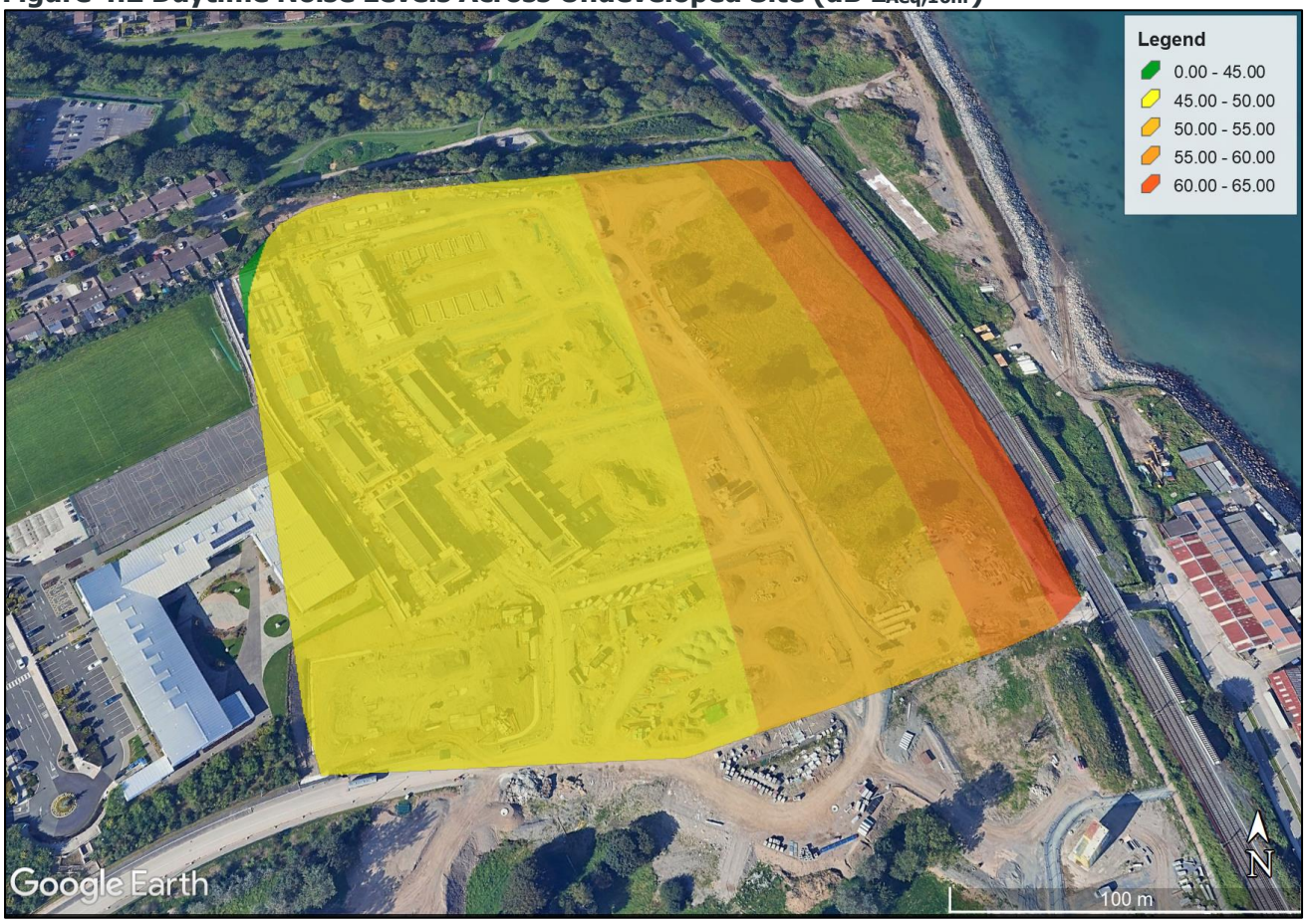
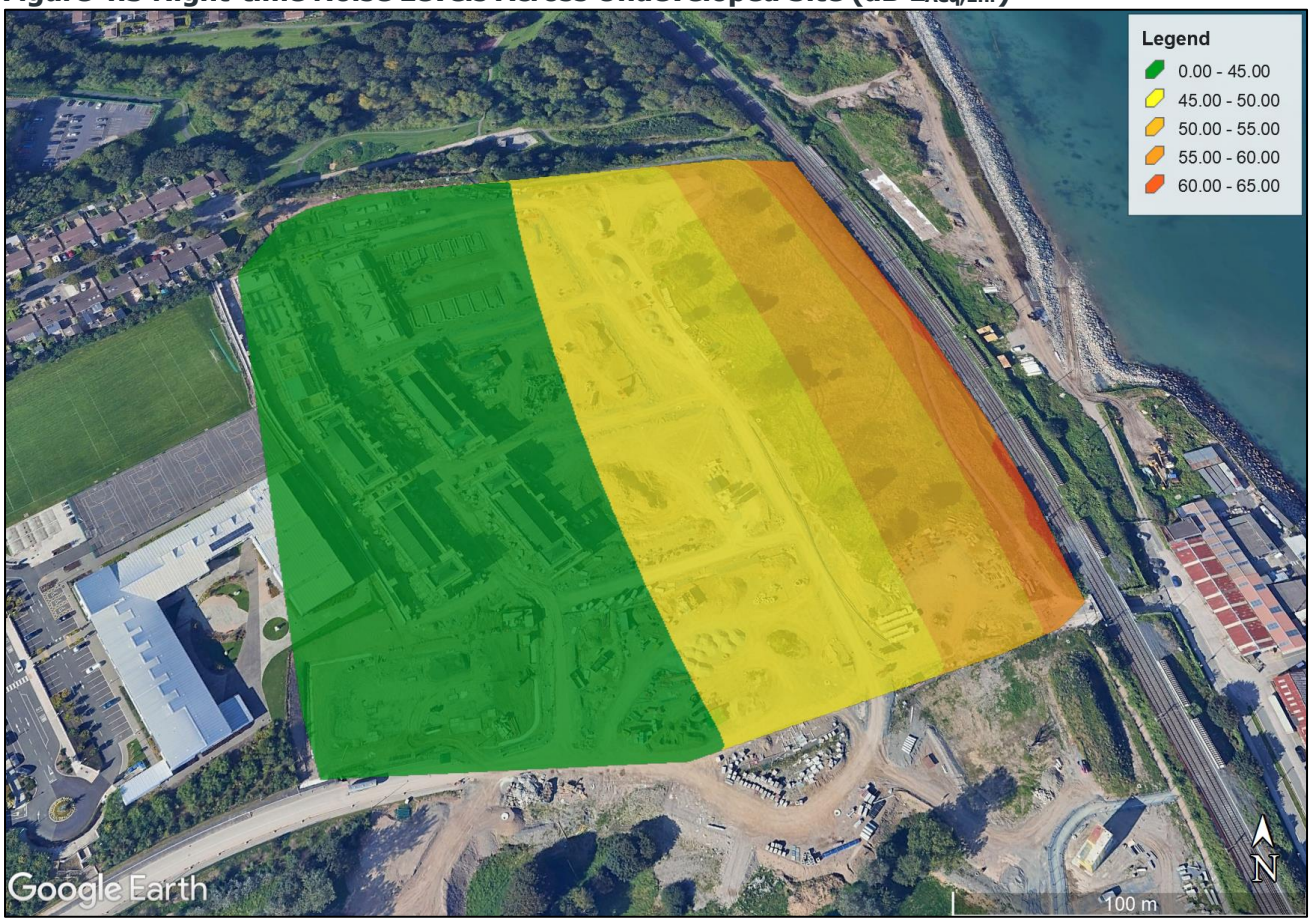


**Figure 4.3 Night-time Noise Levels Across Undeveloped Site (dB $L_{Aeq,1hr}$)**




## 4.3 ProPG Stage 1 - Noise Risk Assessment Conclusion

Giving consideration to the measured and predicted noise levels presented in the previous sections the site noise risk assessment has concluded that the level of risk across the site varies from negligible to medium noise risk.

ProPG states the following with respect to negligible to medium risks:

*Negligible Risk* *These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.*

*Low Risk* *At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.*

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

Given the above it can be concluded that the development site may be categorised as Negligible to Medium Risk and as such an Acoustic Design Strategy will be required to demonstrate that suitable care and attention has been applied in mitigating and minimising noise impact to such an extent that an adverse noise impact will be avoided in the final development.

It should be noted that ProPG states the following with regard to how the site noise risk assessment 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."*

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

# 5. ACOUSTIC DESIGN STRATEGY (PROPG STAGE 2)

## 5.1 ELEMENT 1 – Good Acoustic Desing (GAD) Process

### 5.1.1 ProPG Guidance

In practice, good acoustic design should deliver the optimum acoustic design for a particular site without adversely affecting residential amenity or the quality of life of occupants or compromising other sustainable design objectives. It is important to note that ProPG specifically states that good acoustic design is not equivalent to overdesign or "gold plating" of all new development but that it seeks to deliver the optimum acoustic environment for a given site.

Section 2.23 of the ProPG outlines the following checklist for Good Acoustic Design:

- 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; and,
- Assess external amenity area noise.

In the context of the proposed development, each of the considerations listed above have been addressed in the following subsections.

### 5.1.2 Relocation or Reduction of Noise from Source

The surrounding road and rail networks are located outside the redline boundary of the site and therefore it is beyond the scope of this development to introduce any noise mitigation at source.

### 5.1.3 Planning Layout and Orientation

The buildings have been set back from the rail line and the building layout has been used to provide a barrier effect to the courtyard podium level, reducing noise levels in the area.

### 5.1.4 Select Construction Types for meeting Building Regulations

Masonry or concrete constructions will be used in constructing the external walls of the development. These construction types offers high levels of sound insulation performance. However, as is typically the case the glazed elements and any required ventilation paths to achieve compliance with Part F of the Building Regulations will be the weakest elements in the façade in terms of sound insulation performance.

Consideration will therefore be given to the provision of upgraded glazing and acoustic ventilators where required. For units where it will not be possible to achieve the desirable internal acoustic environments with windows open, the proposal here is to provide dwelling units with glazed elements and vents that have good acoustic insulation properties so that when the windows are closed the noise levels internally are good. Inhabitants will be able to open the windows if they wish, however, doing so will increase the internal noise level. This approach to mitigation is supported in ProPG where it states the following:

> *2.34 Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort*

*without unduly compromising other aspects of the living environment. In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide "whole dwelling ventilation" in accordance with Building Regulations Approved Document F (e.g. trickle ventilators) in the open position (see Supplementary Document 2). Furthermore, in this scenario the internal $L_{Aeq}$ target noise levels should not generally be exceeded."*

In terms of context it is important to note that it is impractical to achieve the good internal noise levels with windows open across the vast majority of development sites in urban locations close to transport sources. Such sites would need to be classified as having a negligible risk in accordance with the ProPG noise risk assessment approach. For this reason, there are no guidance documents either at a local level or an international level that AWN is aware of which would support the approach of achieving the ideal internal noise levels only in the open window scenario. It is therefore considered entirely correct and justifiable to provide building facades with a moderate degree of sound insulation such that with windows closed a good internal acoustic environment is achieved.

### 5.1.5 Impact of noise control measures on fire, health and safety etc.

The good acoustic design measures that have been aforementioned, e.g. locating properties away from the rail line, placing outdoor space on the quiet side of buildings, are considered to be cost neutral and do not have any significant impact on other issues.

### 5.1.6 Access External Amenity Area Noise

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

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

The proposed development comprises of both private and communal external amenity areas. Private balcony spaces are located at the facades of the apartment blocks, with a podium communal space located within the courtyard of the block. These are assessed in Section 5.3.

### 5.1.7 Summary

In terms of viable alternatives to acoustic treatment of façade elements, currently it is not considered likely that there will be further options for mitigation outside of proprietary acoustic glazing and ventilation.

## 5.2 ELEMENT 2 – Internal Noise Levels

### 5.2.1 Internal Noise Crtieria

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are set out in Table 3-1 and are based on annual average data.

ProPG and BS 8233 notes that where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal $L_{Aeq}$ target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

ProPG specifically noted that the more often internal $L_{Aeq}$ levels start to exceed the internal $L_{Aeq}$ target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where

such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal $L_{Aeq}$ levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form.

### 5.2.2 Noise Levels Across Proposed Development

As demonstrated in Section 4.3, the current or potential impact in relation to noise across the site is categorised as medium noise risk.

The proposed site layout has been modelled to determine the calculated noise levels at the facades of the development buildings, these are presented in Figure 5.1 and Figure 5.2 for daytime and night-time, respectively.

**Figure 5.1 Daytime Noise Contours Across Developed Site (dB $L_{Aeq,16hr}$)**

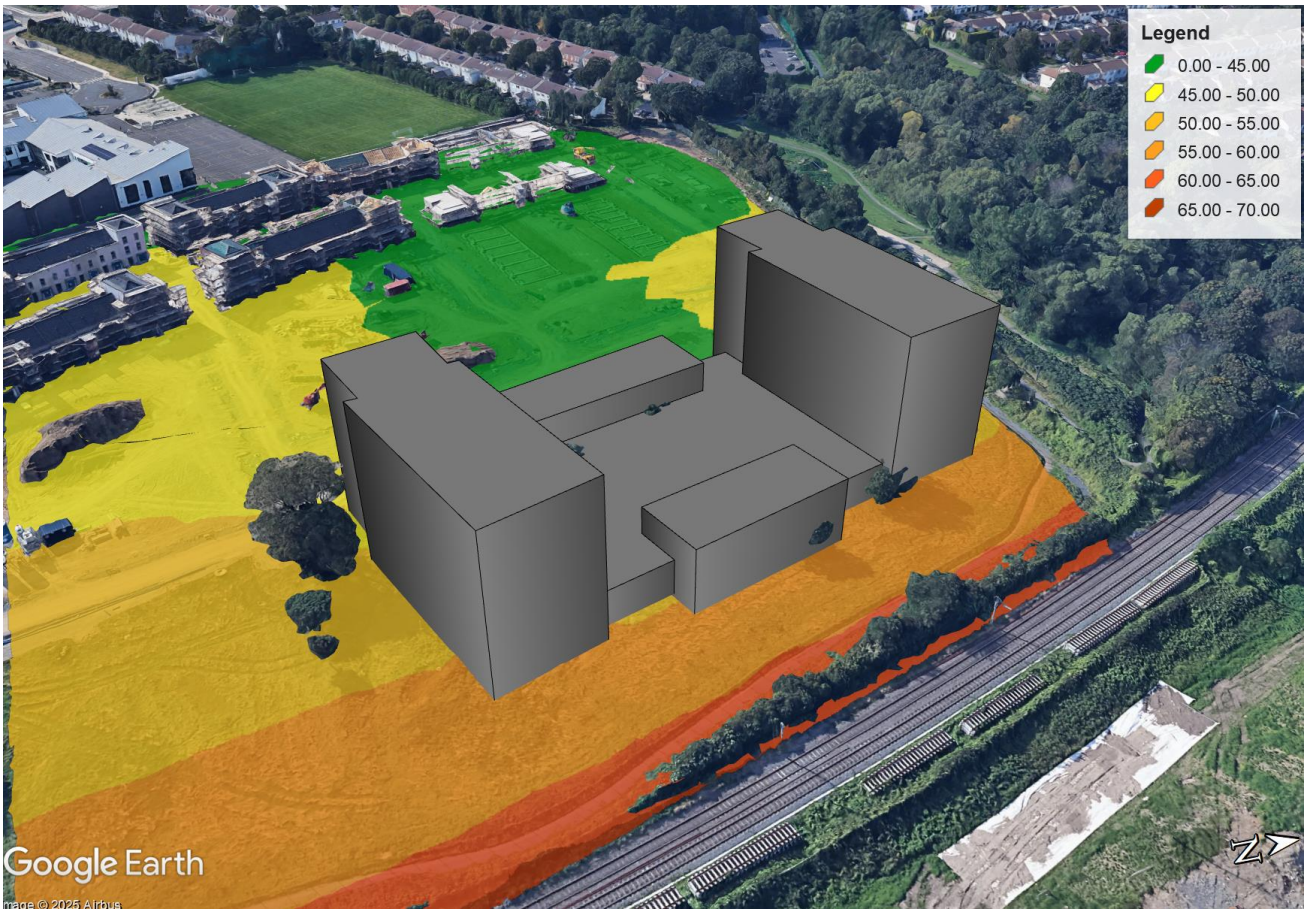
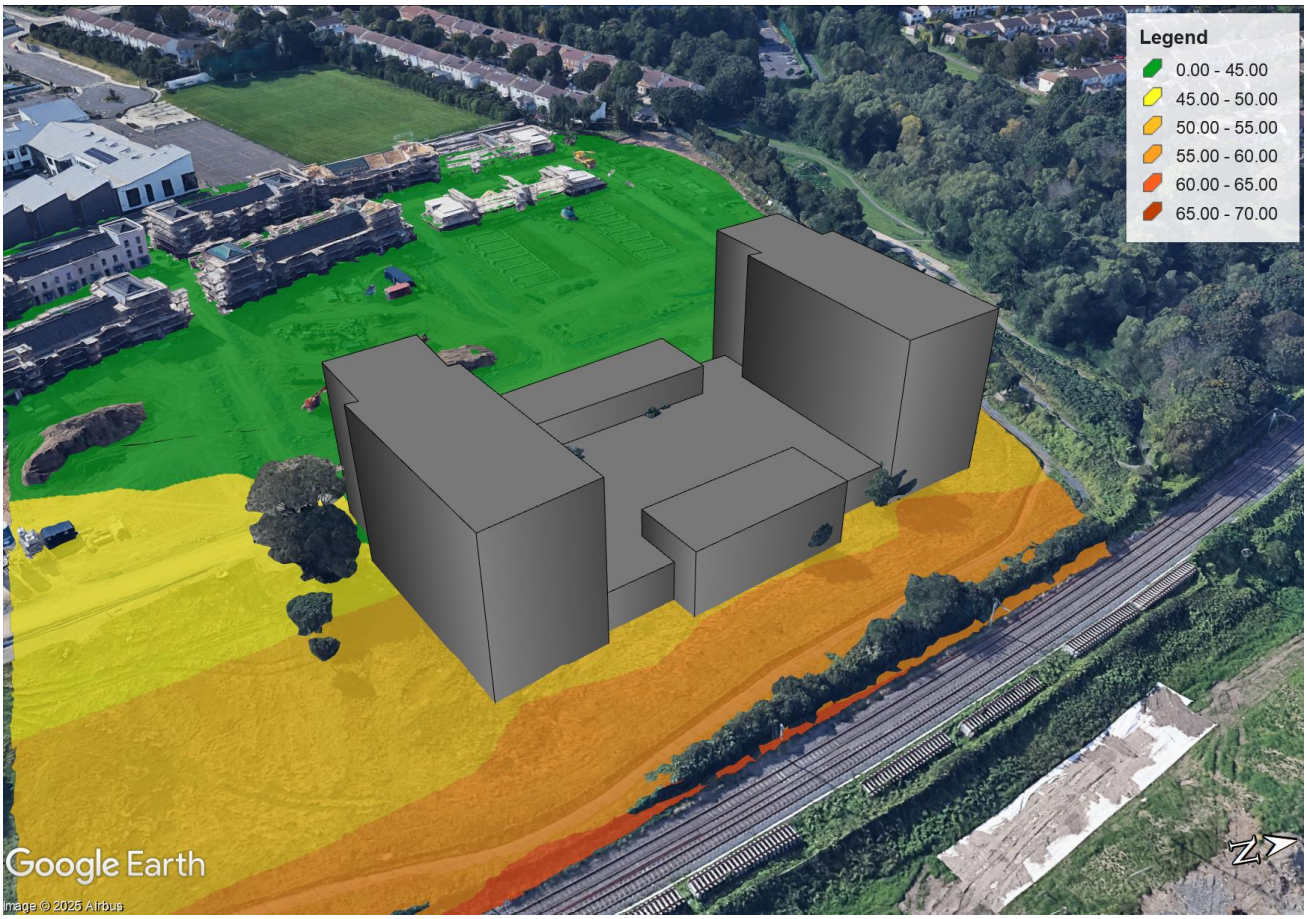


**Figure 5.2 Night-time Noise Contours Across Developed Site (dB $L_{Aeq,1hr}$)**




### 5.2.3 Façade Noise Levels

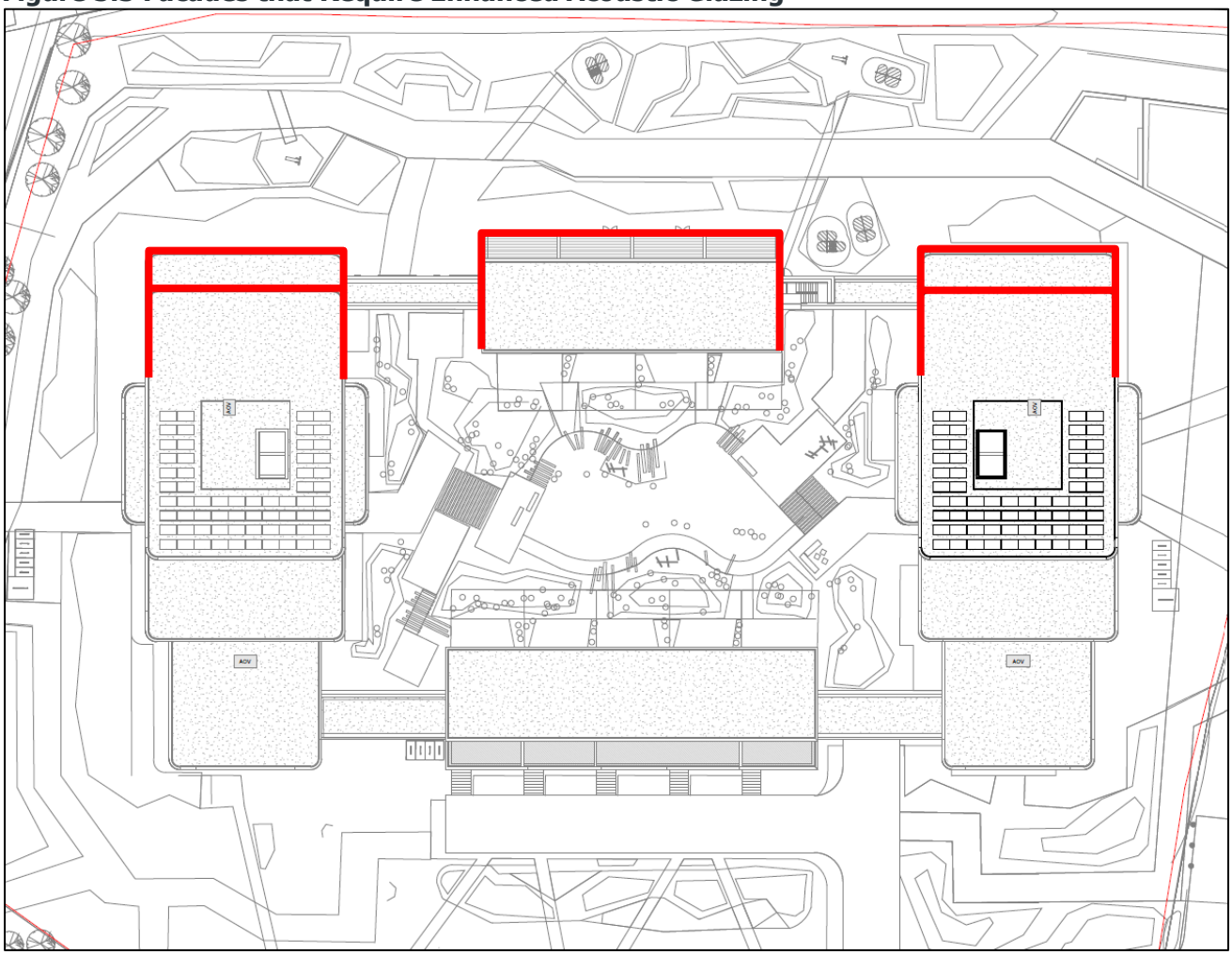
Noise levels have been predicted across the site during day and night-time periods with the proposed buildings in place.

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

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

Red highlighting in Figure 5.3 identifies facades where the noise levels are higher and where mitigation in the form of enhanced glazing and ventilation will be required. The facades face on to, or are perpendicular to the rail tracks. The specification of this enhanced façade is discussed in Section 5.2.4. Note that any façade that is not highlighted has been predicted to fall below 55 dB $L_{Aeq,16hr}$ during the day and 50 dB $L_{Aeq,8hr}$ at night, therefore mitigation is not required for these facades.

**Figure 5.3 Facades that Require Enhanced Acoustic Glazing**



## 5.2.4 Proposed Façade Treatment

The British Standard BS EN 12354-3: 2000: *Building acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound* provides a calculation methodology for determining the sound insulation performance of the external envelope of a building. The method is based on an elemental analysis of the building envelope and can take into account both the direct and flanking transmission paths.

The Standard allows the acoustic performance of the building to be assessed taking into account the following:

- Construction type of each element (i.e. windows, walls, etc.);
- Area of each element;
- Shape of the façade, and;
- Characteristics of the receiving room.

The principals outlined in BS EN 12354-3 are also referred to in BS 8233 and Annex G1F1 of BS 8233 provides a calculation method to determine the internal noise level within a building using the composite sound insulation performance calculated using the methods outlined in BS EN 12354-3. The methodology

[1] The methodology contained within Annex G of BS8233 is based on the assumption that the source is a line source (such as a road) and that the building facades are simple, i.e. do not have balconies. These assumptions are considered valid for the purposes of this assessment and have been adopted.

outlined in Annex G of BS 8233 has been adopted here to determine the required performance of the building facades.

It's noted that the apartments will be serviced with mechanical ventilation that will be ducted from the façade, this is considered to be a strong acoustic solution for the prevention of ingress of noise through the vents. Hence, here the proposed treatment specifications are provided for the glazing systems.

As is the case in most buildings, the glazed elements of the building envelope are typically the weakest element from a sound insulation perspective. In this instance the most effected facades will be provided with glazing that, when closed, achieve the minimum sound insulation performance as set out in Table 5-1. The facades that will require the specified glazing are indicated in Figure 5.3 and the specifications for the glazing are set out in . Facades that aren't highlighted in Figure 5.3 will be able to achieve good internal noise levels with standard glazing.

**Table 5-1. Sound Insulation Performance Requirements for Glazing SRI (dB)**

| Location | Octave Band Centre Frequency (Hz) | | | | | | $R_w$ |
|---|---|---|---|---|---|---|---|
| | 125 | 250 | 500 | 1k | 2k | 4k | |
| **RED FACADE** | 23 | 24 | 34 | 42 | 43 | 52 | 38 |
| All other facades | Standard Double Glazing | | | | | | |

Note that the overriding requirement is that the internal noise guideline levels are achieved. This assessment has demonstrated that the recommended internal noise criteria can be achieved through consideration of the proposed façade elements at the detailed design stage. The calculated glazing specifications are preliminary and are intended to form the basis for noise mitigation at the detailed design stage. Consequently, these may be subject to change as the project progresses as there may be other glazing systems and specifications available that will also be able to achieve the internal noise levels.

## 5.3 ELEMENT 3 - External Noise Levels

Some balcony areas for Block A that face onto the rail tracks are expected to exceed the recommended noise levels for external areas by a minimal amount as predictions indicate that noise levels of up to 56 dB $L_{Aeq,16hr}$ will effect these areas, which slightly is over the recommendation of 55 dB $L_{Aeq,16hr}$ (although it should be noted that there is no perceptible difference between 55 and 55 dB $L_{Aeq,16hr}$). The ProPG document allows for the impact of higher than desirable external noise levels to be offset through assessment of a hierarchy of measures including *"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"* 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)"*. In this instance the block has a communal external area on the podium that has been modelled and is predicted to meet the external noise thresholds. All other external areas other than those previously stated are predicted to meet the external noise thresholds. It is considered that the objective of achieving suitable external noise levels is achieved within the overall site.

## 5.4 ELEMENT 4 – Assessment of Other Relevant Issues

Element 4 gives consideration to other factors that *may* prove pertinent to the assessment, these are defined in the document as:

- 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
- 4(v) acoustic design v wider planning objectives

Each is discussed in turn.

### 5.4.1 Compliance with National and Local Policy

There are no National policy documents relating to the acoustic design of residential dwellings relating to internal noise levels. However, the Dublin Agglomeration Noise Action Plan 2024 – 2028 indicates that the guidance documents referred to in this report are recommended for inward noise impact assessments, this report therefore complies with the requirements of local policy.

### 5.4.2 Magnitude and Extent of Compliance with ProPG

As discussed within this report the following conclusions have been drawn with regards to the extent of compliance with ProPG. The inward noise assessment has concluded that all habitable rooms will be able to achieve a good level of internal noise when suitable glazing specifications are employed where required. The external noise assessment indicates that some balcony spaces may slightly exceed the guidance noise level by 1 dB, however, the ProPG document allows for the impact of higher than desirable external noise levels to be offset through provision of external communal areas that meet the noise guidelines. The calculations indicate that the internal podium space will be well within the ProPG guidance thresholds.

Based on the preceding it is concluded that the proposed development is in compliance with the requirements of ProPG.

### 5.4.3 Likely Occupants of the Development

The criteria adopted as part of this assessment are based on those recommended for permanent dwellings, hence the adopted criteria is considered robust and appropriate for the likely occupants.

### 5.4.4 Acoustic Design v Unintended Adverse Consequences

Unintended adverse consequences did not occur on this project.

### 5.4.5 Acoustic Design v Wider Planning Objectives

With reference to the Dublin Agglomeration Noise Action Plan 2024 – 2028 the proposed development site is within an area where people are being brought to noise in the form of rail noise due to its close proximity to the rail network close to Connolly Station. Through modelling and assessment this report recommends mitigation through improved glazing which will ensure good internal noise levels are achieved.

This report has demonstrated the noise insulation measures required to ensure that the proposed dwelling units achieve a good internal noise environment.

# 6. CONCLUSION

An initial site noise risk assessment has been carried out for the proposed development of Sea Gardens Phase 1 Block A. The proposed development site is located along the adjacent rail network, hence an inward noise impact assessment has been undertaken in order to protect the future residents and ensure that internal and external noise levels are within the proposed guidance values. The site has been classified as having a medium noise risk using guidance contained in ProPG. This was determined through both noise surveying and modelling of the site.

Discussion is presented in terms of the likely noise impact of internal areas of the proposed development. It will be necessary to provide enhanced performance acoustic glazing on the facades indicated within this report to ensure that when windows are closed that the internal noise environment is 'good' for occupants within the building. Once the specified glazing performance is employed the internal noise levels will be within the guidance values, and a 'good' internal noise level will be achieved.

It is noted that some external balcony areas that look directly onto the rail network may experience slightly higher noise levels than those recommended within the guidance (calculated as an exceedance of 1 dB). The ProPG document does provide alternative measures to offset the impact of higher than desirable noise levels, one of these alternate measures is the provision of *"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"* 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)"*.

In this instance the block has a communal external area on the podium that has been modelled and is predicted to meet the external noise thresholds.

Given the above, it is concluded that the proposed development site meets the guidance and criteria set out in the NAP, ProPG and BS8233.