WAVE DYNAMICS
ACOUSTIC CONSULTANTS

Galway Port

Acoustic Design Statement
28 August 2025

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Executive Summary

Wave Dynamics were engaged by the Land Development Agency (LDA) as the acoustic consultants to undertake an Inward Noise Impact Assessment for the planning application for the proposed large-scale residential development at Galway Port, Lough Atalia Road, Galway.

The development consists of:

The Land Development Agency intends to apply to Galway City Council for permission for a 'Large-Scale Residential Development' (LRD) at a site of 1.621 Ha in Galway Port at Dock Road and Lough Atalia Road, Galway City, and extending to include parts of both roads for road infrastructure works and water services infrastructure works.

The proposed development principally consists of: the demolition of the existing office / bus depot building (370.2 sq m) and ancillary building (26.0 sq m); the partial demolition of the existing ESB sub-station and ancillary building (67.4 sq m); the demolition of existing boundary walls at the south-west and north-west; and the construction of a mixed-use development.

The proposed mixed-use development primarily comprises: 356 No. residential apartments (172 No. 1-bed, 169 No. 2-bed and 15 No. 3-bed); crèche (255.9 sq m); 2 No. café/restaurant units (totalling 428.4 sq m); and 1 No. retail unit (156.0 sq m).

The development has a total floor area of 32,096.0 sq m and is primarily proposed in 4 No. blocks (identified as A–D) that generally range in height from 6 No. to 13 No. storeys: Block A ranges from 6 No. to 9 No. storeys; Block B ranges from 6 No. to 11 No. storeys; Block C is 6 No. storeys; and Block D ranges from 6 No. to 13 No. storeys.

The proposed development also includes: new internal street and pedestrian network, including a one-way vehicular route at the north-western side of the site and new junctions with Dock Road at the south-west and with the access road from Lough Atalia at the north-west; upgrades to Lough Atalia Road and the access road from it at the north-west of the site, including the provision of a new toucan pedestrian/cycle crossing at Lough Atalia Road; upgrades to the footpath and road interface with Dock Road to the south-west; 37 No. car parking spaces; 1 No. set-down/delivery bay; 741 No. cycle parking spaces; hard and soft landscaping, including as public open spaces and communal amenity spaces; private amenity spaces as balconies and terraces facing all directions; boundary treatments; public lighting; bin stores; double sub-station; plant rooms; green roofs; rooftop lift overruns and plant; rooftop telecommunications, plant and enclosure at Block C; recladding of the existing sub-station and pumping station; and all associated works above and below ground.

Noise Impact Assessment

A Stage 1 and Stage 2 ProPG assessment have been undertaken. As part of the stage one assessment to categorise the site, a baseline noise survey was undertaken to measure the existing noise levels. Following a review of the noise levels on the site, including the L_{AFmax} and $L_{Aeq,}$ the site has been characterised as low to medium risk for day and night for the across the site therefore, mitigation measures are recommended to control the onset noise levels, this is in the form of glazing performance specification.

Internal Noise Levels

Following the baseline survey, a noise impact assessment was undertaken, this 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. The noise measurements were taken during peak traffic conditions. 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.

External Amenity Noise Levels

The external amenity spaces on the development includes balconies and communal open space at ground level in the centre of the development surrounded by the apartment blocks. Appropriate amenity has been provided on the development for residents using a combination of the balconies on suitable facades and the communal amenity spaces. This is in line with element 3(v) of ProPG.

Based on the recommendations in this report it is predicted that the internal and external noise levels will achieve the targeted noise levels in line with BS 82233:2014 and ProPG 2017 guidance.

Table of Contents

1 Introduction

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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 assessment and report were completed by Cathal Reck | Acoustic Consultant, Cathal has experience of numerous inward noise impact assessments. Cathal's qualifications include; BSc (Hons) in Music Technology & Production, IOA Certificate of Competence in Environmental Noise Measurement. Cathal is a member of the Institute of Acoustics and a SITRI certified sound insulation tester.

The peer review was completed by Sean Rocks, Director | Senior Consultant, Sean has experience of numerous inward noise impact assessments. Sean's qualifications include; BEng (Hons) in Mechanical and Manufacturing Engineering, Diploma in Acoustics and Noise Control (Institute of Acoustics), IOA Certificate of Competence in Environmental Noise Measurement and SITRI certified sound insulation tester. Sean is a member of both Engineers Ireland and the Institute of Acoustics.

2 Site Description

The site is located on Lough Atalia Road on the Galway Bay docklands, Galway. The area is largely industrial with premises to the north, west and south supporting shipping as well as a hotel to the west and service station to the north. The site is bound to the east by the Lough Atalia channel.

Figure 1: Site Location, Measurement Locations A1-A3, Logger Location L1, 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 and
- External amenity noise levels.

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

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

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.
- ✓ Galway City Council – Noise Action Plan 2024 - 2028
- ✓ ProPG Professional Practice Guidance on Planning & Noise.
- ✓ ISO 1996-1:2016 Acoustics — Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures
- ✓ Previous experience on similar projects.

3.1 Noise Assessment Criteria

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

Galway City Council Noise Action Plan

The Galway City Council Noise Action Plan 2024 – 2028 cites guidance from BS 8233:2014: Guidance on Sound Insulation and Noise Reduction for Buildings and Professional Practice Guidance on Planning and Noise (ProPG) in relation to internal noise levels. Guidance from the Noise Action Plan and the referenced standards have been used to develop the criteria outlined in this section.

ProPG: Professional Practice Guidance on Planning & Noise

ProPg 2017 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 illustrates the ProPG approach.

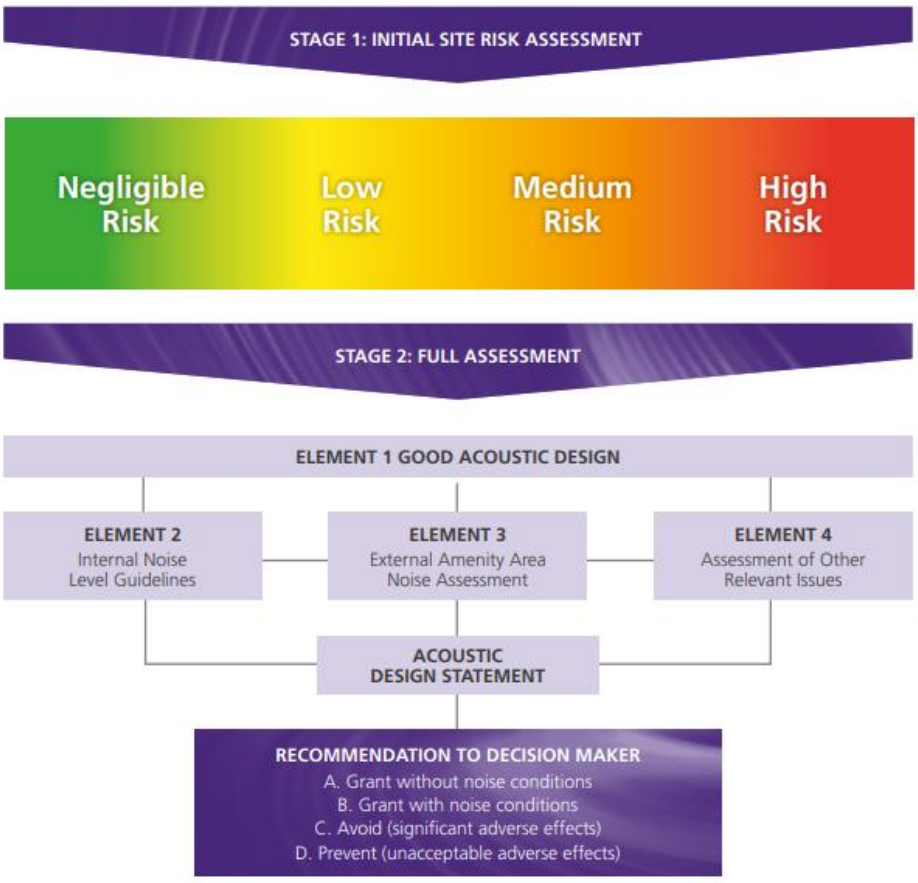


Figure 2: Summary of Overall ProPG Approach.

Internal Noise Levels

Table 1 below outlines the recommended internal noise levels from BS 8233:2014 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 1: BS 8233:2014 Internal Noise Criteria –Residential Buildings.

Activity	Location	07:00 to 23:00 Hrs	23:00 to 07:00 Hrs
Resting	Living Room	35 dB $L_{Aeq,\ 16\ hour}$	-
Dining	Dining Room/Area	35 dB $L_{Aeq,\ 16\ hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,\ 16\ hour}$	30 dB $L_{Aeq,\ 8\ hour}$ 45dB 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 2017 refers to the BS8233:2014 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, publically 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 8233:2014 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 8233:2014 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 BS8233:2014 and ProPG 2017 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.

4 ProPG Stage 1 – 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 2 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.

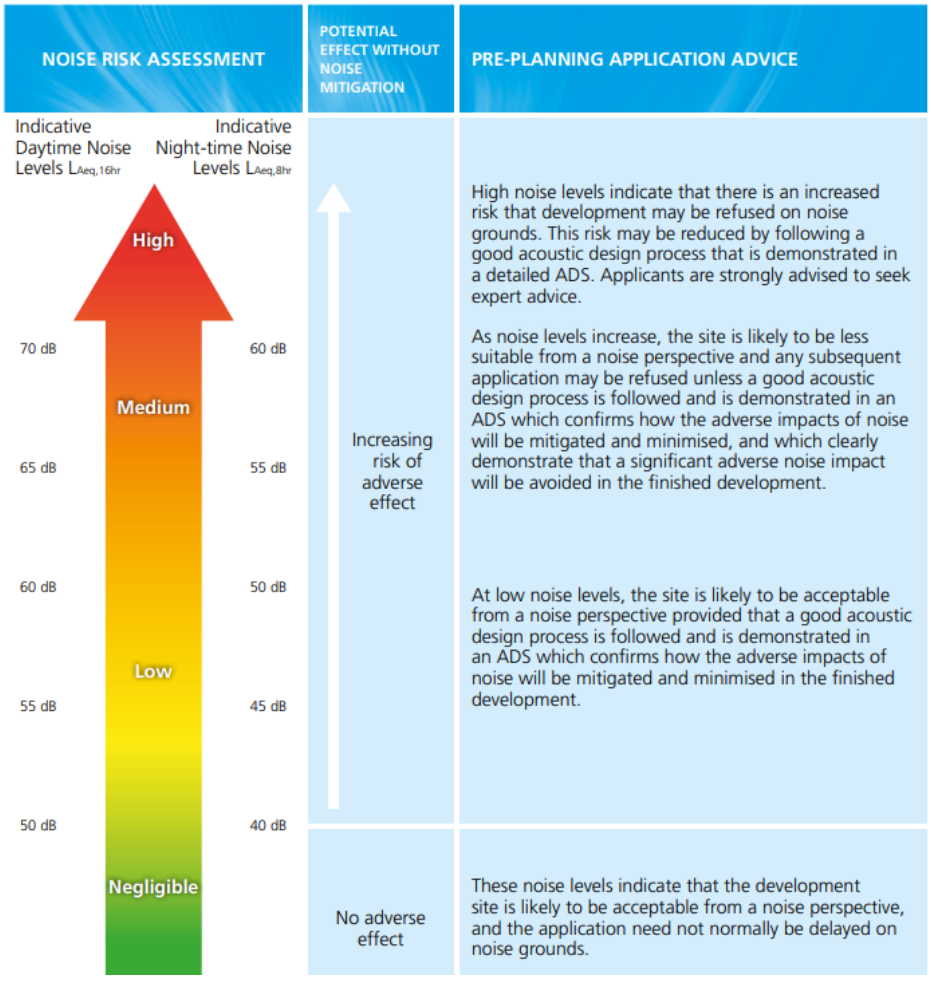


Figure 3: ProPG Risk Analysis.

4.1 Baseline Noise Survey

An unattended and attended noise survey was conducted to quantify the existing noise environment. The attended measurement survey included measurements across the site and the surrounding area. The purpose of the measurements was to quantify the existing noise environment to assess the break in noise.

4.1.1 Site Description and Measurement Locations

The site is located on Galway Port lands at Lough Atalia Road and Dock Road. The area is largely industrial with premises to the north, west and south supporting shipping as well as a hotel to the west and service station to the north. The site is bound to the east by the Lough Atalia channel.

Figure 4: Site Location and Measurement Locations L1 and A1-A3.

4.1.2 Survey Methodology and Personnel

The attended and unattended surveys were completed by Cathal Reck (Acoustic Consultant). The attended noise measurements took place on the 5th of February 2025 between 04:45hrs and 09:09hrs, covering both night (23:00hrs – 07:00hrs) and daytime (07:00hrs – 23:00hrs) periods. The unattended noise logger was deployed by Cathal Reck (Acoustic Consultant) on the 5th of February at 10:15hrs and collected by Sean Rocks (Senior Acoustic Consultant) on the 11th of February 2025 at 14:00hrs.

Unattended Noise Measurements

An unattended noise logger was deployed in location L1. The monitor was deployed on the 5th of February 2025 at 10:15hrs and collected on the 11th of February 2025 at 14:00hrs. The logger was fixed to the side of an existing wall and extended upwards approximately 4m above the ground. 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).

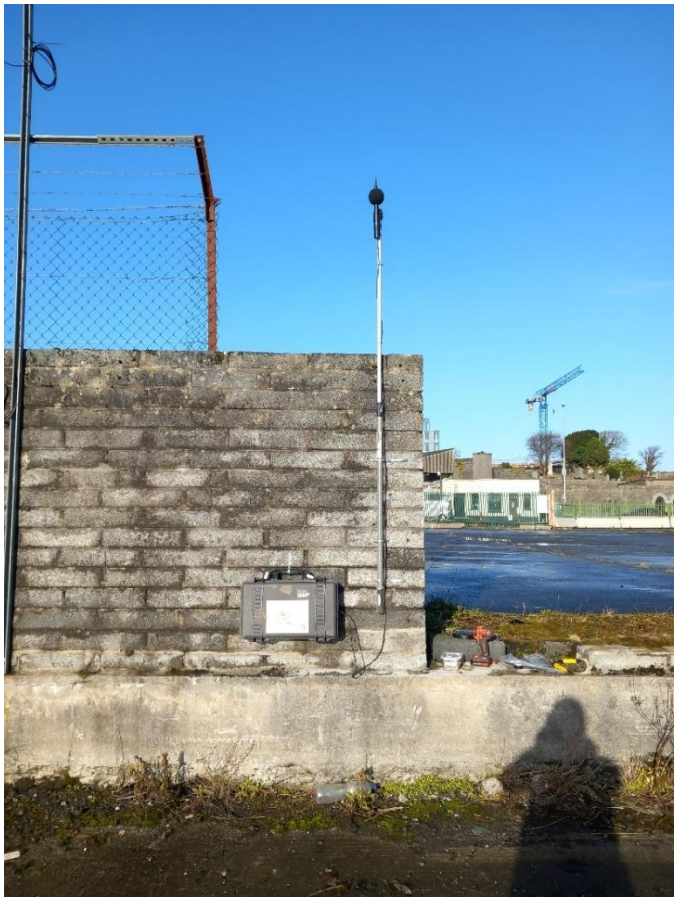


Figure 5: Unattended Measurement Setup.

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 for a duration of 15-60 minutes in the locations A1-A3 and L1 as noted in Figure 4. 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 at A1-A3 and 4m above ground at L1. 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.

4.1.3 Survey Period

The unattended noise measurements were undertaken on the 5th of February 2025 at 10:15hrs and collected on the 11th of February 2025 at 14:00hrs, attended measurements taken on the 5th of February 2025 between 04:45hrs and 09:09hrs.

4.1.4 Noise Measurement Equipment

A Class 1 sound level meter/noise logger in general accordance with IEC 61672-1:2013 was used for the attended measurements. Table 2 below summarises the measurement equipment used.

Table 2: Noise Measurement Equipment.

Description	WD Asset Number	Model	Serial No.	Calibration Certificate No.	Calibration Due Date
Sound Level Meter	SLM4	Nti XL2-TA	A2A-23316-E1	UK-23-100	01/09/2025
Calibrator	CAL1	Nor 1251	31056	AC240268	09/10/2025

4.1.5 Subjective Noise Environment

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

- Road traffic noise from surrounding road network,
- Pedestrian noise,
- Birdsong.

4.2 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 noise measurements.

Attended Measurement Results

Table 3 outlines the results of the attended measurement survey.

Table 3: Attended Noise Measurement Results.

Measurement				Measured Noise Levels		
Location	Date	Time (hrs)	Duration (mins)	L_{Aeq} dB	L_{AFmax} dB	L_{A90} dB
A2	05/02/2025	04:45	15:00	59	78	40
A1	05/02/2025	05:04	15:00	61	77	47
A3	05/02/2025	05:26	15:00	48	67	43
A1	05/02/2025	05:49	15:00	63	81	50
A2	05/02/2025	06:10	15:00	66	83	53
A3	05/02/2025	06:29	15:00	49	63	44
A3	05/02/2025	07:15	1:00:00	54	75	48
A1	05/02/2025	08:27	15:00	68	90	59
A2	05/02/2025	08:48	15:00	69	79	65
A1	05/02/2025	09:09	15:00	68	80	59

Unattended Monitoring Results

Table 4 outlines the results of noise measurements at the unattended monitoring location L1.

Table 4: Unattended Measurement Results.

Start Date	$L_{Aeq,16hour}$ 07:00 - 23:00 dB	L_{night} ($L_{Aeq,8hour}$ 23:00 - 07:00) dB	L_{den} (00:00 - 00:00) dB	10th highest night-time L_{AFmax}	L_{A90} (23:00 - 07:00) dB
05/02/2025	57(1)	51	59(1)	64	42
06/02/2025	57	52	59	66	43
07/02/2025	57	51	60	64	43
08/02/2025	56	51	59	64	44
09/02/2025	56	51	59	66	42
10/02/2025	58	52	60	65	44
11/02/2025	58(1)	N/A	N/A	N/A	N/A

(1) Shortened measurement duration.

(2) Where night-time period is referred to the date is the date the measurement commenced on at 23:00hrs and finished at 07:00hrs on the following calendar day.

(3) Arithmetic average of L_{AF90}.

L_{AFmax} Noise Levels

Based on the project criteria outlined in Section 3, the internal $L_{AFmax\ 15min}$ inside the dwelling bedrooms cannot exceed 45dBA 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 6 below highlights 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 not typically more than 20 occurrences exceeding 80dB L_{AFmax}.

The façade specification outlined in 5.2.3 has been determined in accordance with achieving the internal noise levels for both L_{Aeq} and the L_{AFmax} incident noise levels below.

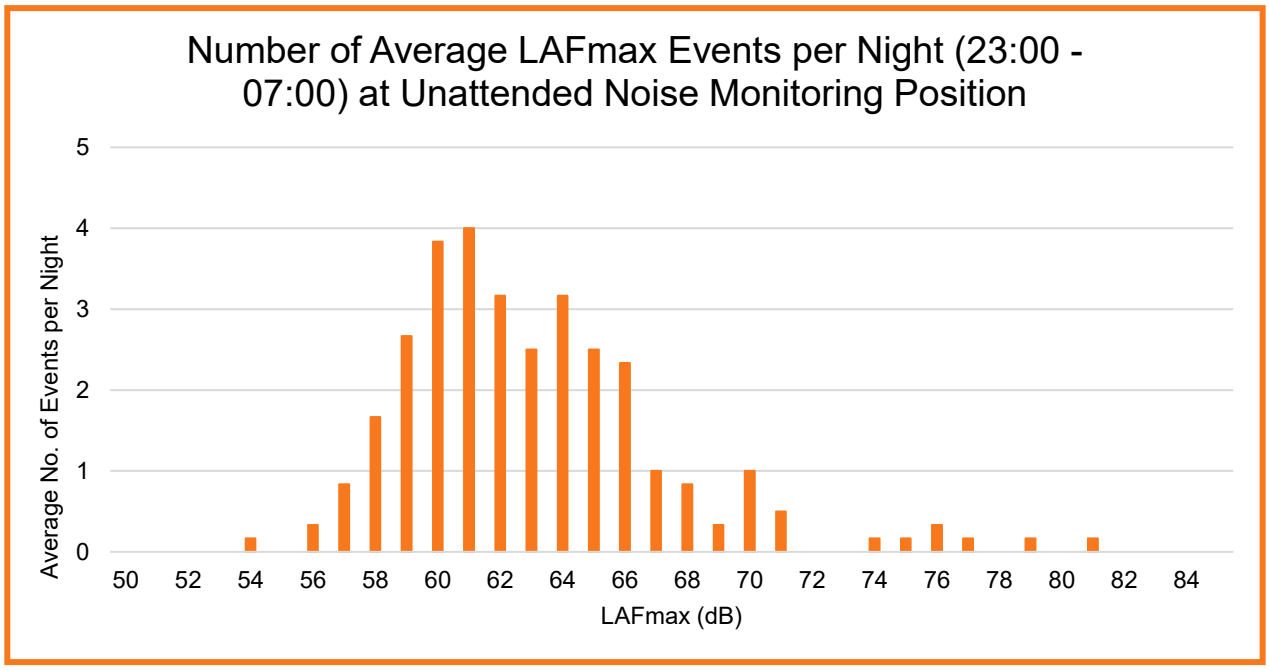


Figure 6: Average Recorded L_{AFmax} Events Per Night Based On 15min Measurement Intervals.

Discussion of Measurement Results

The measurements were taken on weekdays and the weekend to provide an understanding of the noise climate around the site. From the noise levels recorded it can be seen that the levels were steady for the duration of the full survey.

The ambient noise consisted of traffic noise from all immediate surrounding roads, and industrial ongoings in the local area.

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

4.3 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 for the attended surveys.

Where weather conditions during the unattended survey impacted on the results they were filtered where required.

4.4 Future Noise Levels

Road Traffic

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 of 3 dB would be expected from road traffic.

Rail Traffic

The Galway rail line located to the north of the proposed development site, forming part of the approach to Ceannt Station in Galway City. This section of the railway includes a bridge crossing to the north the site, used by trains arriving at and departing from the station. The rail line is located approx. 170 from the closest façade of the proposed development.

Train movements on this bridge were observed to be infrequent and of short duration. Trains operate at reduced speeds in this area due to standard safety and operational speed restrictions associated with station approach and departure. These low speeds significantly limit the potential for elevated noise levels from rail activity. Based on current operations there are a total of c42 train movements on this section of rail line per day.

During the site survey, noise from passing trains was infrequent and quieter than the existing road traffic noise levels in the area. The acoustic environment is dominated by local road traffic, which masks any contribution from occasional rail movements.

It is noted that Ceannt Station is undergoing a significant redevelopment, due for completion in 2026 however there is currently no information available regarding the intensification of rail services on the line. For the purpose of this assessment, a conservative allowance has been made. An indicative doubling of rail traffic volume would result in a noise level increase of approximately 3 dB, which is considered as just perceptible change in noise level. Given the currently low baseline contribution of rail noise, already below that of the continuous road traffic in the area, this increase would remain acoustically insignificant in the context of the overall noise climate.

4.5 ProPG Stage 1 – Initial Risk Assessment

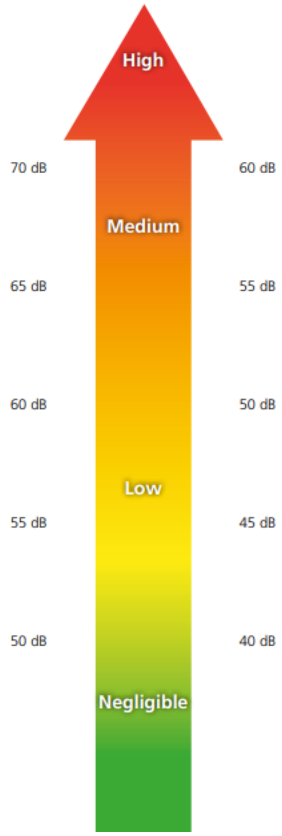
The measured noise levels on the site and future noise levels have been predicted for road traffic noise to assess the probability of an adverse impact.

Table 5 below identifies the Noise Risk Categorisation of the site based on the predicted free field façade noise levels. The site has been categorised as low to medium risk across the site in accordance with the ProPg risk assessment. Considering this risk categorisation of the development no mitigation measures will be required to mitigate the noise risk in following with ProPG guidance and good acoustic design process.

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 5: 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**
		N/A	The southwest boundary of the site occupies the medium risk contour for nighttime noise levels. Good acoustic design should be observed.
		Low Risk	**Low Risk**
		The site occupies the low-medium risk contour for daytime noise levels.	The remainder of the site occupies the low-medium risk contour for nighttime noise levels.
		Negligible Risk	**Negligible Risk**
		N/A	N/A

5 ProPG Stage 2- Full Assessment

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

5.1.1 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."*

5.1.2 Discussion of Good Acoustic Design

Mitigation of Sources

The development is located close to the road 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 southeastern boundary is the most exposed to road traffic noise. Block A of apartments provides a high degree of noise screening to the remainder of the development which is predicted to have lower onset noise levels.

Construction Methods

Section 5.2.3 considers the construction methods required to meet the building performance control measures. The construction measures are in general robust, providing standard external wall and façade details to meet thermal, fire and weathertightness requirements 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 5.2.3. It is generally impractical to provide ventilation via openable windows in urban/built up areas. An open window will provide 10-15dB of attenuation which in build-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 LAeq,16hr."

The external amenity source noise levels are considered in section 5.3.

5.2 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 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.

5.2.1 Noise Prediction Modelling

Following the survey, a computational noise 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 attended and unattended noise measurements. SoundPLAN 9.1 software predicts road traffic noise levels in accordance with *Calculation of Road Traffic Noise* (UK Department for Transport, 1998). This is the recognised appropriate standard for road traffic noise prediction as per TII (Transport Infrastructure Ireland).
The following information was input into the model:

- Development layout provided by architects drawings.
- Google Maps terrain and elevation data of surrounding area.
- Traffic speeds as per local signage and onsite observation.
- Percentage of HGV assumed at 4% based on assessment of similar local roads.
- Annual traffic growth rate of 3.9%.
    - This has been assessed based on pre-covid traffic growth data.
- Daily train count based on Ceannt Station timetable.

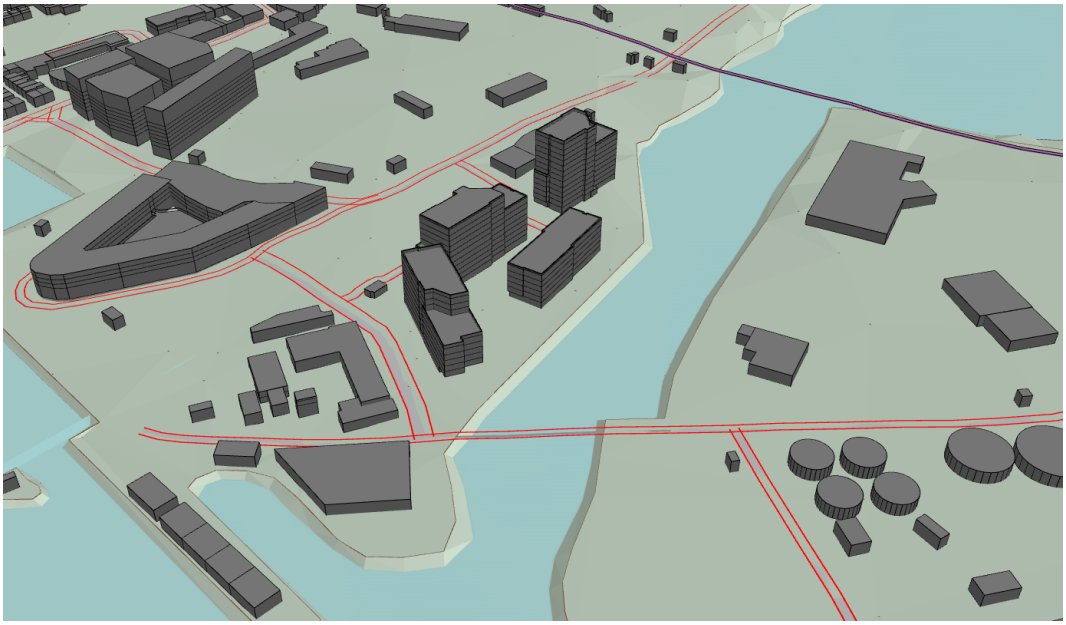


Figure 7: Screenshot of Noise Model.

5.2.2 Predicted Road Noise Levels

Incident road traffic noise levels have been predicted across all facades of the development for both the day and nighttime period.

Daytime Noise Levels

Figure 8, Figure 9, Figure 10 and Figure 11 below outline the predicted road traffic noise levels across the proposed site for the day time period at 1.5m, 4m, 6.5m and 9m height respectively.

Figure 8: Predicted $L_{Aeq,16hour}$ (07:00Hrs – 23:00Hrs) at 1.5m Height for the Future Development.

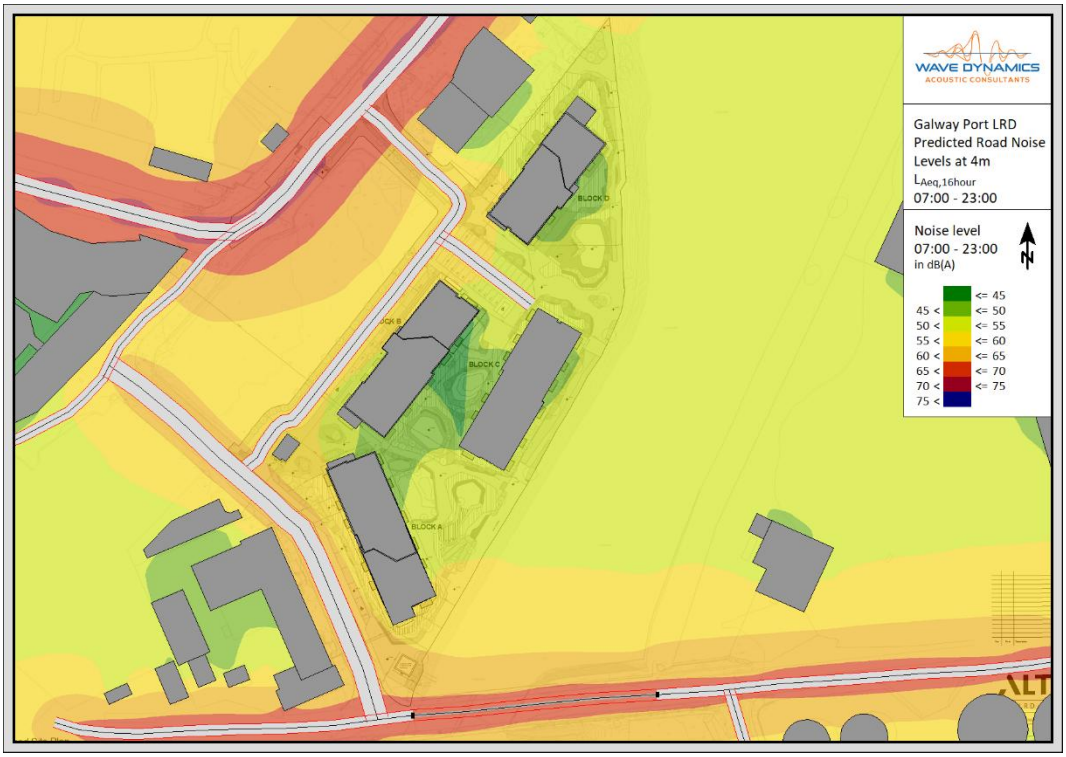


Figure 9: Predicted $L_{Aeq,16hour}$ (07:00Hrs – 23:00Hrs) at 4m Height for the Future Development.

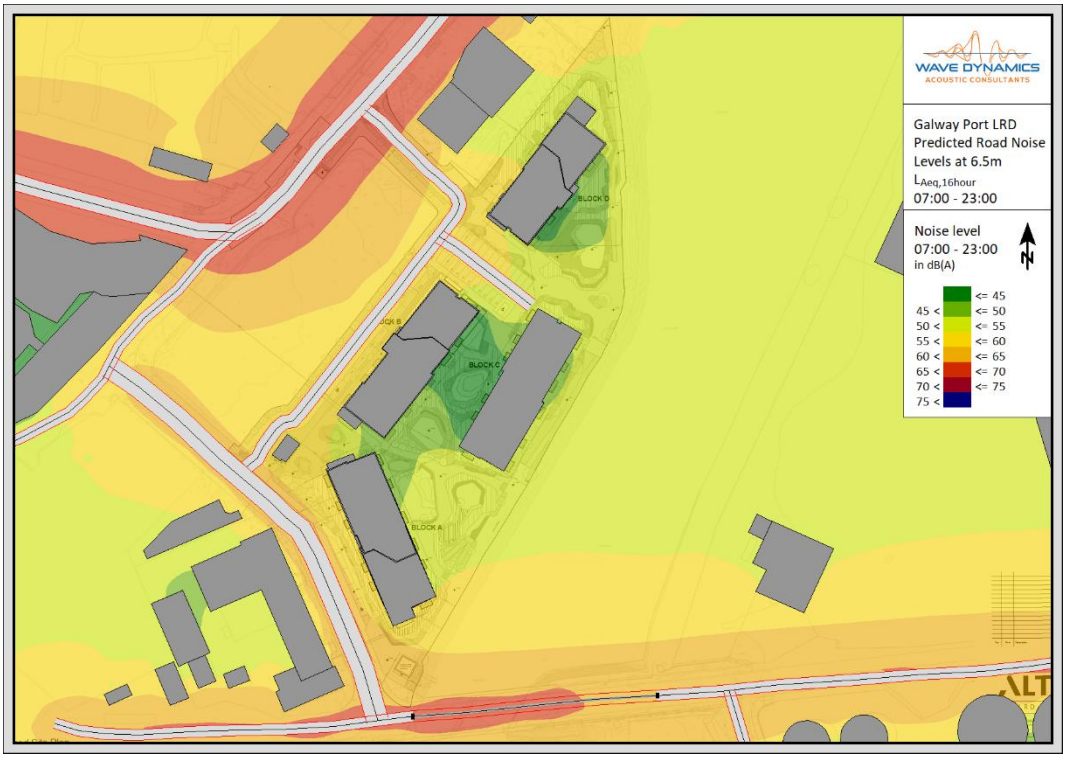


Figure 10: Predicted $L_{Aeq,16hour}$ (07:00Hrs – 23:00Hrs) at 6.5m Height for the Future Development.

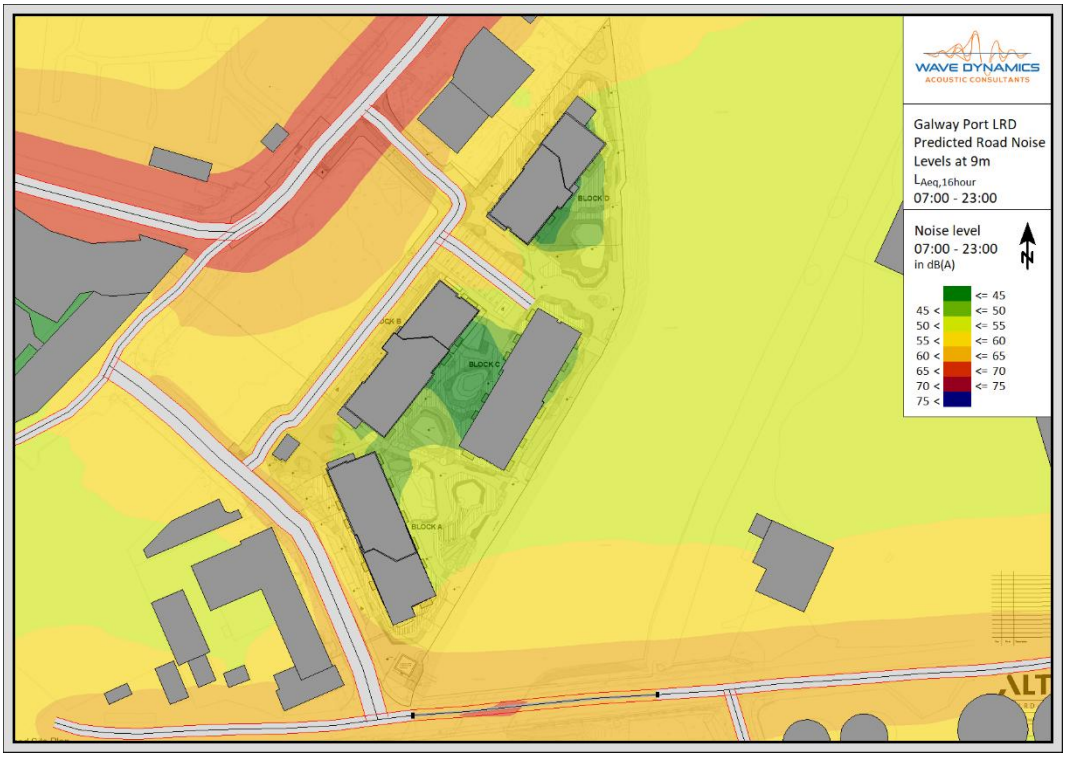


Figure 11: Predicted $L_{Aeq,16hour}$ (07:00Hrs – 23:00Hrs) at 9m Height for the Future Development.

Nighttime Noise Levels

Figure 12, Figure 13, Figure 14 and Figure 15 below outline the predicted road traffic noise levels across the proposed site for the nighttime period at 1.5m, 4m, 6.5m and 9m height respectively.

Figure 12: Predicted $L_{Aeq,8hour}$ (23:00Hrs – 07:00Hrs) at 1.5m Height for the Future Development.

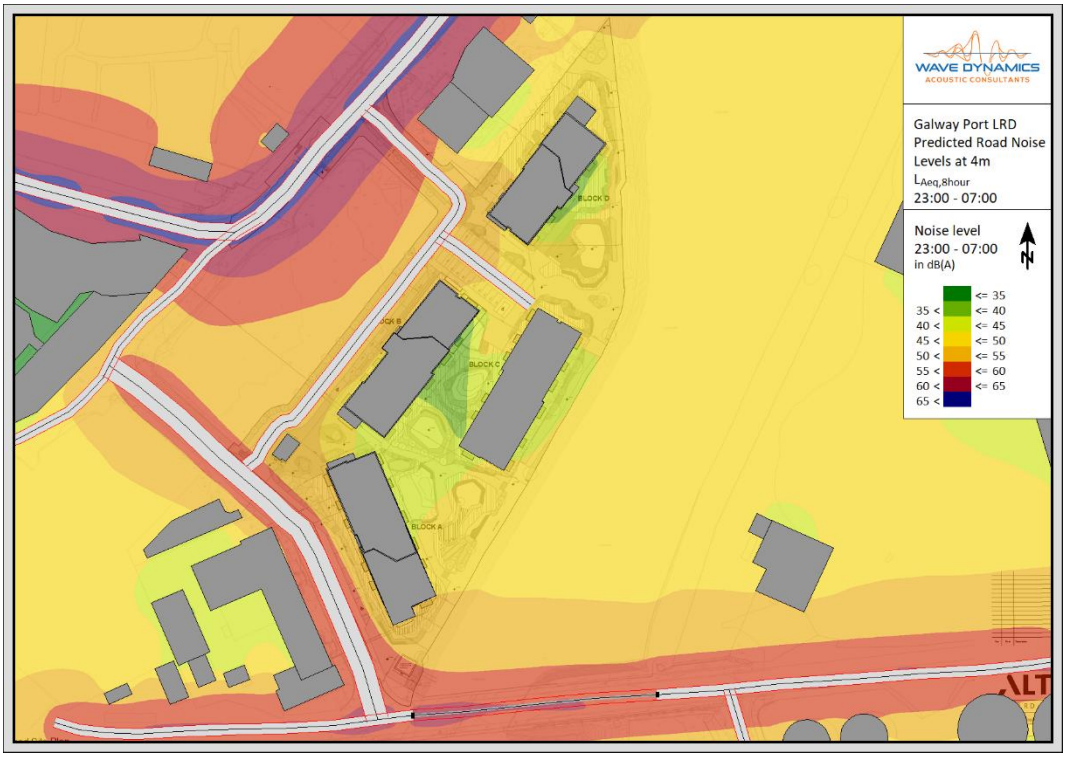


Figure 13: Predicted $L_{Aeq,8hour}$ (23:00Hrs – 07:00Hrs) at 4m Height for the Future Development.

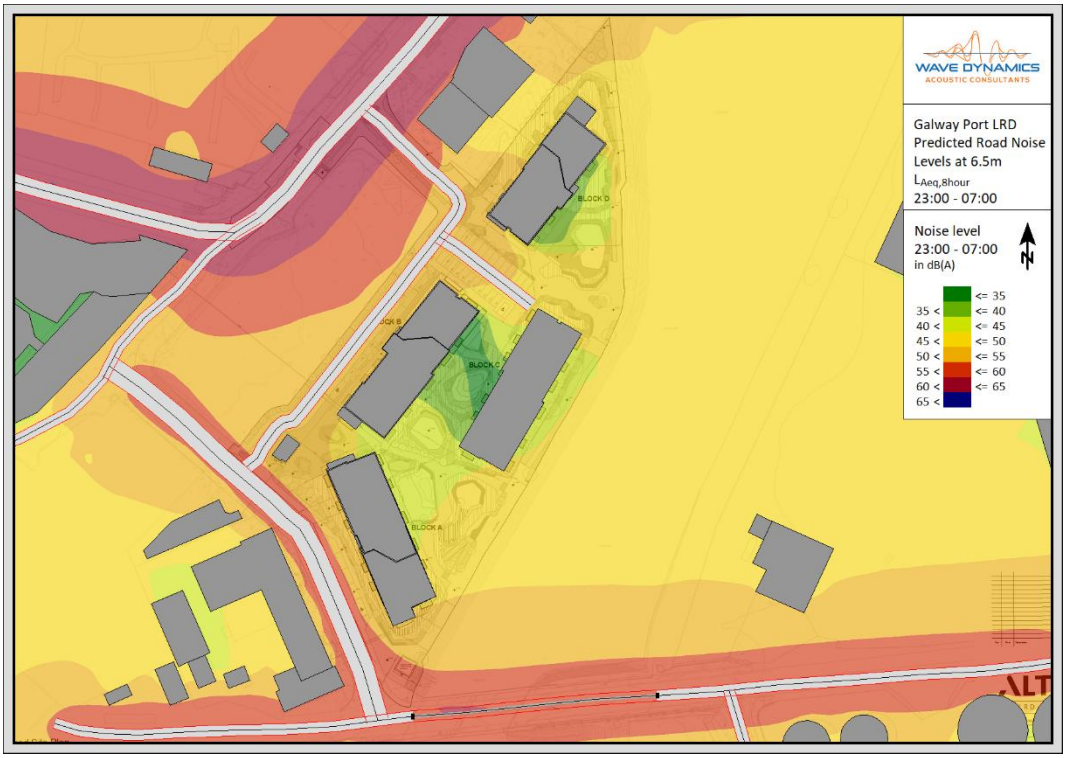


Figure 14: Predicted $L_{Aeq,8hour}$ (23:00Hrs – 07:00Hrs) at 6.5m Height for the Future Development.

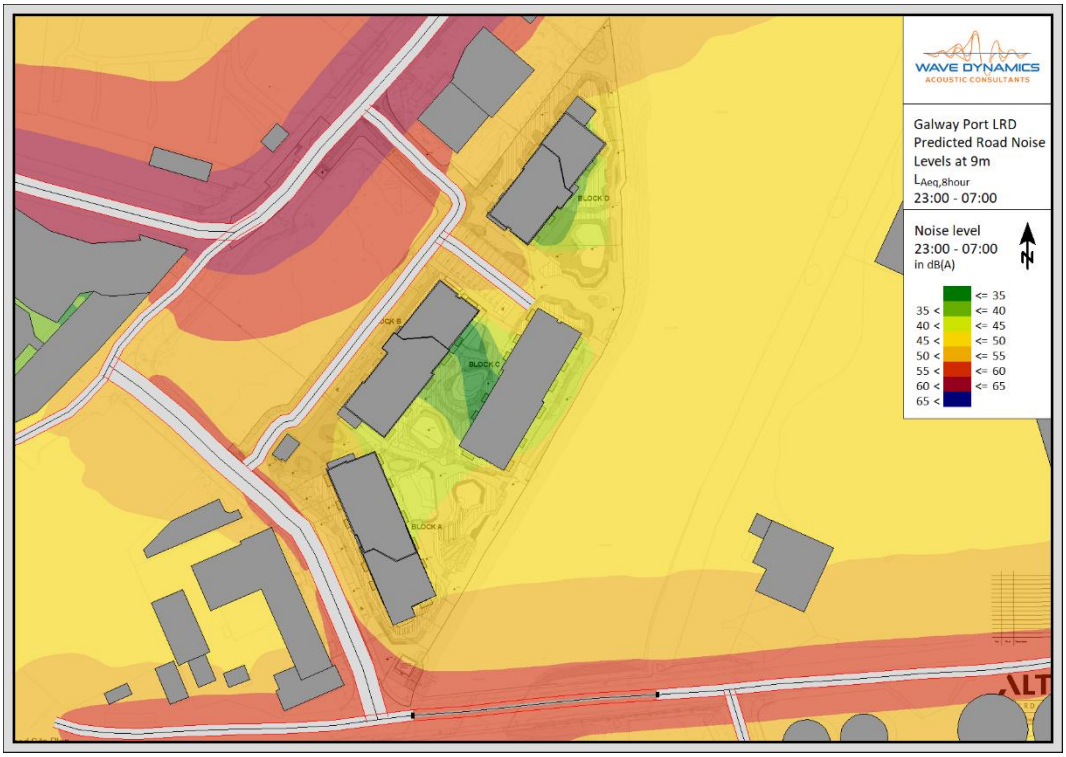


Figure 15: Predicted $L_{Aeq,8hour}$ (23:00Hrs – 07:00Hrs) at 9m Height for the Future Development.

5.2.3 Building Envelope Specification

This section outlines the building envelope requirements based on the measurements outlined in Section 3. 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 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.

Glazed Elements and Ventilation

The glazed elements and ventilation openings are typically the acoustically weakest elements of any façade. The required sound insulation performance of façade glazed elements and ventilation openings is outlined in Table 6 below.

It is required that the glazing, frame and seals as a whole achieve the performance when the window is in the closed position. The performance requirements outlined in Table 6 below are considered to provide adequate sound insulation to achieve the relevant day and night internal design goals respectively. A markup outlining the performance requirements for each façade are included in Appendix B. It is important to note that only the glazing to habitable rooms (bedrooms, living spaces, kitchens etc) is required to achieve the specifications outlined in Table 6 and marked up in Appendix B. Glazing to common space corridors is not required to achieve the below specifications.

Table 6: 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 Rw	
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz		
RED	28	28	29	38	38	34	35dB R_w	38dB $D_{n,e,w}$ (1) Natural Ventilation
BLUE	Standard Glazing						29dB Rw	Standard passive 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 7.

(3) Standard double glazing assumes a construction of two panes of 3mm glass with a 10mm cavity achieving a minimum 29dB R_W, equal or approved. Similarly, standard natural ventilation assumes a performance of 29dB $D_{n,e,w}$.

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.

We understand the ventilation strategy is proposed as a natural ventilation system. Based on the information provided to us on the ventilation system, it has been assumed that this system is a natural ventilation system with passive openings or trickle vents. Should the ventilation strategy change to mechanical ventilation strategy Wave Dynamics should be engaged to provide an appropriate mechanical ventilation sound insulation performance requirement. Typically, the use of a mechanical ventilation strategy will lead to a reduced glazing specification compared to a natural ventilation system. This assessment is based on the windows in closed position, and the vents in the open position.

The calculations for the glazing figures in Table 6 are based on the use of basic trickle vents. The performance value, and that used in the calcs is given in Table 7 below.

Table 7: Recommended Ventilation Specification.

Façade	Description	Octave Band Centre Frequency (Hz) Sound Reduction Index $D_{n,e}$ dB					
		125	250	500	1k	2k	4k
RED	Acoustically rated trickle vent / wall vent $D_{n,e,w}$ 38dB	37	33	34	36	46	44
BLUE	Standard trickle ventilator typically ≥ $D_{n,e,w}$ 29dB	33	28	28	29	27	28

External Wall Construction

The façade wall construction has been assumed to achieve a minimum sound insulation performance of 56dB 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 50dB R_W. Any skylights and glazing in the roof system to corridor or communal areas should be of standard double-glazed construction to meet a performance of minimum 29 dB R_w. There is currently no sky lights proposed to inhabitable

rooms, should the design change to include skylights to habitable bedrooms Wave Dynamics should be informed to provide specific guidance in each case.

5.3 Element 3- External Amenity Spaces

The external amenity spaces on the development include private amenity in the form of balconies and communal open spaces at ground level. Based on the assessment the balconies on the northeastern, western and southern elevations of Block A, the southwestern, western and northern elevations of Block B, and the southwestern, western and northwestern balconies on Block D are above the levels recommended in ProPG and BS 8233 (exceeding by 1-7dBA L_{eq}). However, appropriate amenity has been provided on the development for these residents with the communal open spaces at ground level in the centre of the development. These spaces are predicted to comply with the recommended external amenity noise criteria as outlined in ProPG and BS8233. Additionally, all other balconies are predicted to achieve the desirable external amenity noise levels without mitigation. This is in line with element 3(v) of ProPG which states:

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

"a relatively quiet, 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)".

Based on the measured noise levels at the site it is predicted that the external noise levels in both the communal open spaces and balconies aside from those marked up in Figure 16 will achieve the ProPG recommendations for desirable external amenity noise levels of 50-55dBA $L_{Aeq,16hour}$. Figure 17 below outlines the communal open space at ground floor level across the development.

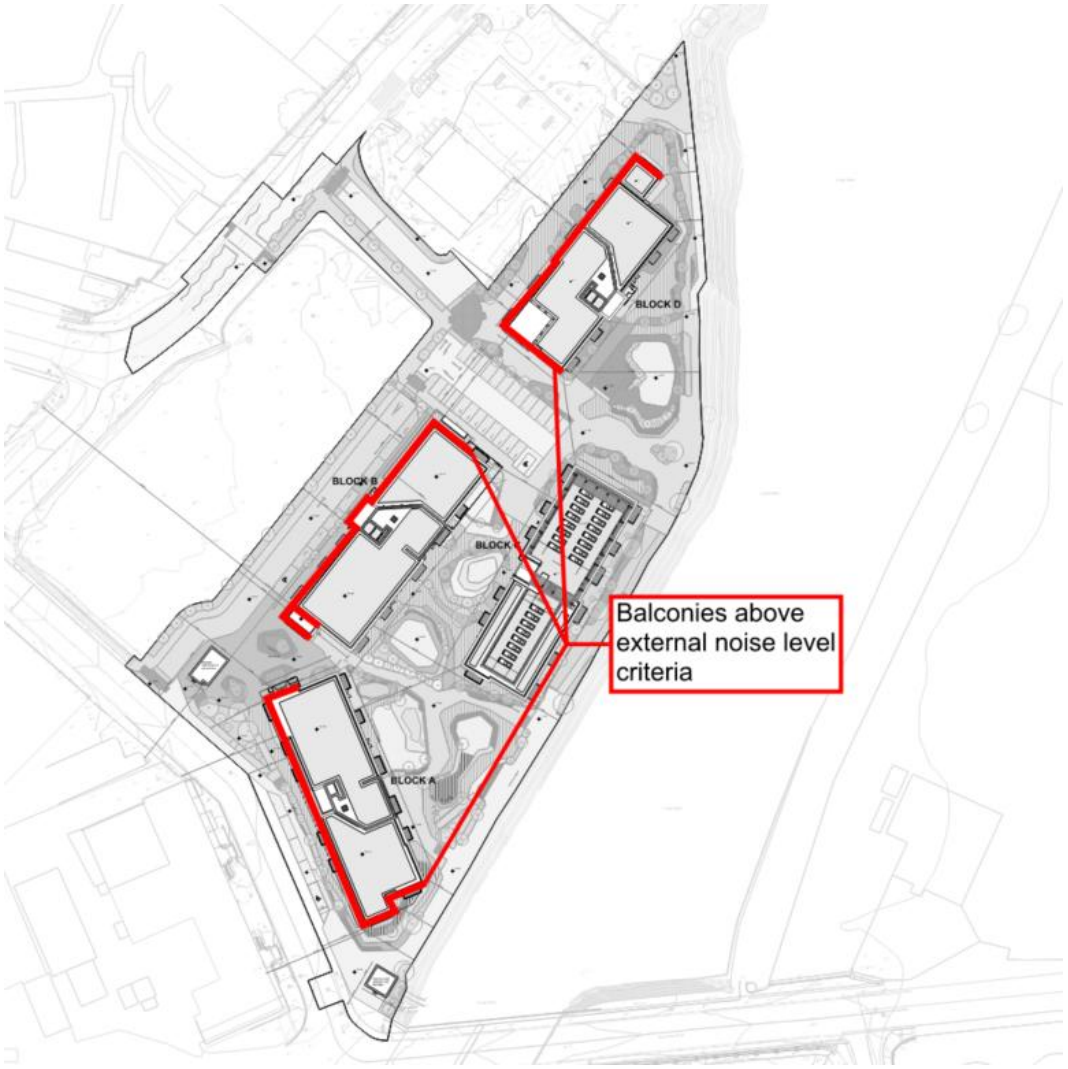


Figure 16: Balconies in Exceedance of External Noise Levels Criteria. (Ref: 24064.P101.4 Site Layout Plan)

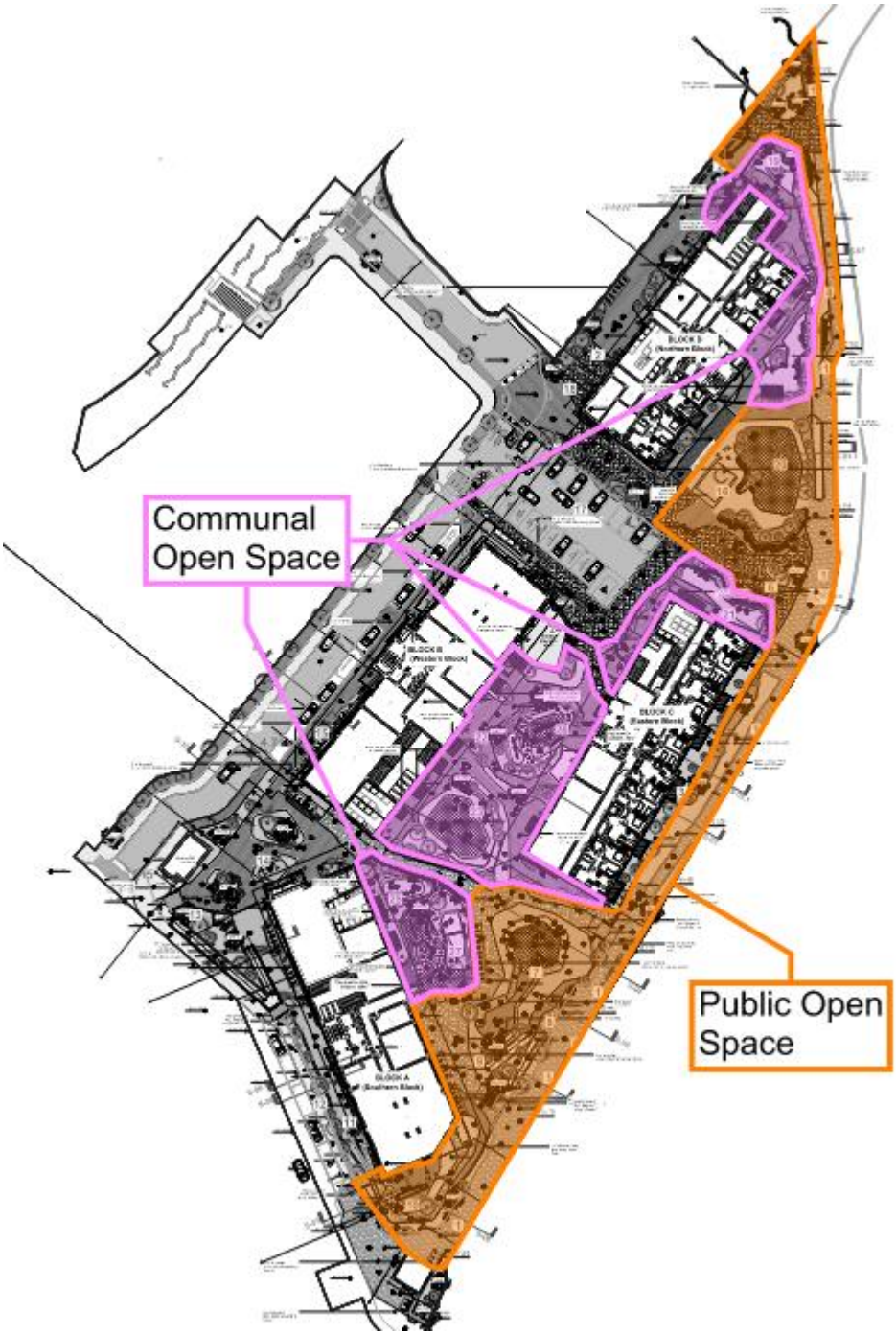


Figure 17: Communal and Public Open Space. (Ref: 24-612-SDA-PD-DR-GF-001)

5.4 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.

5.4.1 Compliance with Relevant National and Local Policy

There are no specific noise guidance or policy documents for residential developments. The Galway City Council Noise Action Plan refers to the ProPG as the relevant document for assessment of the noise impact on new residential developments as followed in this acoustic design statement.

5.4.2 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.

5.4.3 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.

5.4.4 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.

5.4.5 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.

5.5 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. The appropriate provision of external amenity space has been provided through the use of balconies and ground level communal open space and all public open spaces in line with the ProPG guidance.

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

6 Conclusion

Wave Dynamics were engaged by the Land Development Agency (LDA) as the acoustic consultants to undertake an Inward Noise Impact Assessment for the planning application for the proposed large-scale residential development at Galway Port, Lough Atalia Road, Galway.

The development consists of:

The Land Development Agency intends to apply to Galway City Council for permission for a 'Large-Scale Residential Development' (LRD) at a site of 1.621 Ha in Galway Port at Dock Road and Lough Atalia Road, Galway City, and extending to include parts of both roads for road infrastructure works and water services infrastructure works.

The proposed development principally consists of: the demolition of the existing office / bus depot building (370.2 sq m) and ancillary building (26.0 sq m); the partial demolition of the existing ESB sub-station and ancillary building (67.4 sq m); the demolition of existing boundary walls at the south-west and north-west; and the construction of a mixed-use development.

The proposed mixed-use development primarily comprises: 356 No. residential apartments (172 No. 1-bed, 169 No. 2-bed and 15 No. 3-bed); crèche (255.9 sq m); 2 No. café/restaurant units (totalling 428.4 sq m); and 1 No. retail unit (156.0 sq m).

The development has a total floor area of 32,096.0 sq m and is primarily proposed in 4 No. blocks (identified as A–D) that generally range in height from 6 No. to 13 No. storeys: Block A ranges from 6 No. to 9 No. storeys; Block B ranges from 6 No. to 11 No. storeys; Block C is 6 No. storeys; and Block D ranges from 6 No. to 13 No. storeys.

The proposed development also includes: new internal street and pedestrian network, including a one-way vehicular route at the north-western side of the site and new junctions with Dock Road at the south-west and with the access road from Lough Atalia at the north-west; upgrades to Lough Atalia Road and the access road from it at the north-west of the site, including the provision of a new toucan pedestrian/cycle crossing at Lough Atalia Road; upgrades to the footpath and road interface with Dock Road to the south-west; 37 No. car parking spaces; 1 No. set-down/delivery bay; 741 No. cycle parking spaces; hard and soft landscaping, including as public open spaces and communal amenity spaces; private amenity spaces as balconies and terraces facing all directions; boundary treatments; public lighting; bin stores; double sub-station; plant rooms; green roofs; rooftop lift overruns and plant; rooftop telecommunications, plant and enclosure at Block C; recladding of the existing sub-station and pumping station; and all associated works above and below ground.

Noise Impact Assessment

A Stage 1 and Stage 2 ProPG assessment have been undertaken. As part of the stage one assessment to categorise the site, a baseline noise survey was undertaken to measure the existing noise levels. Following a review of the noise levels on the site, including the L_{AFmax} and $L_{Aeq,}$ the site has been characterised as low to medium risk for day and night for the across the site therefore, mitigation measures are recommended to control the onset noise levels, this is in the form of glazing performance specification.

Internal Noise Levels

Following the baseline survey, a noise impact assessment was undertaken, this 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. The noise measurements were taken during peak traffic conditions. 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.

External Amenity Noise Levels

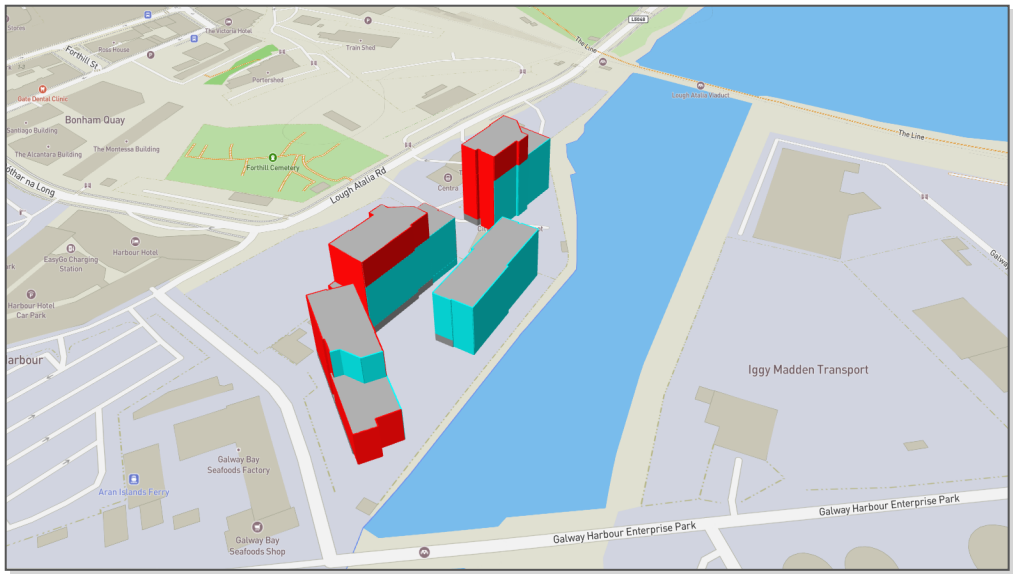
The external amenity spaces on the development includes balconies and communal open space at ground level in the centre of the development surrounded by the apartment blocks. Appropriate amenity has been provided on the development for residents using a combination of the balconies on suitable facades and the communal amenity spaces. This is in line with element 3(v) of ProPG.

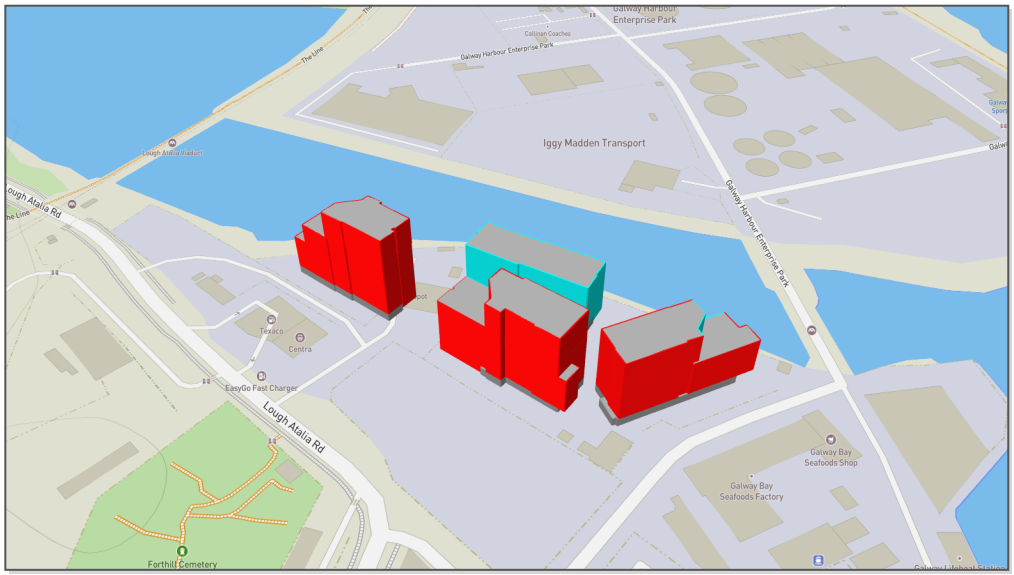
Based on the recommendations in this report it is predicted that the internal and external noise levels will achieve the targeted noise levels in line with BS 82233:2014 and ProPG 2017 guidance.

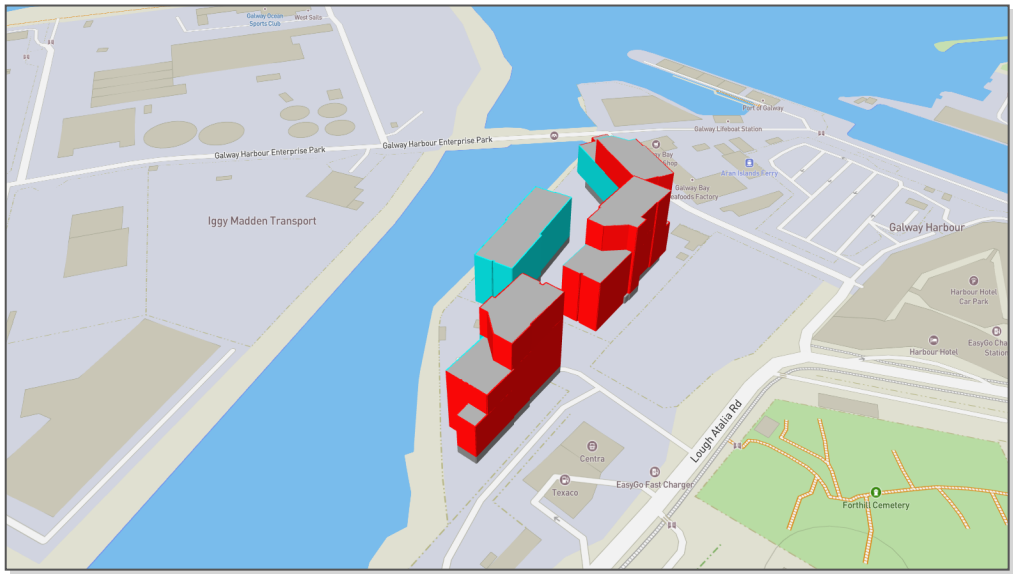
Appendix A- Glossary of Terms

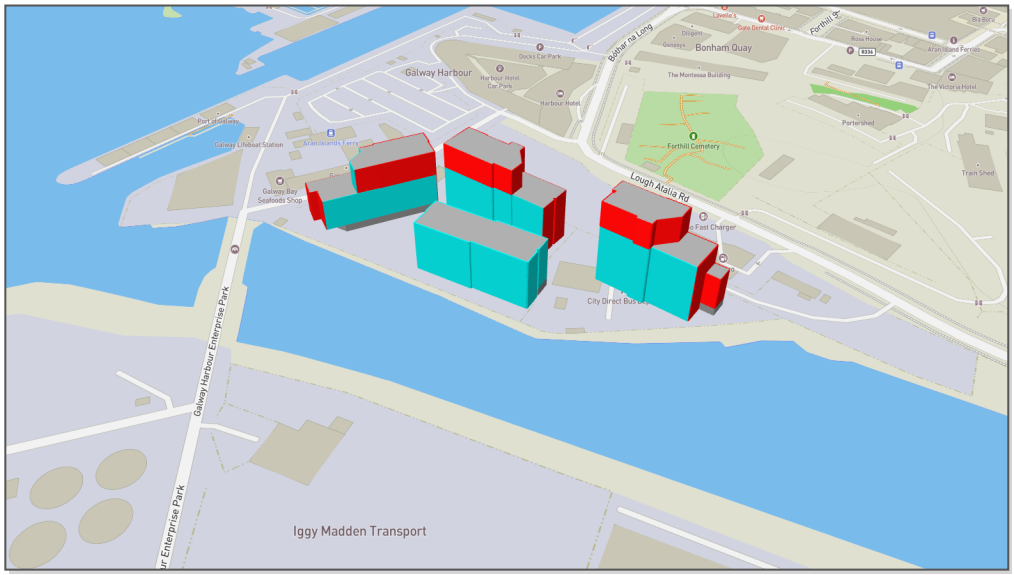
Ambient Noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from all the noise sources in the area.
Background Noise	The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the 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
L_{den}	day-evening-night noise level, the A-weighted, Leq (equivalent noise level) over a whole day, but with a penalty of 10 dB(A) for night-time noise (23:00-07:00) and 5 dB(A) for evening noise (19:00-23:00), also known as the day evening night noise indicator

Appendix B- Façade Mark Ups









Glazed Element Specification

- Rw 35
- Standard Double Glazing

Natural Ventilation Specification

- 38 Dn,e,w
- 29 Dn,e,w Standard Trickle Ventilator

WAVE DYNAMICS
ACOUSTIC CONSULTANTS
DUBLIN WEXFORD CORK LONDON

Project: Galway Port LRD
Title: Glazed Element Specification
Author: Cathal Reck
Reviewer: Sean Rocks
Date: 2025-08-26