WAVE DYNAMICS
ACOUSTIC CONSULTANTS

Glenamuck North – Southern Site

Acoustic Design Statement
27 November 2025

WDA250802RP_A_01

www.wdacoustics.com

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Executive Summary

Wave Dynamics were engaged by Durkan Glenamuck Developments Limited as the acoustic consultants to undertake an inward noise impact and external amenity noise assessment, a construction noise and vibration assessment and operational noise assessment for the planning application for the proposed new large-scale residential development (LRD) on lands in Glenamuck North, Kilternan, Co. Dublin.

"Durkan Glenamuck Developments Limited intend to apply for permission for a Large-Scale Residential Development on a site measuring c. 3.27 Ha in the townland of Glenamuck North in Kilternan, Dublin 18. The site is generally bounded by: the recently constructed Glenamuck District Distributor Road to the north (to be known as the Kilternan Road); the under construction Glenamuck Link Distributor Road to the east (to be known as the Kilternan–Glenamuck Link Road); Glenamuck Manor and a residential dwelling (known as 'Westgate'), its associated outbuildings and wider land holding to the south; and a residential dwelling (known as 'Shaldon Grange') and its wider landholding located to the west.

Road works are proposed to the approved Glenamuck District Roads Scheme (ABP Ref. HA06D.303945) to provide access to the development from the Kilternan Road. The Kilternan Road access point will include works, inclusive of any necessary tie-ins, to the footpath and cycle track to create a side road access junction incorporating the provision of uncontrolled pedestrian and cyclist crossing across the side road junction on a raised table. A surface water outfall pipe (225 mm) is also proposed to pass through land to the north of the site, including the future Kilternan Road. The total site area including the development site, road works and infrastructure works measures c. 3.32 Ha.

The development will principally consist of the construction of 135 No. residential units, comprising 65 No. houses (9 No. 2-bed units, 46 No. 3-bed units and 10 No. 4-bed units) and 70 No. duplex units (21 No. 1-bed units, 22 No. 2-bed units and 27 No. 3-bed units). The proposed development will principally range in height from 2 No. to 4 No. storeys.

The development also provides: car parking spaces; bicycle parking; bin storage; ancillary storage; private balconies, terraces and gardens; hard and soft landscaping; boundary treatments; lighting; substations; and all other associated site works above and below ground."

Inward 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 risk for both day and nighttime noise based on the existing noise levels. Consideration has been given to the Glenamuck District Distributor Road (GDDR) to the north, and the Glenamuck Link Distributor Road (GLDR) which is currently under construction (permitted under ABP reference 303945).

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 and took into consideration the traffic flow data provided by DBFL Consulting Engineers, found in Chapter 9 of the EIAR report by AWN Consulting (ABP reference 303945) for the 'Do Something 2035' scenario for the Glenamuck District Distributor Road (GDDR) and Glenamuck Link Distributor Road (GLDR). Consideration has also been given to the future growth of the surrounding roads. Following the assessment, the building envelope performance requirements were determined. The performance specification for the building envelope has been provided in this report which includes the external walls, glazing, roof and ventilation requirements.

External Amenity Noise Levels

The external amenity spaces on the development includes rear gardens to houses, public and communal outdoor space across the development and private amenity in the form of terraces and balconies for the Duplexes.

Appropriate amenity has been provided on the development for residents using the both the public and communal outdoor spaces. This is in line with element 3(v) of ProPG.

Based on the measured noise levels at the site it is predicted that the internal and external noise levels will achieve the targeted noise levels in line with BS 8233:2014 and Propg 2017 guidance.

Construction Noise Impact

The construction noise impact is predicted to achieve the BS 5228 requirements **without any mitigation** measures for any stages of the project except for NSL4 and NSL5 during the substructure stage. Recommendations have been outlined in this report to further reduce the noise impact from construction.

In addition to the recommendations, guidance has been provided in this report for consideration to construction noise monitoring during the construction period to manage noise levels to manage construction noise.

Operational Noise

An operational noise impact assessment has been conducted to assess noise generated from the public and communal open spaces, and the outdoor play area. It is predicted that operational noise from the proposed development will not cause a negative noise impact on the nearby noise sensitive locations during both daytime and nighttime operations The mechanical plant and equipment specification is not available at this stage of the project. Specific noise limits have been provided in this report for mechanical plant and equipment, at design development stage once the plant and equipment information are available it should be assessed for compliance with the criteria outlined in this report.

Table of Contents

1 Introduction

Wave Dynamics were engaged by Durkan Glenamuck Developments Limited as the acoustic consultants to undertake an Acoustic Design Statement including an inward noise impact and external amenity noise assessment, a construction noise and vibration assessment and operational noise assessment for the planning application for the proposed new large-scale residential development (LRD) at Glenamuck North, Kilternan, Co. Dublin.

"Durkan Glenamuck Developments Limited intend to apply for permission for a Large-Scale Residential Development on a site measuring c. 3.27 Ha in the townland of Glenamuck North in Kilternan, Dublin 18. The site is generally bounded by: the recently constructed Glenamuck District Distributor Road to the north (to be known as the Kilternan Road); the under construction Glenamuck Link Distributor Road to the east (to be known as the Kilternan–Glenamuck Link Road); Glenamuck Manor and a residential dwelling (known as 'Westgate'), its associated outbuildings and wider land holding to the south; and a residential dwelling (known as 'Shaldon Grange') and its wider landholding located to the west.

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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 Saoirse Mulvaney | Acoustic Consultant. Saoirse holds a BSc (Hons) in Physics with Astronomy from Dublin City University and has conducted numerous similar planning stage noise impact assessments.

The peer review was completed by Sean Rocks, Director | Senior Consultant, Sean has experience of numerous planning stage 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 at Glenamuck North, Kilternan, Co. Dublin. There are residential areas to the east, west and south of the site. The site is located adjacent to the Glenamuck District Distributor Road (to be known as the Kilternan Road), the Glenamuck Link Distributor Road to the east (to be known as the Kilternan-Glenamuck Link Road), with the R842 located to the south of the site.

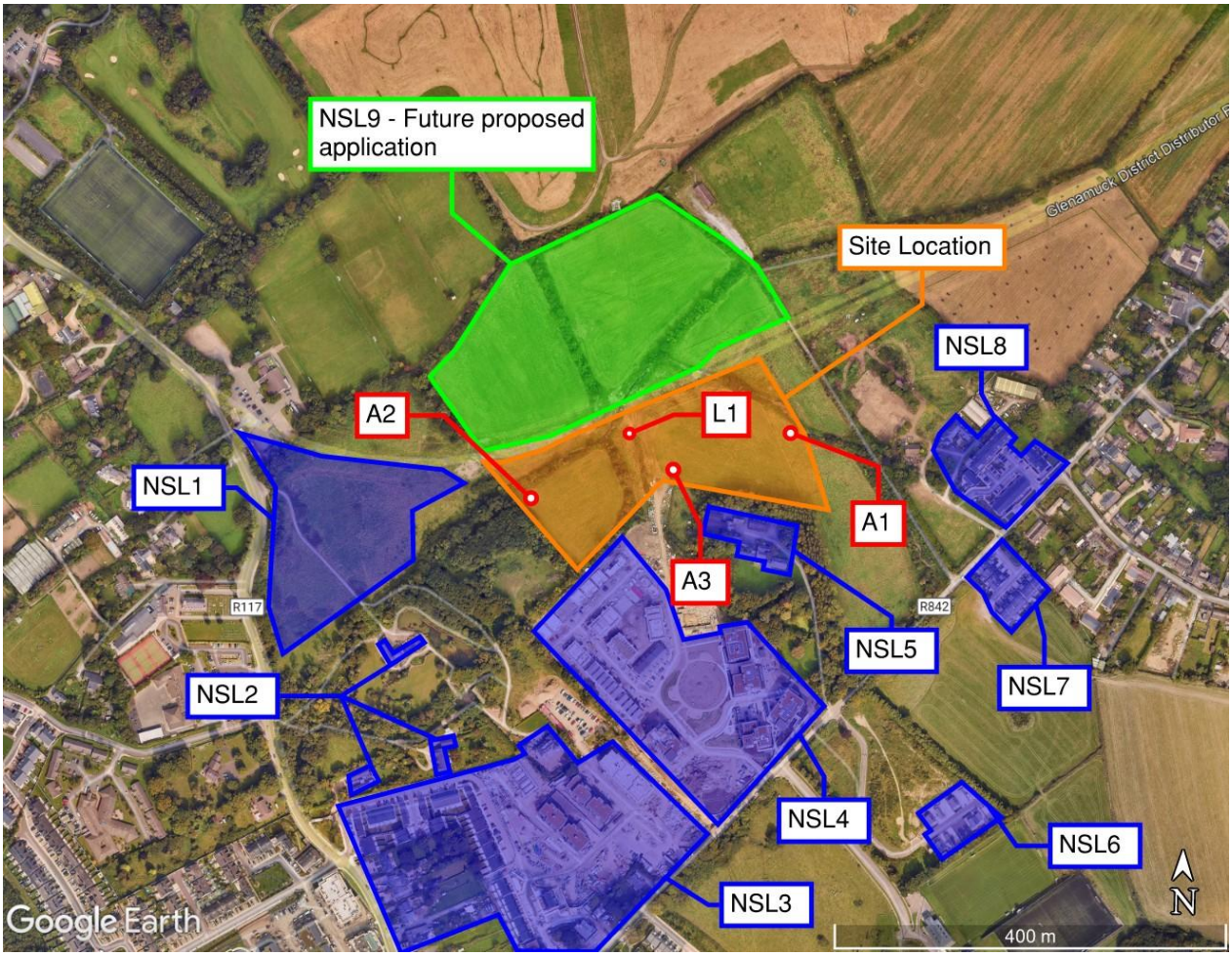


Figure 1: Site location, measurement locations A1-A3 and L1, noise sensitive locations NSL1-NSL9 and the surrounding area.

Figure 2 outlines the Glenamuck Link Distributor Road (to be known as the Kilternan-Glenamuck Link Road) in relation to the layout of the site.

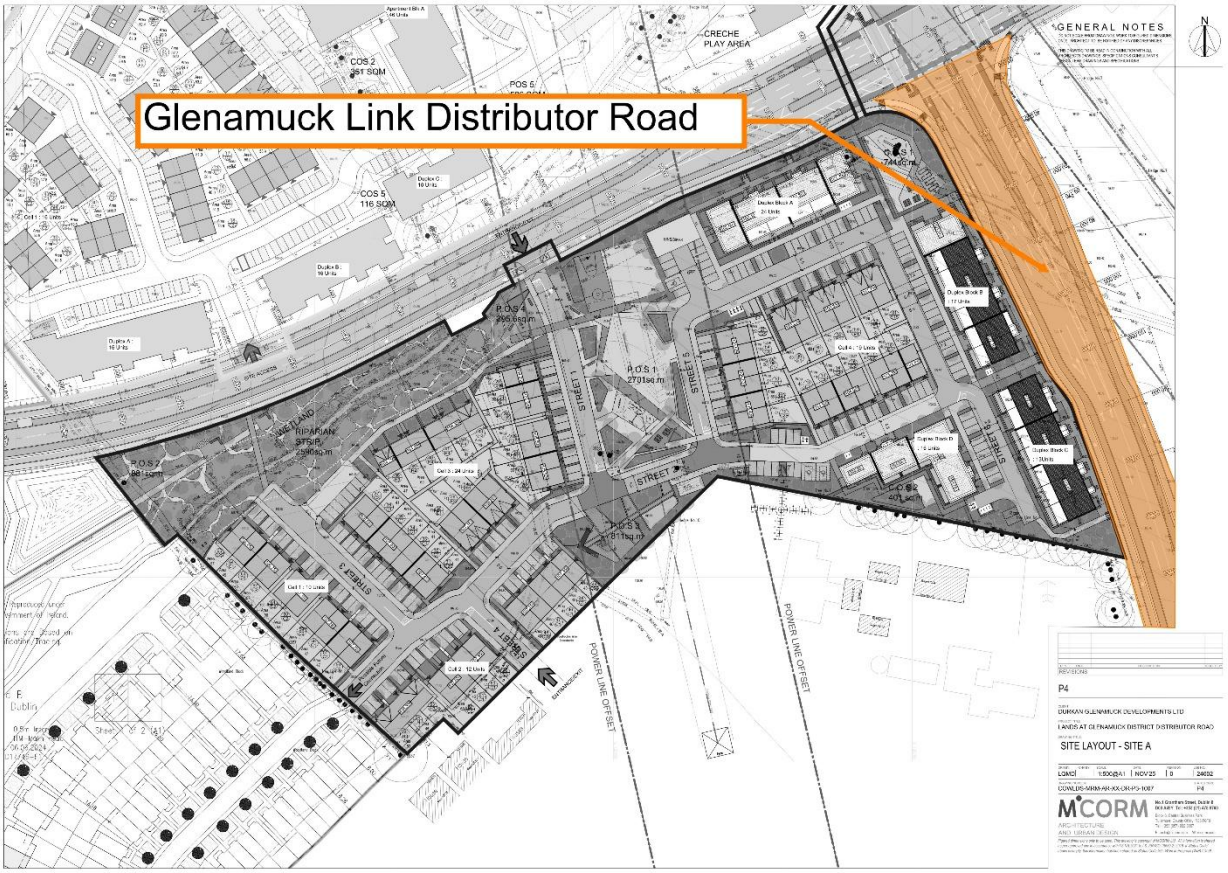


Figure 2: Glenamuck Link Distributor Road Layout.

3 Project Criteria

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

- Internal noise levels,
- External amenity noise levels.
- Construction noise and vibration, and
- Operational noise.

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

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

Assessment Standards

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

- ✓ BS 8233:2014 Guidance on sound insulation and noise reduction for buildings.
- ✓ Dublin Agglomeration Noise Action Plan 2024 - 2028
- ✓ ProPG Professional Practice Guidance on Planning & Noise.
- ✓ BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings.
- ✓ BS 5228-1:2009 A1:2014 Noise and Vibration Control of Open Sites (Noise).
- ✓ BS 5228-2:2009 A1:2014 Noise and Vibration Control of Open Sites (Vibration).
- ✓ BS 4142 2014 A1:2019: Methods for rating and assessing industrial and commercial sound.
- ✓ EPA NG4: Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities.
- ✓ ISO 1996-1:2016 Acoustics — Description, measurement, and assessment of environmental noise — Part 1: Basic quantities and assessment procedures
- ✓ Previous experience on similar projects.

3.1 Inward Noise Impact Assessment Criteria

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

Dublin Agglomeration Noise Action Plan 2024 - 2028

The Dublin Agglomeration Noise Action Plan 2024 – 2028 states the following with respect to the prevention of excessive noise levels for proposed new developments:

> *"Applications for new residential developments in the Agglomeration will be assessed in accordance with the policies and goals outlined in the relevant City and County Development Plans. Where applicable, these include adoption of the principles of Professional Planning Guidance (ProPG) on Planning & Noise: New Residential Development, as described in Section 7.5.1.*
>
> *Where the assessment outcome determines the likelihood of an adverse noise impact, planning applications should be supplemented by an Acoustic Design Statement carried out by appropriately qualified acousticians and competent persons."*

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 3 on the next page illustrates the ProPG approach.

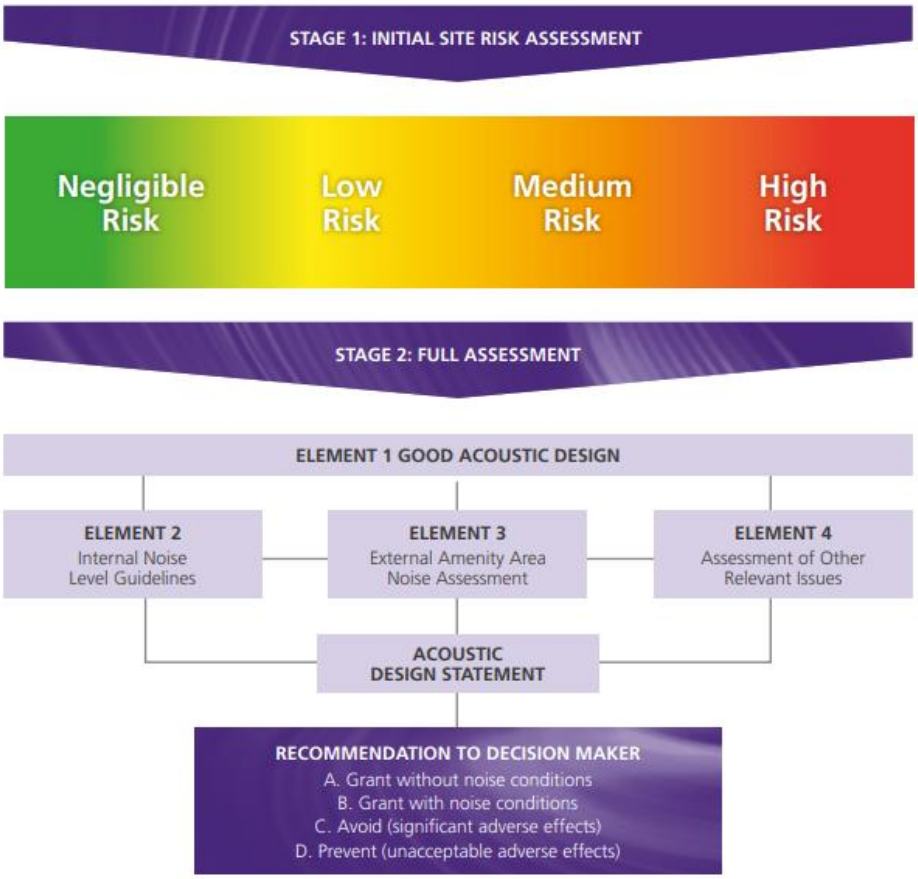


Figure 3: Summary of overall ProPG approach

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	40 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, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations."*

BS 8233:2014 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.

3.2 Construction Noise Assessment Criteria

There is currently no statutory Irish guidance for construction noise requirements from noise during the construction phase of a project.

In the absence of specific noise limits, the appropriate criteria for the allowable construction noise levels may be found in British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise.

The standard (BS5228-1:2009+A1) provides examples of acceptable limits for construction and/or demolition noise in both subjective and objective form. For example, paragraph E.2 of the standard states:

> *"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut."*

Paragraph E.2 goes on to state:

> *"Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:*

- *70 decibels (dBA) in rural, suburban areas away from main road traffic and industrial noise;*
- *75 decibels (dBA) in urban areas near main roads in heavy industrial areas".*

Typically, the local councils refer to BS 5228 Part 1 as a method to control construction noise from sites on the local environment. This standard is therefore the de facto appropriate standard in the absence of regulatory guidance.

Based on paragraph E.2 of BS 5228 the following criteria is adopted for this project:

- For residential properties it is considered appropriate to adopt the 70dB(A) criterion for
- non-residential locations it is considered appropriate to adopt the higher category values of 75dB(A) during the day. These will only be assessed as noise sensitive during office hours.

Table 2 below outlines the project criteria in tabular form.

Table 2: BS 5228 threshold levels.

Assessment category and threshold value period	**Threshold value, in decibels (dB) (L_{Aeq})**		
	Category A[1]	**Category B [2]**	**Category C[3]**
Daytime (07:00 – 19:00) and Saturdays (07:00 – 14:00)	65	70	75
Evenings and weekends [4]	55	60	65
Night-time (23:00 to 07:00hrs)	45	50	55

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

3.3 Construction Vibration Criteria

Best practice guidance is taken from British Standard BS 5228:2009 + A1 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 2 Vibration.

The standard recommends that for a soundly constructed residential property and similar structures (in good repair), the threshold for minor or cosmetic (i.e. non- structural) damage should be taken as a Peak Particle Velocity (PPV) (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above. Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:

Table 3: Likely Construction Noise Impact

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:			
Building Type	**Less than 15Hz**	**15 to 40Hz**	**40Hz and above**
Light framed structures/ residential buildings	15 mm/s	20 mm/s	50 mm/s

3.4 Operational Noise Criteria

Local authorities can set noise limits from typical residential developments pertaining to noise however there is currently no national policy for operational noise limits from residential developments for planning noise assessments. Noise limits for new developments are typically sought from local council's noise action plan, EPA NG4 or BS4142. On review of the Dublin Agglomeration Noise Action Plan no specific guidance has been outlined for noise limits from residential premises and therefore the criteria from EPA NG4 and BS4142 has been adopted for the project.

BS 4142:2014+A1:2019

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

It considers the likelihood of complaints by considering the margin by which the noise in source the background noise level.

BS 4142 states that and exceedance of the noise source of the background noise by:

- +10 dB or more indicates that complaints are likely,
- + 5 dB is of marginal significance, and;
- The rating level is more than 10 dB below the measured background noise level, then this is a positive indication that complaints are unlikely.

BS4142 outlines guidance for penalty corrections to be applied to the noise sources in question should the noise source have one of the following characteristics:

- The noise contains a distinguishable, discreet, continuous tone (whine, or hum);
- The noise contains distinct impulses (i.e. bangs),
- The noise is intermittent or:
- The noise is irregular.

EPA NG4

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

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

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

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

4 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 4 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.

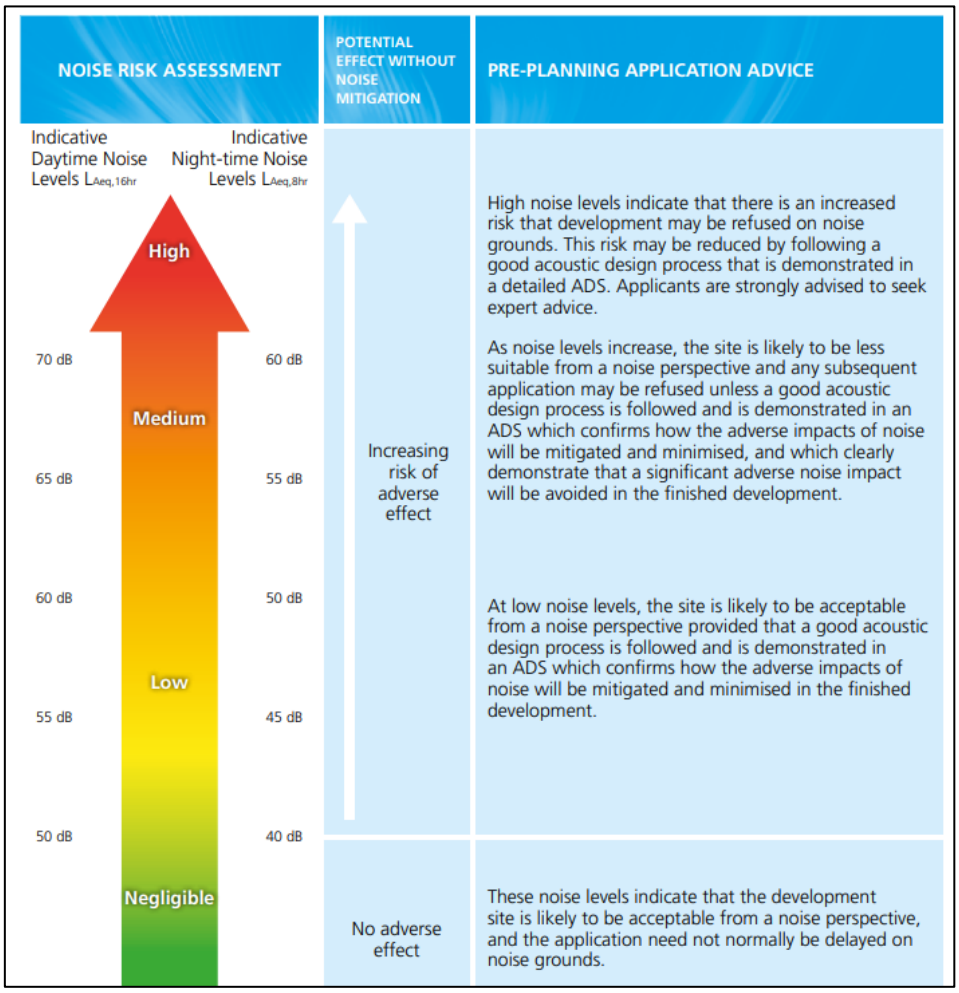


Figure 4: ProPG Risk Analysis

4.1 Baseline Noise Survey

An attended noise survey was conducted to quantify the existing noise environment and current noise levels experienced at Glenamuck North and the surrounding existing residential areas. 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 at Glenamuck North, Kilternan, Co. Dublin. There are residential areas to the east, west and south of the site. The site is located adjacent to the Glenamuck District Distributor Road (to be known as the Kilternan Road), the Glenamuck Link Distributor Road to the east (to be known as the Kilternan-Glenamuck Link Road), with the R842 located to the south of the site.

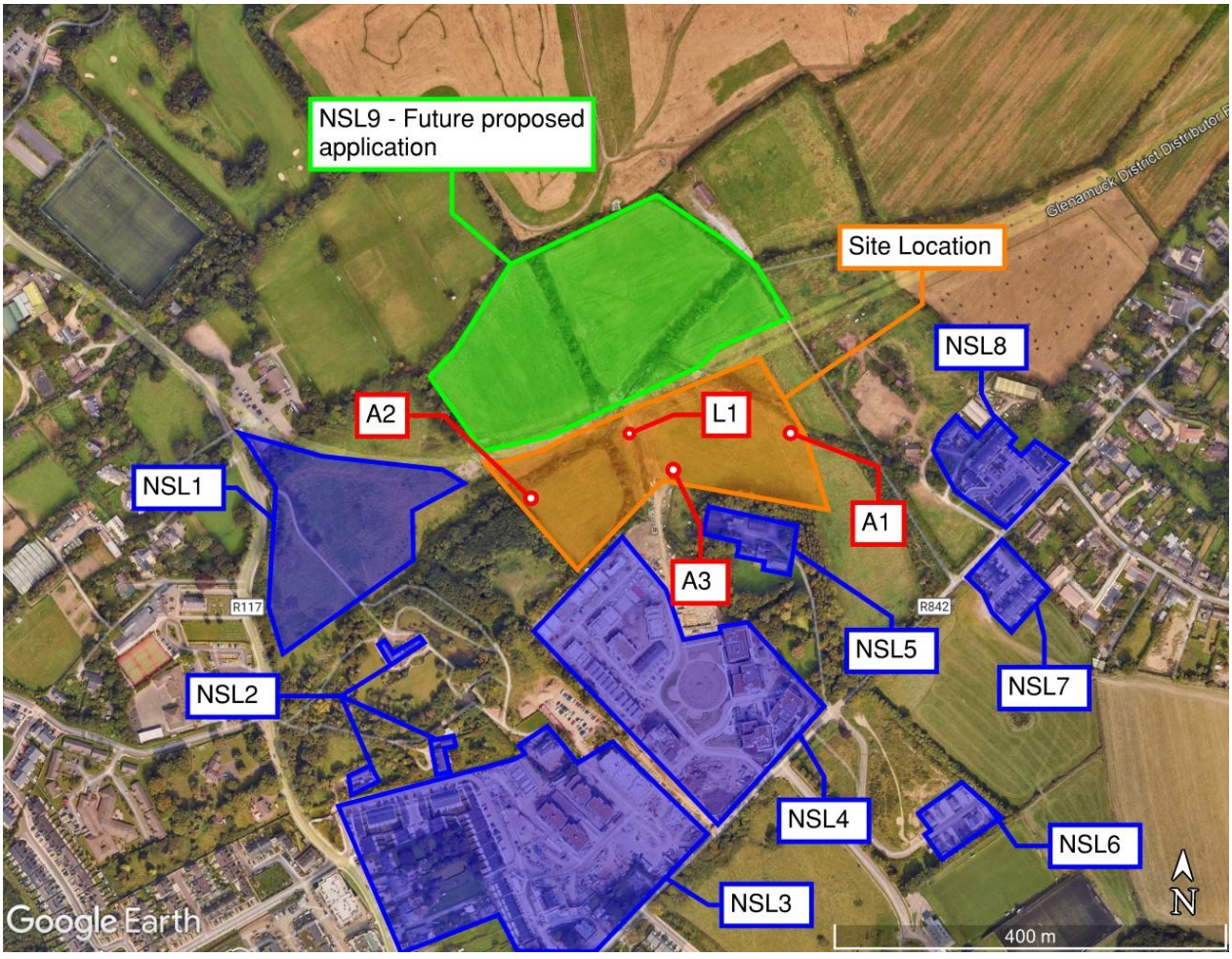


Figure 5: Site location, measurement locations A1-A3 and L1, noise sensitive locations and the surrounding area.

4.1.2 Survey Methodology and Personnel

The attended survey was completed by Stephen McDonagh (Acoustic Consultant) and Paraic Hayden (Field Engineer) on the 2nd of September 2025, 5th of September 2025 and the 9th of September 2025.

Attended Noise Measurements

Noise measurements were undertaken in general accordance with ISO 1996-1:2016 using ISO Class 1 sound analysers. Attended measurements were taken at A1-A3 as seen in Figure 5. Care was taken to avoid any effect on the measurement of extraneous noise, acoustic vibration, or interference. During the attended noise measurements, the sound level meter was positioned at approximately 1.5m above the ground level. The weather conditions were calm (wind less than 5m/s) with no rain, a wind shield was used for the duration of the attended surveys. The noise logger was calibrated before and after the survey and no significant drift was noted.

Figure 6: Attended Measurement set up.

Unattended Noise Measurements

An unattended noise logger was deployed in location L1. The monitor was deployed on the 5th of September 2025 at 15:30hrs and collected on 9th of September 2025 at 11:45hrs. The logger was positioned approximately 3m 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 7: Unattended measurement set up.

4.1.3 Survey Period

The unattended noise measurements were undertaken between the 5th of September 2025 at 15:30hrs to the 9th of September 2025 at 11:45hrs.

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 4 below summarises the measurement equipment used.

Table 4: Noise Measurement Equipment

Description	WD Asset Number	Model	Serial No.	Calibration Certificate No.	Calibration Due Date
Calibrator	CAL3	Nor 1251	32096	AC250308	22/07/2026
Sound Level Meter	SLM2	Nor 140	1406532	UCRT25/2495	20/10/2027

4.1.5 Subjective Noise Environment

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

- Road noise from surrounding roads,
- Distant construction 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 and unattended noise measurements.

Attended Measurement Results

Table 5 outlines the results of the attended measurement survey.

Table 5: Attended Noise Measurement Results

Measurement				Measured Noise Levels		
Location	Date	Time (hrs)	Duration (mins)	L_{Aeq} dB	L_{AFmax} dB	L_{A90} dB
A3	02/09/2025	14:03	15:00	49	58	46
A1	02/09/2025	14:19	15:00	46	58	43
A3	05/09/2025	13:00	15:00	48	68	44
A2	05/09/2025	13:20	15:00	52	69	45
A2	05/09/2025	13:35	15:00	51	70	46
A1	05/09/2025	13:57	15:00	48	60	44
A1	05/09/2025	14:12	15:00	54	73	46
A3	05/09/2025	14:31	15:00	49	60	44
L1	05/09/2025	15:10	15:00	58	66	52
L1	09/09/2025	11:31	15:00	59	73	52

Unattended Monitoring Results

Table 6 outlines the results of noise measurements at the unattended monitoring location L1.

Table 6: Unattended Measurement Results at Location L1

Start Date	$L_{Aeq,16hour}$ (07:00 – 23:00) dB	L_{night} ($L_{Aeq,8hour}$ 23:00 – 07:00) dB[1]	L_{den} (00:00 - 00:00) dB	10th highest night-time[1] L_{AFmax} dB	L_{A90} (23:00 - 07:00) dB[1,2]	L_{A90} (07:00 – 23:00) dB[2]
05/09/2025	56(3)	48	58(3)	63	38	45
06/09/2025	56	48	58	65	39	48
07/09/2025	57	46	58	N/A	38	47
08/09/2025	57(3)	N/A	N/A	N/A	39	48
09/09/2025	59(3)	N/A	N/A	N/A	N/A	52

(1) 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.

(2) Arithmetic average of L_{AF90}.

(3) Shortened measurement duration.

4.2.1 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 8 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 less than 20 occurrences exceeding 80dB L_{AFmax}.

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

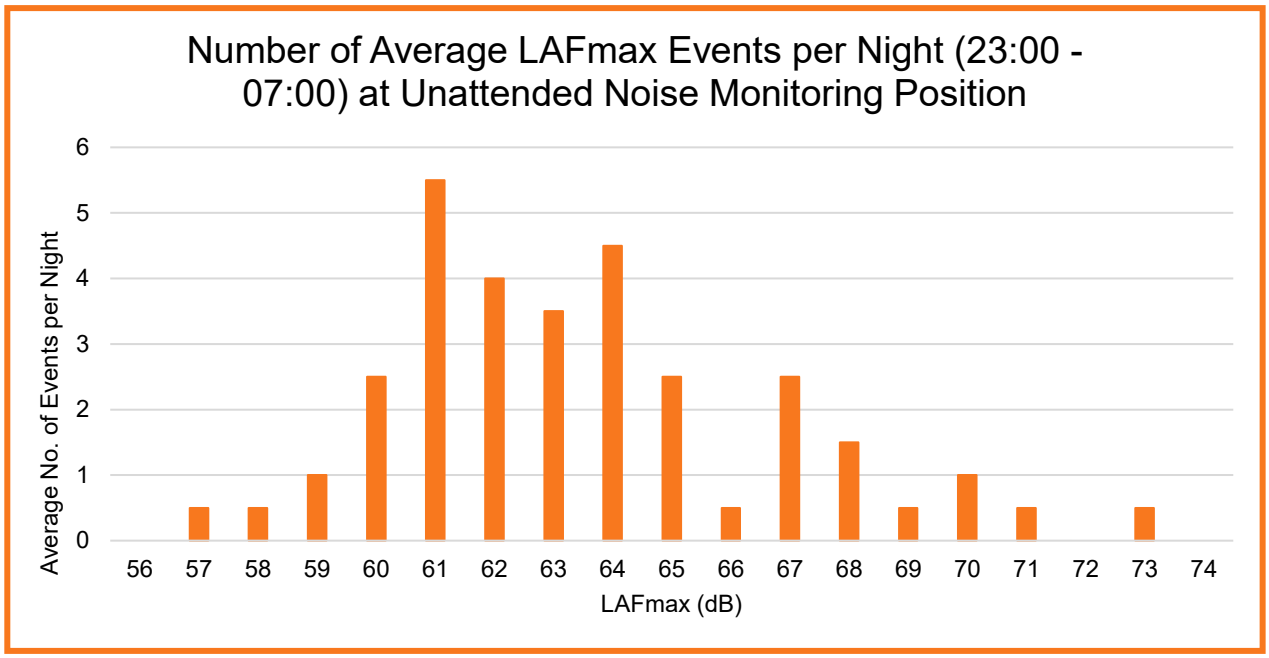


Figure 8: Average recorded L_{AFmax} events per night based on 15min measurement intervals.

Discussion of Measurement Results

The baseline noise monitoring survey consists of both weekday and weekend noise data. Measurements were obtained at various locations throughout the proposed development site to establish the existing noise conditions within the boundary of the site. The ambient noise consisted of traffic noise from local roads in the surrounding area.

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

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

4.4 Future Noise Levels

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

Permitted GLDR & GDDR Roads

An Bord Pleanála (ABP) have approved planning permission for the Glenamuck District Distributor Road (GDDR) and the Glenamuck Link Distributor Road (GLDR) (ABP reference 303945) which are located to the north and east of the proposed development, respectively. The GDDR is now operational, having opened on the 19th of June 2025, while the GLDR is currently under construction. The assessment has considered the proposed road infrastructure using AADT traffic volumes and the proposed speed limits, as outlined in Chapters 7 and 9 of the planning stage EIAR, based on the 'Do Something 2035' scenario. This includes for future traffic growth as the predictions are based on the future scenario year 2035.

4.5 ProPG Stage 1 – Initial Risk Assessment

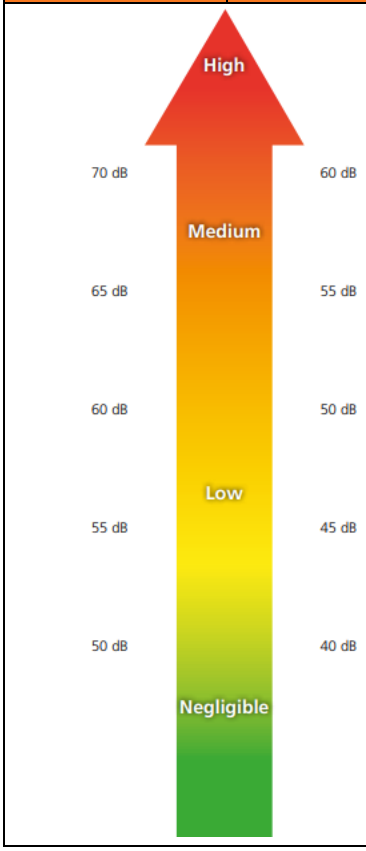
The measured noise levels on the site have been predicted for the existing road traffic noise to assess the probability of an adverse impact.

Table 7 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 risk for the existing noise levels at the site. Consideration has been given to the operational GDDR, but the GLDR is under construction and not yet fully constructed, the likelihood for noise risk at the site is higher than the existing noise levels at the site and therefore mitigation measures will be required to mitigate the noise risk in line with ProPG guidance and good acoustic design process. The glazing and ventilation element specifications to achieve required internal noise levels are outlined in Section 5.2.3.

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 7: 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.	N/A.
		Low Risk	**Low Risk**
		The majority of the site is at low risk. Good Acoustic design should be demonstrated.	The majority of the site is at low risk. Good Acoustic design should be demonstrated.
		Negligible Risk	**Negligible Risk**
		N/A.	N/A.

4.6 Consideration of EPA Noise Maps

In addition to the attended and unattended noise surveys conducted on the site, consideration was also given to the predicted noise levels at the site as per the EPA Noise Maps. It should be noted that the EPA maps specifically state the following in relation to the use of these contours for site specific assessments and therefore the measured noise levels provide a better understanding into the noise climate at the site:

> *"The strategic noise maps should not be relied upon in the context of planning applications for noise sensitive developments in the vicinity of the mapped sources".*

While some surrounding roads are included in the EPA noise maps, the maps have not yet been updated to include the GDDR and GLDR. This is shown in Figure 9 below where the site is not placed within a predicted noise contour as the EPA maps considers noise from the M50 motorway and other local road networks.

The EPA L_{den} predicted noise maps place the site outside the traffic noise level contour as shown in Figure 9. In reality the measured noise levels at the most exposed boundary of the site were measured to be in the 55-60 dB L_{den} range as shown in Table 6.

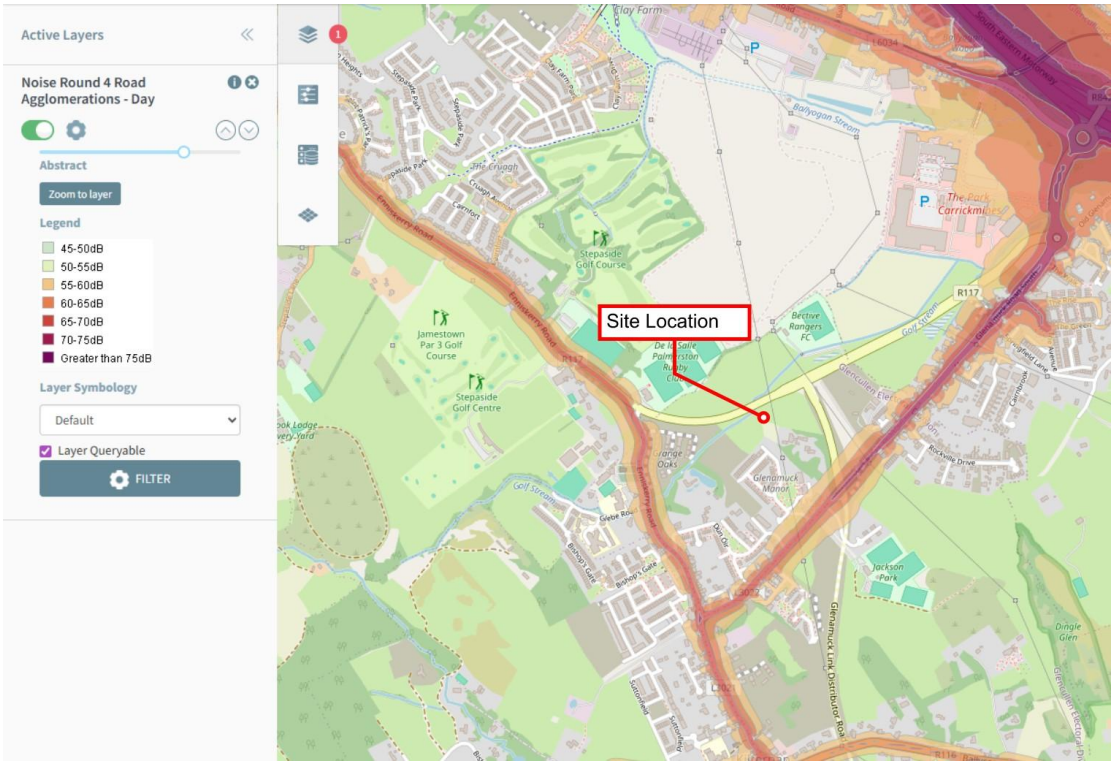


Figure 9: EPA predicted Lden road traffic noise levels at the proposed site

The EPA L_{night} predicted noise maps place the site outside the traffic noise level contour as shown in Figure 10. In reality the measured noise levels at the most exposed boundary of the site were measured to be in the 45-50dB L_{night} range as shown in Table 6.

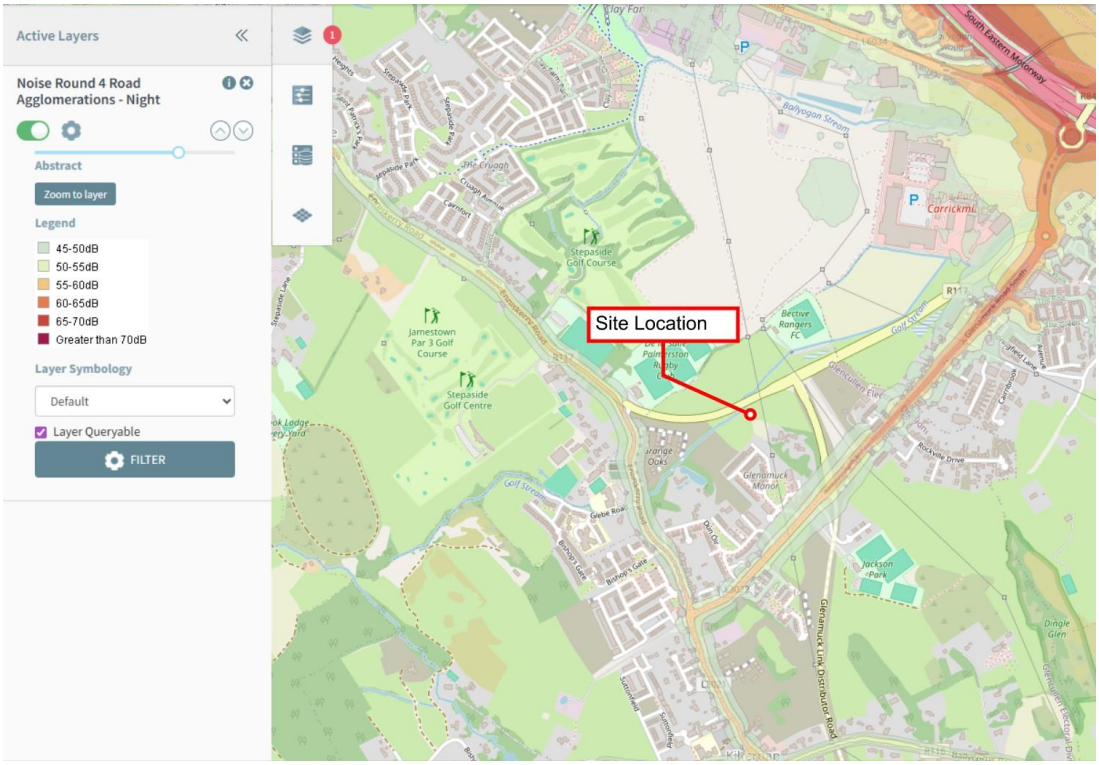


Figure 10: EPA predicted Lnight road traffic noise levels at the proposed site

5 ProPG Stage 2- Full Assessment

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

5.1 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."*

5.1.1 Discussion of Good Acoustic Design

Mitigation of Sources

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

Site Layout and Orientation

The northern and eastern elevation of the site is currently most exposed to noise with direct line of sight to the road.

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 built up urban areas is not practical. In general, the good acoustic design process in these areas is to provide ventilation via attenuated natural vents or mechanical ventilation. This allows the occupants to have adequate ventilation with adequate noise levels.

External Amenity

ProPG states the following with regard to external amenity spaces:

"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB 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 traffic noise).
- The sound insulation performance of each façade element (i.e. Windows, Walls, Roof…).
- The area of each façade element.
- Direct and flanking transmission paths.

5.2.1 Noise Prediction Modelling

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

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

The noise model has been calibrated against the noise measurements for the existing road network in the area and includes the traffic flows provided by DBFL Consulting Engineers, which are used in the Glenamuck District Roads Scheme EIAR Chapter 9 report (ABP reference 303945) for the 'Do Something 2035' scenario. SoundPlan 9.1 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 architect's drawings.
- Google Maps terrain and elevation data of surrounding area.
- Traffic speed of 50km/hr as per the EIAR Chapter 9 report (ABP reference 303945).
- Percentage of HGV assumed at 6% and AADT of 14,250 for the Glenamuck District Distributor Road (west) (Chapter 9 EIAR - ABP reference 303945).
- Percentage of HGV assumed at 8.6% and AADT of 26,600 for the Glenamuck District Distributor Road (east) (Chapter 9 EIAR - ABP reference 303945).
- Percentage of HGV assumed at 5.4% and AADT of 21,600 for the Glenamuck Link Distributor Road (north) (Chapter 9 EIAR - ABP reference 303945).
- Annual traffic growth rate of 3.9%.

- This has been assessed based on pre-covid traffic growth data.

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 11, Figure 12 and Figure 13 below outline the predicted road traffic noise levels across the proposed site for the daytime period at 1.5m, 4m and 6.5m.

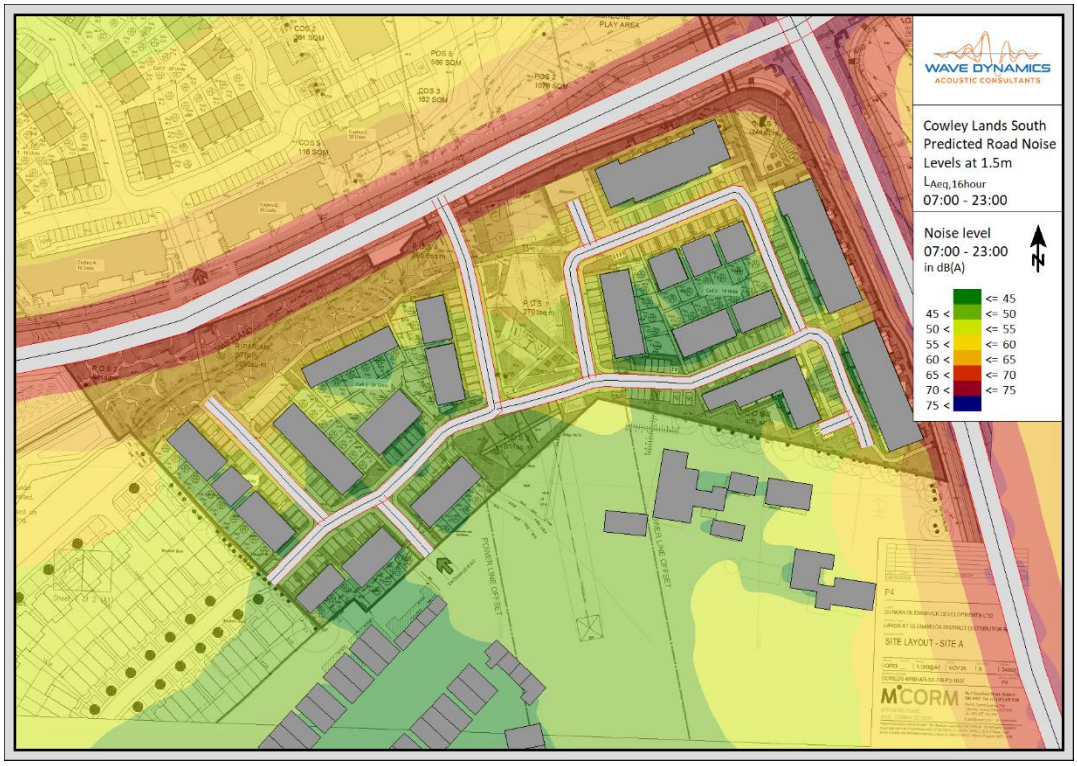


Figure 11: Predicted $L_{Aeq,16hour}$ (07:00hrs – 23:00hrs) at 1.5m height for the future development.

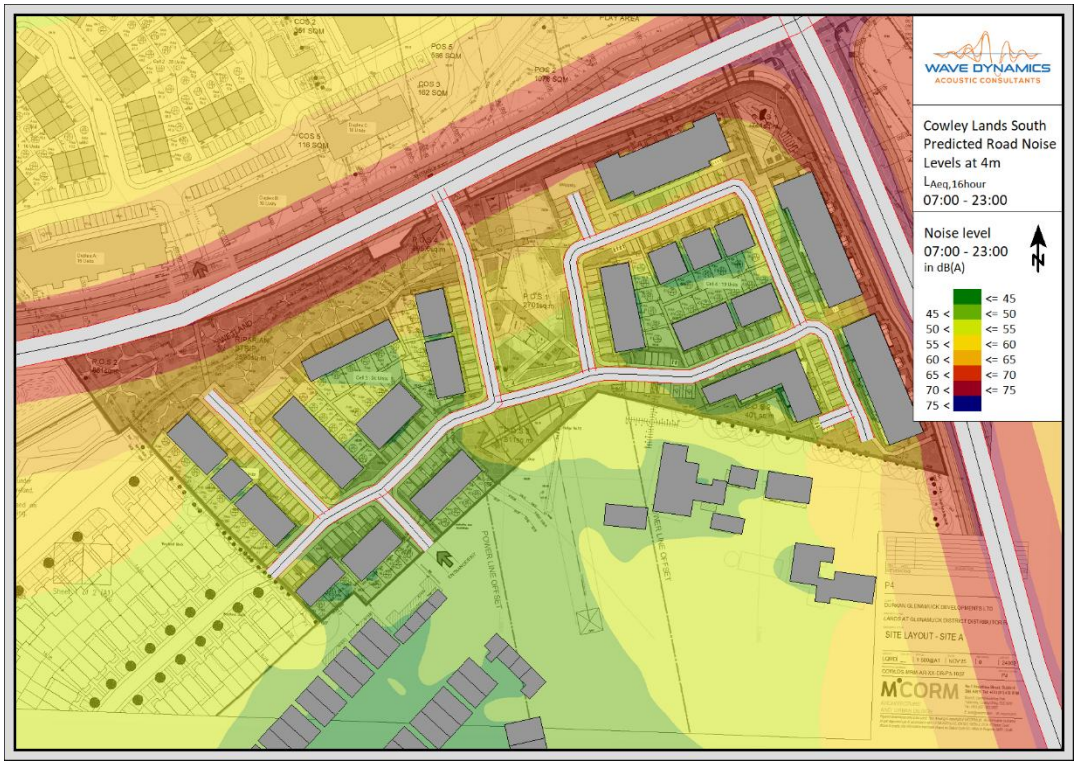


Figure 12: Predicted $L_{Aeq,16hour}$ (07:00hrs – 23:00hrs) at 4m height for the future development.

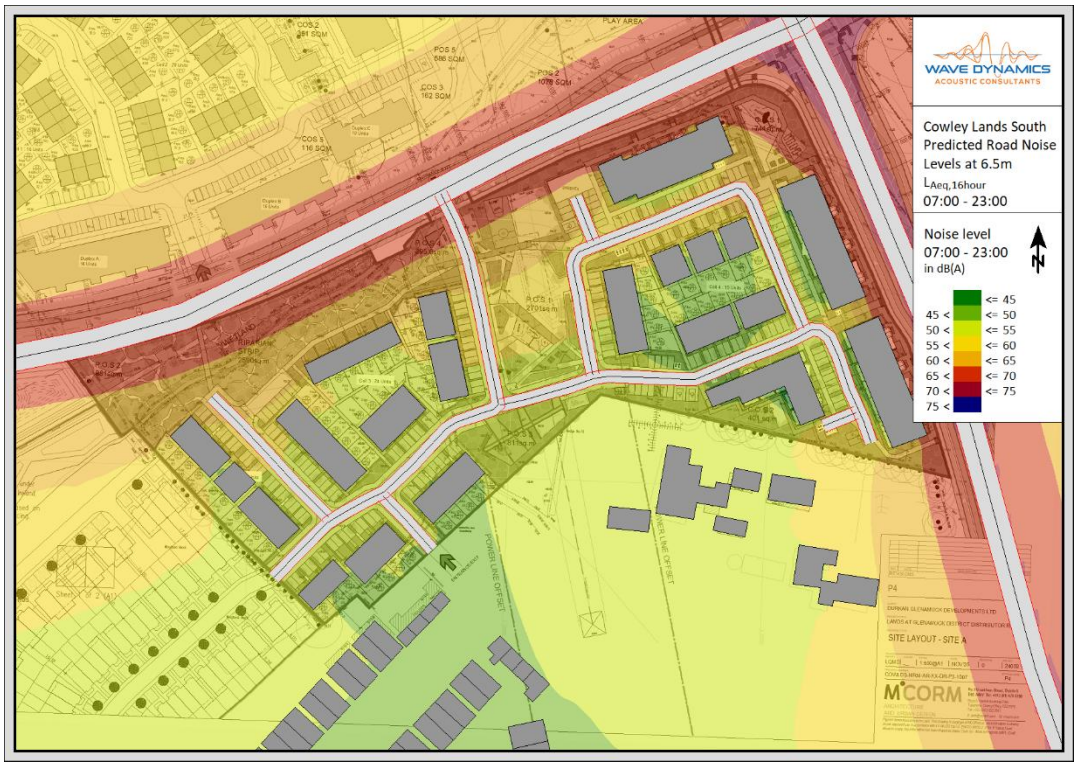


Figure 13: Predicted LAeq,16hour (07:00hrs – 23:00hrs) at 6.5m height for the future development.

Nighttime Noise Levels

Figure 14, Figure 15 and Figure 16 below outline the predicted road traffic noise levels across the proposed site for the nighttime period at 1.5m, 4m and 6.5m.

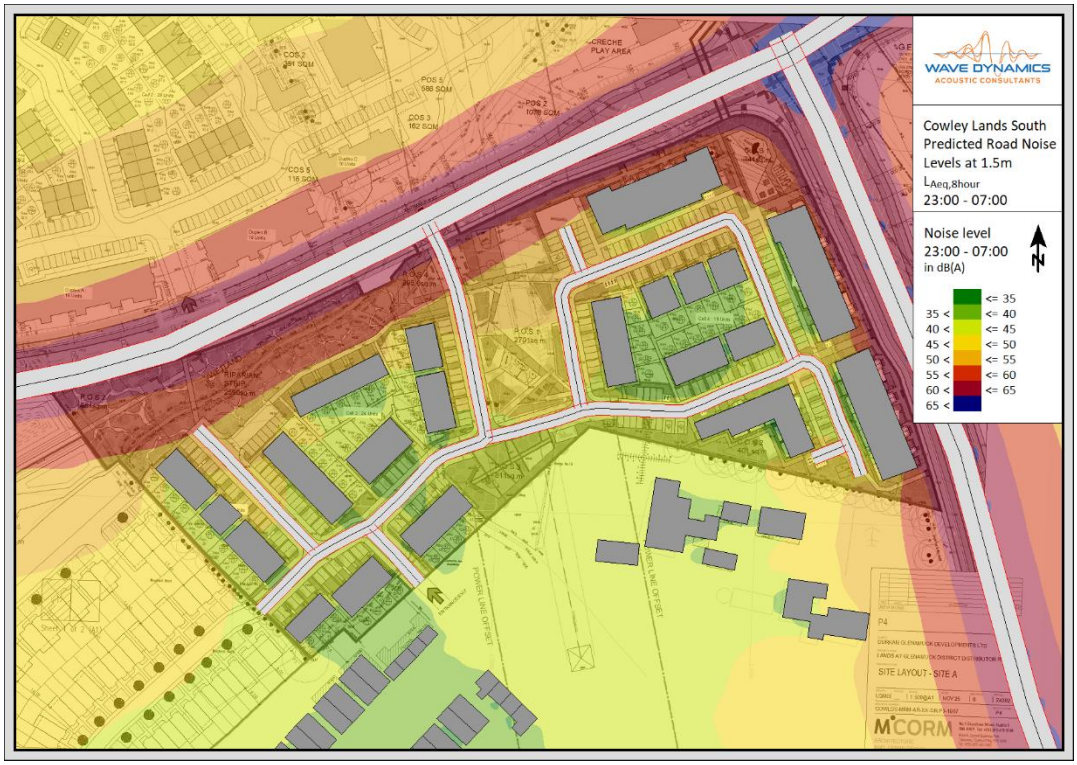


Figure 14: Predicted $L_{night\ (}$23:00hrs – 07:00hrs) at 1.5m height for the future development.

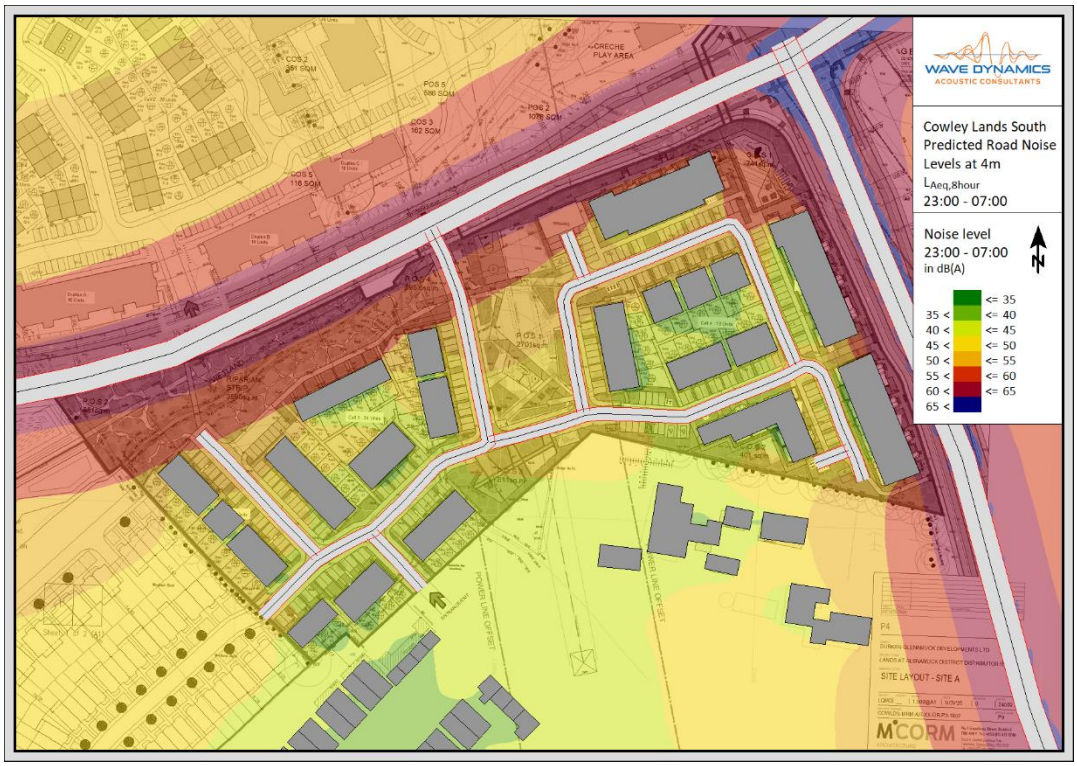


Figure 15: Predicted $L_{night\ (}$23:00hrs – 07:00hrs) at 4m height for the future development.

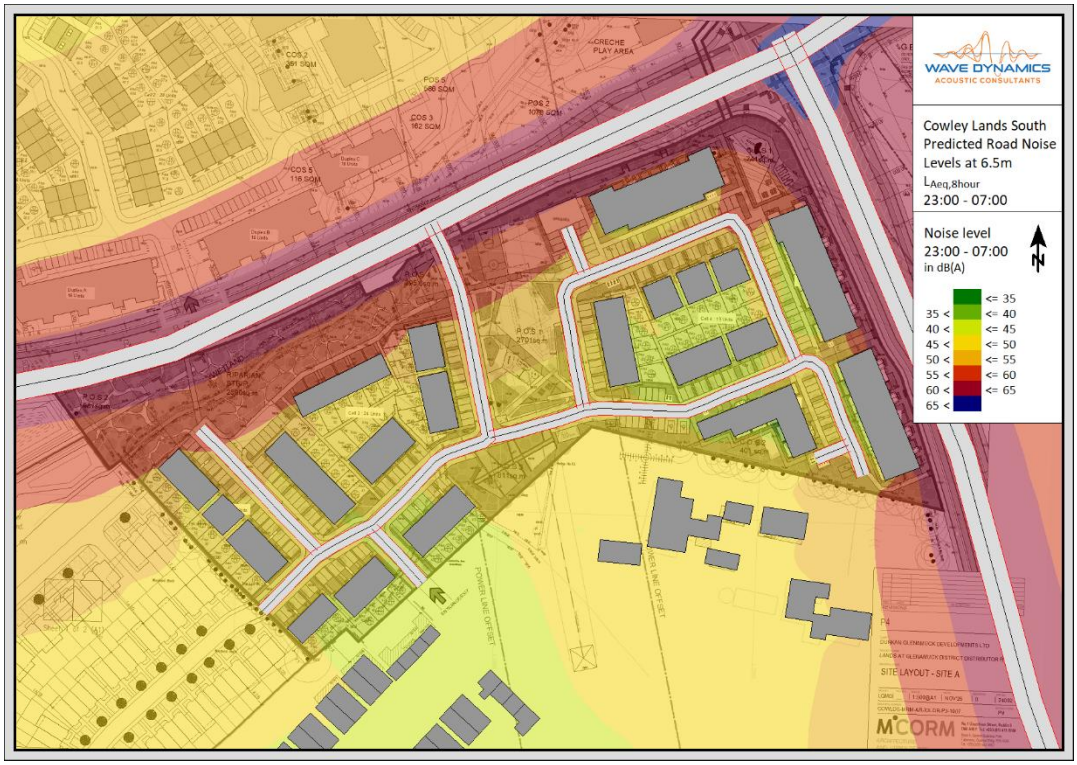


Figure 16: Predicted L_{night} (23:00hrs – 07:00hrs) at 6.5m height for the future development.

5.2.3 Building Envelope Specification

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

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 8 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 8 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.

Table 8: 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[1]
	Octave Band Frequency Requirements[1] R dB						Glazing Acoustic Performance dB R_W	
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz		
BLUE	19	27	34	45	48	52	37dB R_w	Mechanical Ventilation
RED	28	20	28	35	40	42	32dB R_w	Mechanical Ventilation

Façade	Glazed Elements (Frame & Glazing) Sound Insulation Requirements (Indicative requirements equal or approved)							Façade Ventilation Requirement[1]
	Octave Band Frequency Requirements[1] R dB						Glazing Acoustic Performance dB R_W	
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz		
GREEN	Standard Double Glazing [(2)]							Mechanical Ventilation

(1) Assumes fully sealed system with no passive opening or trickle vents. If wall/trickle vents are required, the above specification should be reviewed and confirmed by an acoustic consultant at design stage.

(2) 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.

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

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

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. If there are any skylights to habitable bedrooms Wave Dynamics should be informed to provide specific guidance in each case.

Consideration of Openable Windows

From a review of predicted noise contours across the site there are a number of facades which benefit from screening from the building layouts. The areas facing into the rear of buildings are provided with natural shading from the proposed buildings themselves. In some locations the screening provided by the proposed buildings is adequate to allow for consideration of openable windows to provide ventilation during the daytime period.

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

Figure 17 below shows the facades of the development which have low enough onset noise levels to achieve the internal noise levels with windows in the half-open or tilted position in the daytime period.

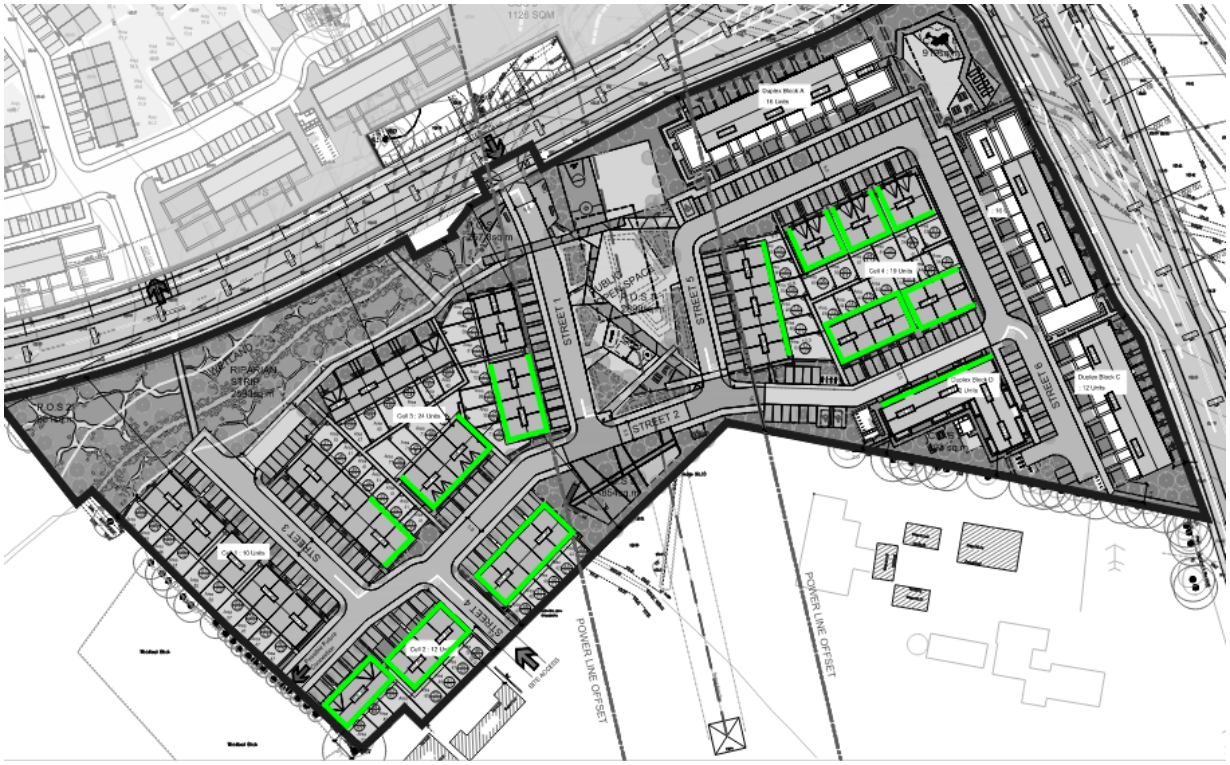


Figure 17: Locations of façades suitable for ventilation via openable windows in the daytime period (green).

5.3 Element 3- External Amenity Spaces

The external amenity spaces on the development include external amenity in the form of rear gardens to the houses, terraces and balconies to duplex units and several public and communal open spaces across the development. All external amenity spaces have been assessed, and it can be concluded that the rear gardens of the houses and several public and communal open spaces across the site are predicted to achieve the external amenity noise levels in accordance with BS8233:2014 of 55dBA L_{Aeq_16hr}.

Some sections of public open space 1, 2 and 4, and communal open space 2, which are all adjacent to the GDDR and the under construction GLDR, are predicted to exceed the recommended desirable levels however this is mitigated in the remaining large areas of public and communal space, rear gardens and majority of balconies and terraces which will achieve the ProPG recommended external noise levels.

The duplex blocks have been carefully oriented such that the majority of balconies and terraces face away from the GDDR and GLDR roads and therefore are predicted to achieve the recommended external amenity noise levels. There are a total of 6 balconies on both of the east and western facades of Block A, and on the north and south elevation of Block B which are predicted to have noise levels which exceed the recommended however alternate amenity has been provided on the development in the form of public open space. This is compliant with ProPG Element 3 (v) 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 amenities in the form of rear gardens to the houses, and several public and communal open spaces across the development and private amenity in the form of terraces and balconies, except for public open spaces 1, 2 and 4 and communal open space 1 will achieve the ProPG recommendations for desirable external amenity noise levels of 50-55dBA $L_{Aeq,16hour}$.

Figure 18: Site Layout of the public and communal open spaces and the rear gardens.

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 Dublin Agglomeration 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 inward noise impact assessment.

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. Appropriate provision of external amenity space has been provided in line with the ProPG guidance.

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

6 Construction Noise Assessment

6.1 Noise Sensitive Locations and Noise Limits

Based on the location of the site, the construction works and its proximity to the residential receptors the following noise sensitive receptors have been identified.

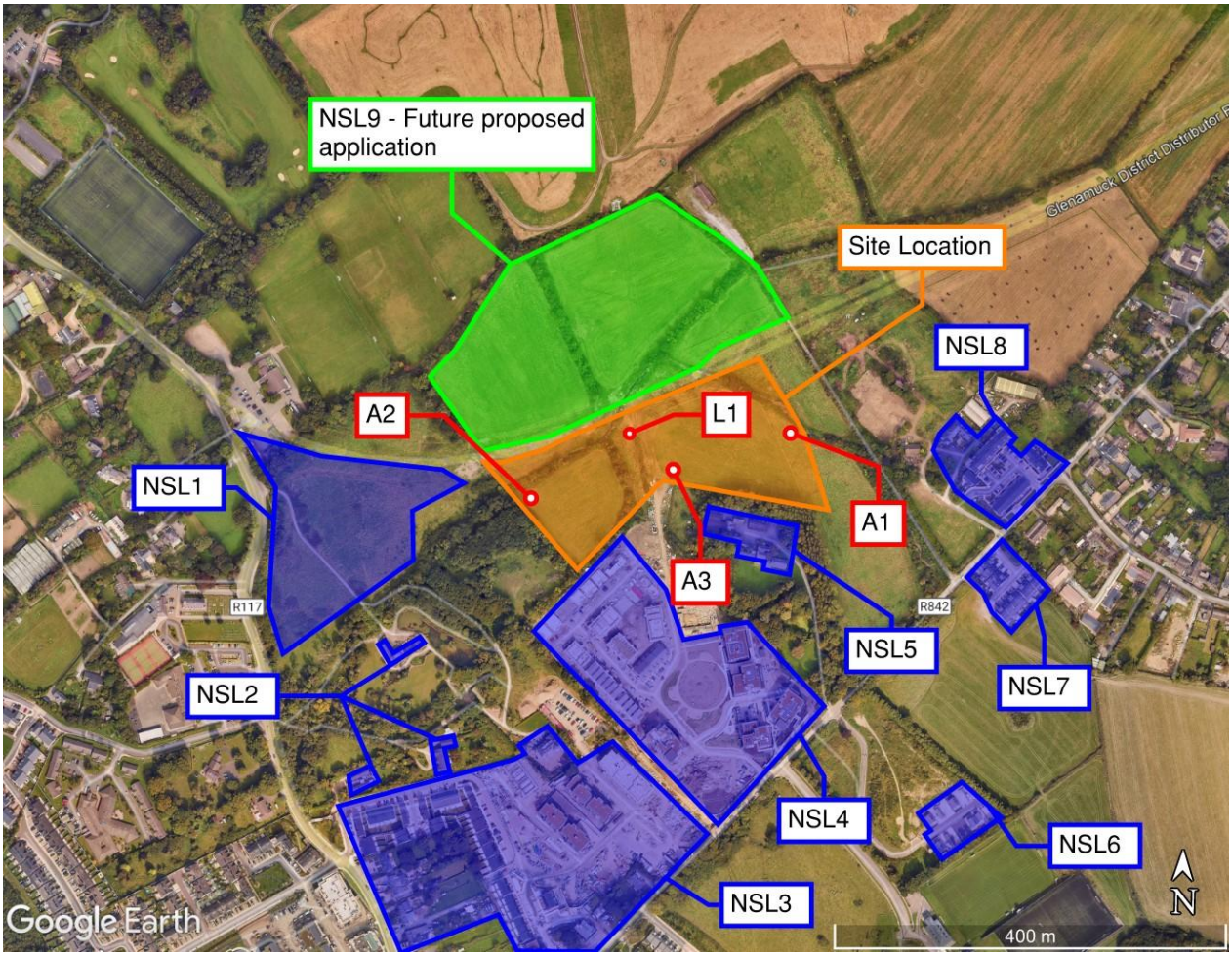


Figure 19: Site location and noise sensitive locations 1-9.

Noise Limits

The criteria for the project based on the criteria outlined in section 3 and the background noise in the area the project criteria for construction noise is outlined below in Table 9. Reference to the baseline survey results and guidance contained in BS 5228 Part 1 for construction noise levels threshold for significance affect from constriction activities is set as follows for the closest noise sensitive locations:

Table 9: Project Criteria

Construction Noise Limits			
Noise Sensitive Location	**Distance To the Centre of The Site (m)**	**Ambient Noise dB(A)**	**Noise Limit dB(A) [1]**
NSL1	210	52	65
NSL2	310	52	65
NSL3	320	52	65

Construction Noise Limits			
NSL4	120	52	65
NSL 5	110	49	65
NSL 6	480	49	65
NSL 7	375	54	65
NSL 8	315	54	65
NSL 9	50	49	65

(1) 65 dB (A) lower threshold limit

For the appropriate assessment period (i.e. daytime in this instance) the ambient noise level is determined and rounded to the nearest 5dB. If the noise generated by construction activities exceeds the appropriate category value, then a significant effect is deemed to occur.

For this project a limit of 65dB(A) is set as the appropriate upper limit for construction noise. Given the urban location of the development and its proximity to local transport infrastructure, this is considered an appropriate upper limit for construction noise.

6.1.1 Construction Noise Predictions

Construction noise for the site has been predicted based on the information provided. A summary of the expected equipment, durations and operating times are provided in Table 10. The noise sources are assumed to be located at the centre of the new developments. The prediction methodology in BS5228 has been used to calculate the noise level over a typical day for each of the main construction stages.

Table 10: Proposed construction equipment, noise levels and duration.

Construction Phase	Item of Plant (BS 5228-1:2009+A1:2014 Ref)	Noise Level (L_{Aeq} at 10m dB(A))	On Time of 10 hr day
Site Setup	Digger	77	4 hours
	Carpentry tools	78	3 hours
	Skill saw	84	2 hours
Substructure	Excavators	77	2 Hours
	Con saws	84	3 Hours
	Rail saw	85	2 Hours
	Drills	89	1 Hours
	Dumper 7t	81	2 Hours
	Cement Mixer	75	4 Hours
	Lorry Idling	80	2 Hours
	Telescopic Handler	71	5 Hours
	CFA Piling	80	5 Hours

Construction Phase	Item of Plant (BS 5228-1:2009+A1:2014 Ref)	Noise Level (L_{Aeq} at 10m dB(A))	On Time of 10 hr day
Superstructure	Drills	89	2 Hours
	Power tools	70	3 Hours
	Impact steel	69	2 Hours
	Hammer	69	0.5 Hours
	Dumper 7t	81	3 Hours
	Cement Mixer	75	2 Hours
	Lorry Idling	80	2 Hours
	Telescopic Handler	71	5 Hours
External finishes	Tools	70	5 hours
	Con saw	84	2 hours

Table 11 summarises the predicted construction noise level at the noise sensitive locations. Examination of the results indicate the construction noise without mitigation is predicted to not exceed the noise limits during any stages of the development except for NSL4, NSL5 and NSL9.

*Table 11: Predicted noise levels **without** mitigation for each stage.*

Location	Noise Limit	Predicted noise level (construction noise + ambient) with no mitigation L_{Aeq}, dB			
		Site Set Up	Substructure	Superstructure	External finishes
NSL1	65	56	61	58	52
NSL2	65	54	58	56	52
NSL3	65	49	58	56	52
NSL4	65	59	66	63	53
NSL5	65	59	66	63	51
NSL6	65	51	55	53	49
NSL7	65	55	58	56	54
NSL8	65	55	59	57	54
NSL9	65	66	73	70	56

The calculations set out above are based on assumed site construction works and a combination of the plant operating at the same time i.e. worst-case scenario.

Table 12: Attenuation required based on the construction noise predictions.

Location	Noise Limit	Noise reduction required at each stage of works to meet criteria (dBA)			
		Site Set Up	Substructure	Superstructure	External finishes
NSL1	65	0	0	0	0
NSL2	65	0	0	0	0

Location	Noise Limit	Noise reduction required at each stage of works to meet criteria (dBA)			
		Site Set Up	Substructure	Superstructure	External finishes
NSL3	65	0	0	0	0
NSL4	65	0	1	0	0
NSL5	65	0	1	0	0
NSL6	65	0	0	0	0
NSL7	65	0	0	0	0
NSL8	65	0	0	0	0
NSL9	65	1	8	5	0

Noise mitigation measures will be required at the substructure stage of the development. A combination of the mitigation measures outlined in section 6.2 should be used to reduce the levels of construction noise by the values listed in Table 12 above.

6.2 Noise Mitigation Recommendations

Best practice control measures for noise from construction sites are found within BS 5228 (2009 +A1 2014) part 1. Construction noise impacts are expected to vary during the construction phase of the project, this impact will depend on the distance between the construction activities and noise sensitive receptor. The contractor will ensure that all best practice noise and control methods will be used, to ensure any negative noise impacts at off-site noise sensitive locations are minimised.

The best practice measures set out in BS 5228 (2009) Part 1 includes guidance on several aspects of construction site mitigation measures, this includes the

- selection of quiet plant and equipment;
- noise control at source of the noise;
- screening, and;
- public liaison.

6.2.1 General Recommendations

This section of the report sets out noise mitigation options and detailed comment on each one specifically for this site.

Selection of Plant and Equipment

The noise impact of all plant and equipment should be assessed prior to selection of plant for the project. Where an item of plant is identified as noisy with the potential to cause a negative noise impact it should be reviewed to check if there is an alternative quieter version of the same plant to undertake the same construction task.

Noise Control at Source

Where replacing a noisy item of plant is not viable or practical, consideration should be given to control that noise at source. This includes modifying the piece of plant or equipment to generate less noise, using dampening to control vibration induced noise or rattling. Example best practice mitigation measures to be considered are as follows:

- All plant and equipment to be switched off when idling.
- The use of white noise reversing alarms.
- Restriction on the dropping and loading of materials to less sensitive hours.
- The use of local screening for noisy activities or works with hand tools

- Not dropping materials onto hard surfaces and using rubber mats etc for the dropping of materials.
- Ensure all plant and equipment is well maintained and cleaned, all lubrication should be in line with manufacturers guidelines.

Screening

Screening when used correctly can be an effective method of reducing the construction noise impact on the NSL's. The use of site hoarding and careful selection of areas for noise works, using buildings on the site, site offices and the building being constructed to screen noise from the works.

Local screening of noisy works with the use of temporary acoustic barriers, examples are provided below:

- https://ventac.com/acoustic-products/noisebreak-acoustic-barrier/
- https://echobarrier.com/

Figure 20: Temporary Construction Noise Barrier © Ventac

Public Engagement

It is recommended that a public liaison officer should be put forward by the contractor to liaise with the local residents on matters relating to noise. Occupants should be informed of any noise works scheduled where there is the potential to generate high levels of construction noise or if specialist works etc need to be conducted out of the working hours. This person should also be the point of contact for all complaints and be responsible for reviewing the noise monitoring results and exceedances.

Construction Noise Monitoring

Construction noise monitoring should be considered at periodic sample periods on the boundary with the nearest noise sensitive receptors.

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

6.2.2 Site Specific Recommendations

Table 13 below outlines the recommended site-specific noise mitigation measures based on the attenuation required in Table 12.

Table 13: Attenuation required based on the construction noise predictions.

Construction Stage	Recommended Noise Mitigation Measure
Site Setup	Erect a minimum 2.4m high site hoarding that blocks the line of sight between noise source and receiver. Example construction for the site hording would be as follows: • A 2.4m high and 9mm plywood (4.5 kg/m^2). Barrier must be solid and not contain gaps at the bottom or between adjacent panels Local screening using the examples provided in General Recommendations section 6.2.1 are required around hand tools in addition to hoarding. An absorptive lining should be considered for screening around hand tools will need to have an absorptive lining to avoid reflections increasing noise at other receivers. On this project 9 NSL's have been identified it is recommended that a noise monitor should be placed on the boundary with each of nearest noise sensitive locations closest to the works.
Substructure	Site hoarding to block line of sight. Local screening around noisy plant and equipment. An absorptive lining should be considered for screening around large plant that will need to have an absorptive lining to avoid reflections increasing noise at other receivers Noise monitoring as above
Superstructure	Local screening around saws/hammers where possible. Use external new building to screen noise from works where possible. Noise monitoring as above
External finishes	Local screening around hand tools. Noise monitoring as above

6.3 Vibration

Prediction of vibration levels at receptors is complex and dependent on a number of factors. As the development will consist of substructure works, precautionary vibration monitoring at the boundary with the nearest sensitive receptors will be considered as required during construction (for vibration generating works).

6.3.1 Vibration Monitoring

Where required vibration monitors can be erected during the substructure phase of the development between the site and the closest noise sensitive location(s).

The Vibration monitoring stations should continually log vibration levels using the Peak Particle Velocity parameter (PPV, mm/s) in the X, Y and Z directions, in accordance with BS ISO 4866: 2010: Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures.

Vibration Limits

The recommended vibration limits to avoid cosmetic damage to buildings, as set out in:

- British Standard BS7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration, and;

- British Standard BS5228-2: 2009 + A1: 2014: Code of practice for noise and vibration control on construction and open sites – Vibration.

The standards note that minor structural damage can occur at vibration magnitudes which are greater than twice those presented in Table 14 and major damage to a building structure is possible at vibration magnitudes greater than four times the values set out in Table 14. Definitions of the damage categories are presented in BS 7385-1:1990.

Table 14: Transient vibration guide values for cosmetic damage

Vibration PPV at the closest part of sensitive property to the source of vibration Frequency		
4 to 15 Hz	15 to 40Hz	40Hz and above
15 mm/s	20 mm/s	50 mm/s

Note 1: At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded
Note 2: It should be noted that these values are at the base of the building.

7 Operational Noise Impact

The operational noise sources from the development include the operational noise from the public and communal open spaces and basketball court play area.

This section includes an assessment of the operational noise impacts for noise from the public and communal open spaces, and the basketball court play area. The plant and equipment for the project have not been determined at this time. The heating and cooling methodology will be developed at design development stage. Therefore, plant noise limits have been set out in this section of the report. As part of the building design an acoustic consultant should be engaged to review the plant noise emissions from the development to ensure that the upper noise limits outlined in this report are achieved.

7.1 Noise Sensitive Locations

The Proposed Development site is located at Glenamuck, Kilternan, Co. Dublin. There are residential areas to the west (NSL1-3), to the south (NSL4-6), to the east (NSL7-8) and to the north (NSL9) of the site.

A desk-based review was carried out to identify existing noise sensitive locations within proximity to the proposed development site. Noise sensitive locations relevant to the Proposed Development site are illustrated in Figure 21.

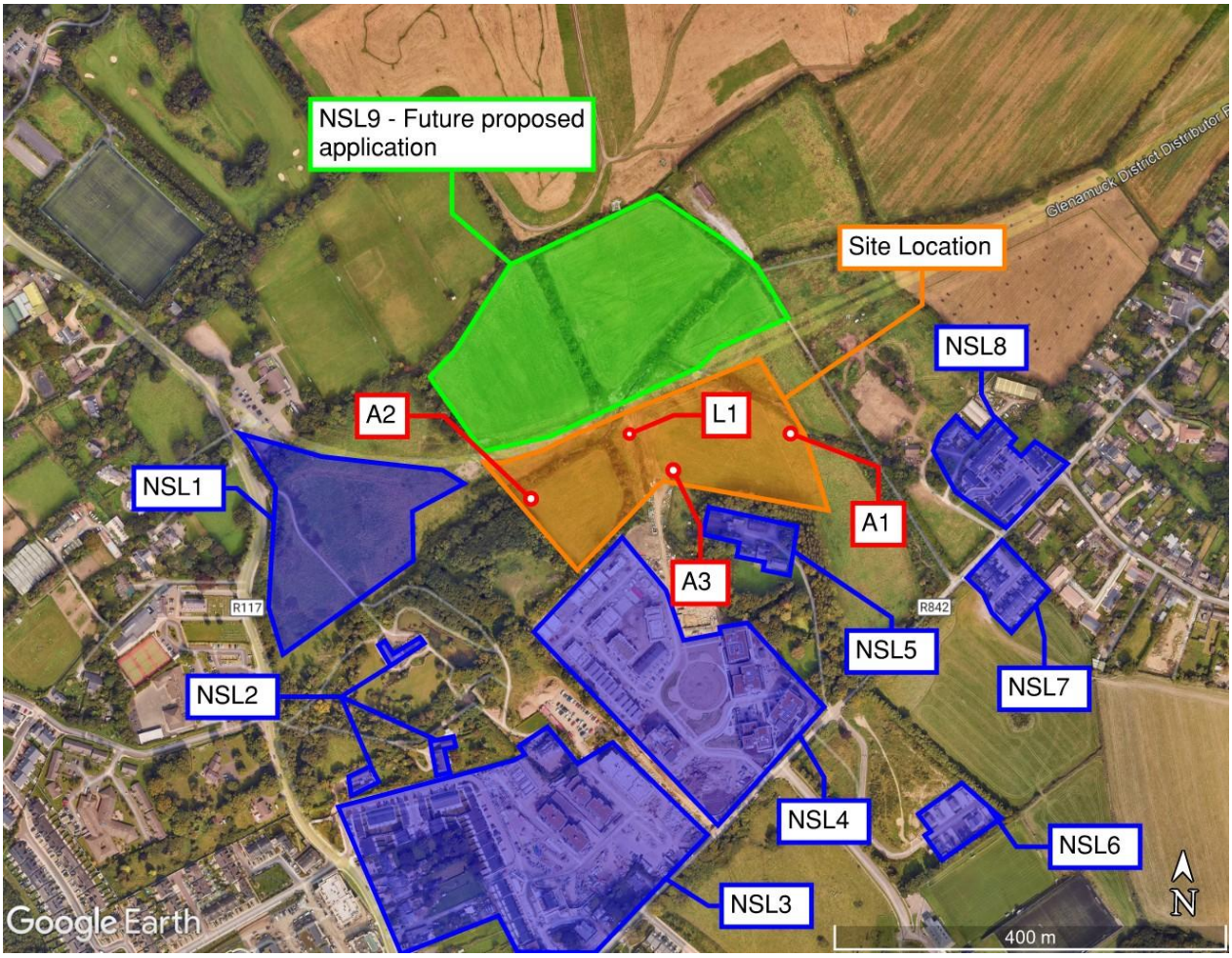


Figure 21: Noise Sensitive Locations

7.2 Noise Prediction Modelling

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

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

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

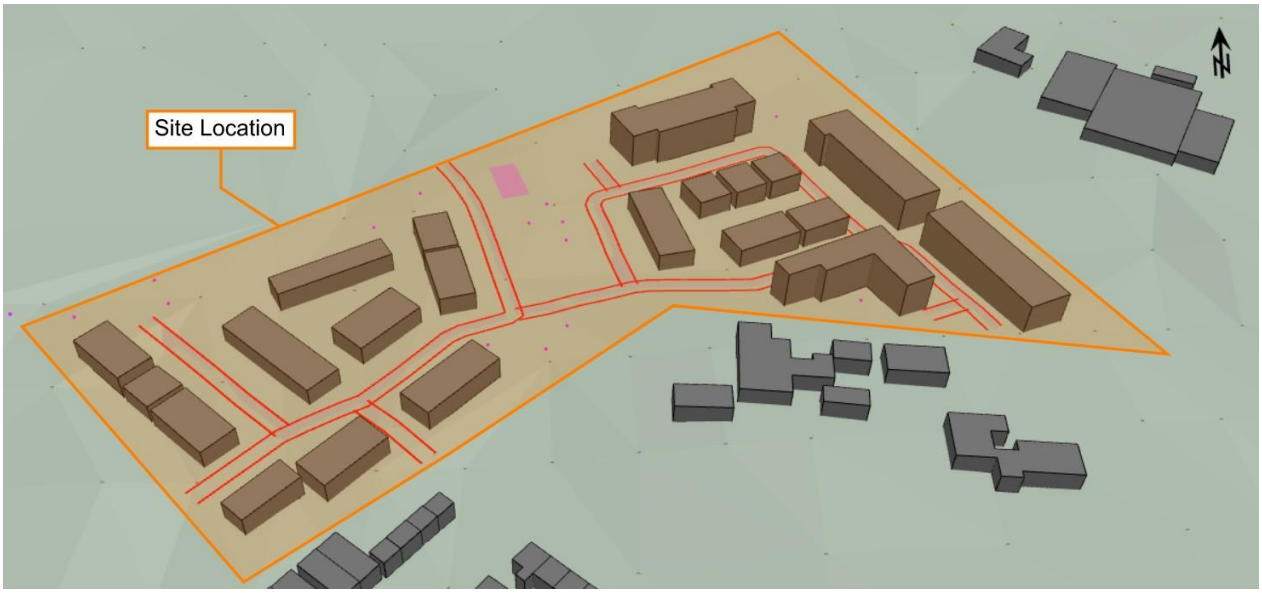


Figure 22: Screenshot from the model showing the proposed development.

7.3 Assessment of Operational Noise Impact

This section outlines the operational noise impact from the residents using the external amenity spaces.

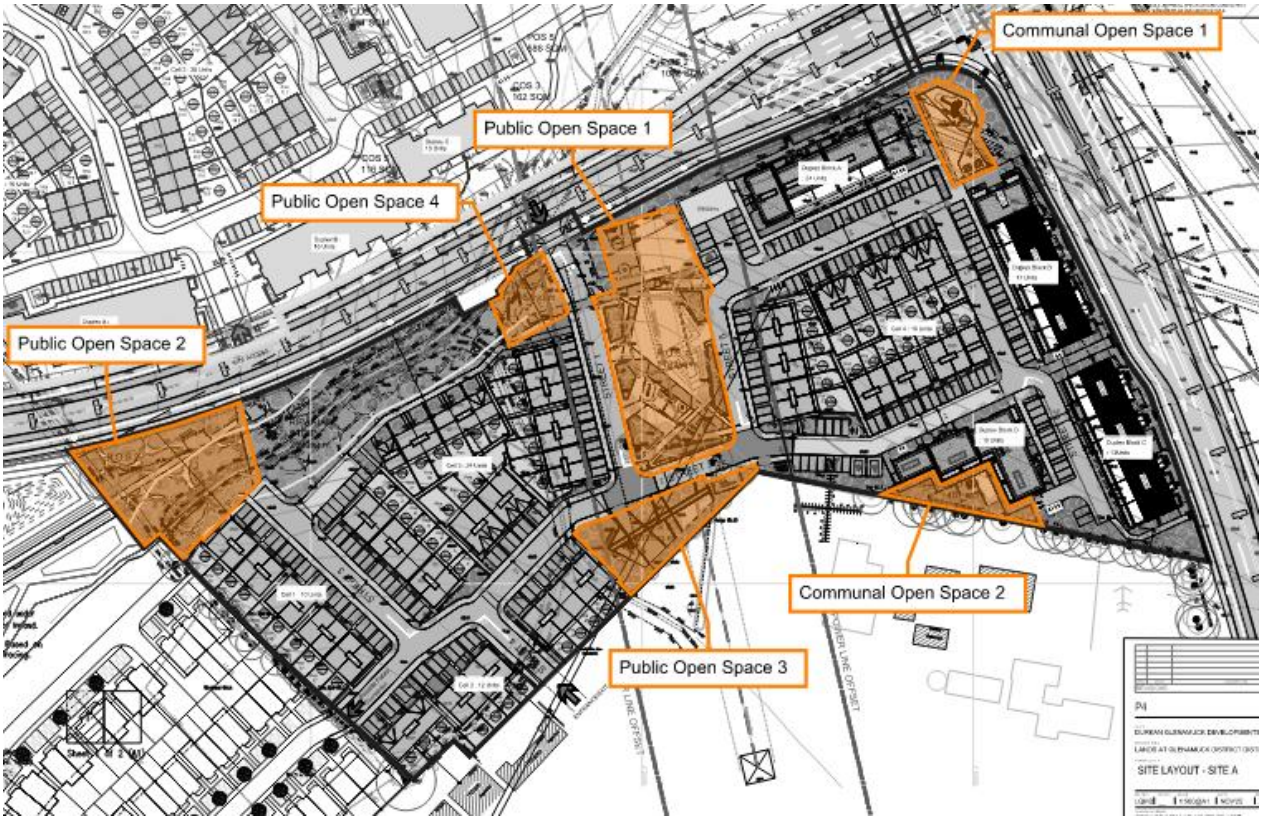


Figure 23: Site Layout showing the external amenity spaces.

The proposed plans include four public open spaces, two communal open spaces and a basketball court play area. The operational noise impact considers the noise impact from all these noise sources on the nearest noise sensitive receptors.

The nearest noise sensitive location to the development is NSL 5 (existing residential buildings).

7.3.1 Noise Sources

External Amenity Spaces

For the purpose of the model, it is assumed that each external amenity space will be operational during daytime hours 07:00hrs-23:00hrs, and night-time hours 23:00hrs – 02:00hrs, assuming 12 persons within the larger amenity spaces (POS 1, 2 and 3 and COS 1) during the daytime hours and 6 persons during nighttime hours and up to 9 persons within the smaller amenity spaces (POS 4 and COS 2) during the daytime hours and 4 persons during the nighttime hours. It is assumed that 1 in 3 persons will be talking as a worst-case scenario. Table 4 below outlines the noise spectrum used to model an amenity space with up to 12 persons.

Table 15: AAAC Patron noise levels at 1m distance for the external amenity spaces.

Description	Source Sound Power Level Lw(dB) at Octave Band Centre Frequency, Hz							Overall dBA Lw
	125	250	500	1000	2000	4000	8000	
1 person talking with raised voice	58	67	69	63	59	55	50	72

Basketball Court Play Area Noise Levels

It has been assumed that the basketball court play area will be in use from 07:00hrs to 02:00hrs and will have a noise level of 60dBA L_W / m^2 as per the SoundPLAN 9.1 library source levels for a small children's playground.

Car Parking

The proposed development will have a surface parking spaces on ground level. Operational noise from surface car parking will be spread across the site, isolated, and of short duration, it will not have a negative impact on nearby noise sensitive locations (NSLs).

7.4 Assessment of The Operational Noise Impact

This section outlines the operational noise impact from the proposed development, which includes the public and communal open spaces and the basketball court play area. The operational noise impact considers the noise impact of all noise sources at the nearest noise sensitive locations.

7.4.1 Daytime Scenario

As the new development has the potential to generate noise with different characteristics for both the day and nighttime, a model has been undertaken for both the day and nighttime operations of the proposed development.

The daytime situation assumes the following noise sources:

- Use of all external amenity spaces during the hours of 07:00-23:00.
- Assumed occupancy of 12 persons within the larger amenity spaces (POS 1, 2 and 3 and COS 1) and up to 9 persons within the smaller amenity spaces (POS 4 and COS 2). It is assumed that 1 in 3 persons will be talking as a worst-case scenario.
- Basketball court play area to be in use from 07:00hrs to 23:00hrs.

Noise Impact (BS 4142 Assessment) for Daytime Hours

The noise impact at the nearest noise sensitive locations (NSL1-NSL9) has been assessed in accordance with BS 4142. The predicted noise from the development is worst case at NSL5 due to its proximity to the development. The BS4142 at NSL5 is outlined in Table 16 below.

Table 16: BS4142 Assessment for daytime period

Results		Relevant BS 4142 Clause	Commentary
Predicted specific sound level (daytime)	$L_{Aeq(15min)}$ = 38dB	7.3.6	As the new development is not yet existing, the noise levels have been predicted using SoundPlan modelling software. Worst case specific sound predicted at NSL5 as this is closest to the proposed development.
Residual sound level (daytime)	$L_{Aeq(15min)}$ = 56dB	7.3.2	The residual sound level was dominated by road traffic noise. Measurement location L1 was assessed as this is representative for worst case receptor (NSL5).
Background sound level (daytime)	$L_{A90(60min)}$ = 45dB	8.1.2 8.4	The L_{A90} sound level was measured at the noise sensitive location with the source absent.
Assessment made during the daytime, so the reference time interval is 1 hour		7.2	
Specific sound level as predicted	$L_{Aeq(15min)}$ = 38dB	7.3.6	The specific sound has been predicted by calculation alone as the new development was not existing at the time.

Results		Relevant BS 4142 Clause	Commentary
Acoustic feature correction	+0dB	9.2 9.3.2	It is not anticipated that the specific sound will have any impulsive, tonal or intermittent characteristics.
Rating level	(38 + 0) dB = 38dB	9.2	
Background sound level	$L_{A90(60min)}$ = 45dB	8	
Excess of rating over background sound level	(38 - 45) dB = -7dB	11	Assessment indicates that no adverse impact is likely on the noise sensitive locations as the specific sound is 7dB below the background levels and is lower than the residual sound. Context has also been considered.
Uncertainty of the assessment	Not significant	10	The specific sound is a worst-case prediction as the assessment assumes large groups of persons occupying the amenity spaces during daytime and evening hours with one in three speaking with raised voice, children playing in the basketball court play area during the daytime hours.

Based on the review of the noise sources and the BS 4142 assessment it is predicted that the noise emanating from the proposed development will not have an adverse impact on the surrounding noise sensitive locations.

NG4

NG4 recommends a daytime criteria of (07:00hrs – 19:00hrs) 55dB $L_{Aeq,T}$, the predicted noise emissions from the development are 38 dBA, with no tonality or impulsivity, therefore the NG4 criteria is expected to be achieved. Table 17 below outlines the predicted noise impact at each noise sensitive location, the project criteria and compliance with the project criteria.

Table 17: Model results for each NSL during the daytime period.

NSL	Distance from centre of the site to NSL (m)	Criteria (07:00hrs – 19:00hrs) EPA NG4	Result (L_{Aeq} dB)	Compliance
NSL1	210	55	30	Compliant
NSL2	310	55	22	Compliant
NSL3	320	55	20	Compliant
NSL4	120	55	30	Compliant
NSL5	110	55	38	Compliant
NSL6	480	55	19	Compliant
NSL7	375	55	16	Compliant
NSL8	315	55	18	Compliant
NSL9	50	55	38	Compliant

7.4.2 Night-time Scenario

The proposed development has potential to generate noise impact at nighttime.

The nighttime situation assumes the following noise sources:

- Use of all external amenity spaces during the hours of 23:00-02:00.

- Assumed occupancy of 6 persons within the larger external amenity spaces (POS 1, 2 and 3 and COS 1) and up to 4 persons within the smaller external amenity spaces (POS 4 and COS 2). It is assumed that 1 in 3 persons will be talking as a worst-case scenario.
- Basketball court play area to be in use from 23:00hrs to 02:00hrs.

BS4142 Nighttime Assessment

The noise impact at the nearest noise sensitive locations (NSL1-9) has been assessed in accordance with BS 4142.

Table 18: BS4142 Assessment for nighttime period

Results		Relevant BS 4142 Clause	Commentary
Predicted specific sound level (nighttime)	$L_{Aeq(15min)}$ = 31dB	7.3.6	As the new development is not yet existing, the noise levels have been predicted using SoundPlan modelling software. Worst case specific sound predicted at NSL5 as this is closest to the proposed development.
Residual sound level (nighttime)	$L_{Aeq(15min)}$ = 46dB	7.3.2	The residual sound level was dominated by road traffic noise. Measurement location L1 was assessed as this is representative for worst case receptor (NSL5).
Background sound level (nighttime)	$L_{A90(15min)}$ = 38dB	8.1.2 8.4	The L_{A90} sound level was measured at the noise sensitive location with the source absent.
Assessment made during the daytime, so the reference time interval is 15 minutes		7.2	
Specific sound level as predicted	$L_{Aeq(15min)}$ = 31dB	7.3.6	The specific sound has been predicted by calculation alone as the new development was not existing at the time of the survey.
Acoustic feature correction	+0dB	9.2 9.3.2	It is not anticipated that the specific sound will have any impulsive, tonal or intermittent characteristics.
Rating level	(31 + 0) dB = 31dB	9.2	
Background sound level	$L_{A90(15min)}$ = 38dB	8	
Excess of rating over background sound level	(31 - 38) dB = -7dB	11	Assessment indicates that no adverse impact is likely on the noise sensitive locations as the specific sound is 7dB below the background levels and is lower than the residual sound. Context has also been considered.
Uncertainty of the assessment	Not significant	10	The specific sound is a worst-case prediction as the assessment assumes large groups of persons occupying the amenity space during nighttime hours with one in three speaking with raised voice and the basketball court play area in use.

Based on the review of the noise sources and the BS 4142 assessment it is predicted that the noise emanating from the proposed development will not have any adverse impact on the surrounding noise sensitive locations.

NG4

NG4 recommends a nighttime criteria of (23:00hrs – 07:00hrs) 45dB $L_{Aeq,T}$, the predicted noise levels from the new development are 31 dBA, with no tonality or impulsivity, therefore the NG4 criteria is expected to be achieved. Table 19 below outlines the predicted noise impact at each noise sensitive location, the project criteria and compliance with the project criteria.

Table 19: Model results for each NSL during the nighttime period.

NSL	Distance from centre of the site to NSL (m)	Criteria (23:00hrs – 07:00hrs) EPA NG4	Result (L_{Aeq} dB)	Compliance
NSL1	210	45	22	Compliant
NSL2	310	45	15	Compliant
NSL3	320	45	13	Compliant
NSL4	120	45	22	Compliant
NSL5	110	45	31	Compliant
NSL6	480	45	11	Compliant
NSL7	375	45	9	Compliant
NSL8	315	45	11	Compliant
NSL9	50	45	31	Compliant

7.4.3 Modelling Assumptions

The following assumptions were made throughout the modelling and assessment:

- Assessment based on the noise measurements undertaken on the 5th of September and 9th of September.
- Noise source data for the assessment was based on the measurements undertaken onsite.
- Model assumes a worst-case operating scenario as outlined in Section 7 above.
- Modelling based on the drawings, layouts and information provided.
- Assessment based on proposed new development only.

7.4.4 Mechanical Plant & Equipment

As the proposed development is currently at planning stage, the mechanical plant and equipment information is not available for the project. It is currently understood that specific mechanical plant and equipment will not be further developed and specified until further in the design process as this is a design and build project. The acoustic consultant at design stage for the project should ensure that the above criteria outlined in Section 3 of this report is achieved.

In the absence of information regarding the operational plant at this planning stage, the approach has been taken to determine suitable operational noise emission limits for any proposed mechanical plant and equipment.
The closest NSL to the proposed development site is NSL4 and NSL5. The closest representative noise monitoring location to NSL 5 is noise monitoring location L1.

To be reflective of a worst-case scenario, the lowest L_{A90} measurements from the daytime L_{A90}, 1hour (07:00-23:00) and night-time L_{A90}, 15min (23:00-07:00) at noise monitoring location L1 have been used to determine suitable operational noise emission limits.

Table 20 below contains the daytime and nighttime noise threshold limit to be adhered to for any plant/equipment noise from the proposed development at the nearest noise sensitive locations (NSL 1-9). It should be noted that these limits are for the combined plant and equipment across the development and not any one specific unit.

Table 20: Derived Noise Threshold Limits for Plant/Equipment Noise

Noise Sensitive Location	Background Sound Levels L_{A90} dB	Penalty for Tonality dB(A)	Derived Noise Threshold Limit dB(A) Leq at Noise Sensitive Receptors
NSL 1-9	45 (Daytime)	TBC	42
	38 (Night-time)	TBC	35

The final detailed design and location of building services, such as heat pumps, must avoid the generation of potential conflicts in terms of noise amenity affecting adjoining land uses. At detailed design stage mitigation measures, if required, may need to be incorporated into the design of external mechanical plant and equipment if applicable.

The final plant and equipment design should consider the likelihood of tonality and impulsivity and should be designed to ensure these characteristics do not occur.

8 Conclusion

Wave Dynamics were engaged by Durkan Glenamuck Developments Limited as the acoustic consultants to undertake an inward noise impact and external amenity noise assessment, a construction noise and vibration assessment and operational noise assessment for the planning application for the proposed new large-scale residential development (LRD) on lands in Glenamuck North, Kilternan, Co. Dublin.

"Durkan Glenamuck Developments Limited intend to apply for permission for a Large-Scale Residential Development on a site measuring c. 3.27 Ha in the townland of Glenamuck North in Kilternan, Dublin 18. The site is generally bounded by: the recently constructed Glenamuck District Distributor Road to the north (to be known as the Kilternan Road); the under construction Glenamuck Link Distributor Road to the east (to be known as the Kilternan–Glenamuck Link Road); Glenamuck Manor and a residential dwelling (known as 'Westgate'), its associated outbuildings and wider land holding to the south; and a residential dwelling (known as 'Shaldon Grange') and its wider landholding located to the west.

Road works are proposed to the approved Glenamuck District Roads Scheme (ABP Ref. HA06D.303945) to provide access to the development from the Kilternan Road. The Kilternan Road access point will include works, inclusive of any necessary tie-ins, to the footpath and cycle track to create a side road access junction incorporating the provision of uncontrolled pedestrian and cyclist crossing across the side road junction on a raised table. A surface water outfall pipe (225 mm) is also proposed to pass through land to the north of the site, including the future Kilternan Road. The total site area including the development site, road works and infrastructure works measures c. 3.32 Ha.

The development will principally consist of the construction of 135 No. residential units, comprising 65 No. houses (9 No. 2-bed units, 46 No. 3-bed units and 10 No. 4-bed units) and 70 No. duplex units (21 No. 1-bed units, 22 No. 2-bed units and 27 No. 3-bed units). The proposed development will principally range in height from 2 No. to 4 No. storeys.

The development also provides: car parking spaces; bicycle parking; bin storage; ancillary storage; private balconies, terraces and gardens; hard and soft landscaping; boundary treatments; lighting; substations; and all other associated site works above and below ground."

Inward 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 risk for both day and nighttime noise based on the existing noise levels. Consideration has been given to the Glenamuck District Distributor Road (GDDR) to the north, and the Glenamuck Link Distributor Road (GLDR) which is currently under construction (permitted under ABP reference 303945).

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 and took into consideration the traffic flow data provided by DBFL Consulting Engineers, found in Chapter 9 of the EIAR report by AWN Consulting (ABP reference 303945) for the 'Do Something 2035' scenario for the Glenamuck District Distributor Road (GDDR) and Glenamuck Link Distributor Road (GLDR). Consideration has also been given to the future growth of the surrounding roads. Following the assessment, the building envelope performance requirements were determined. The performance specification for the building envelope has been provided in this report which includes the external walls, glazing, roof and ventilation requirements.

External Amenity Noise Levels

The external amenity spaces on the development includes rear gardens to houses, public and communal outdoor space across the development and private amenity in the form of terraces and balconies for the Duplexes.

Appropriate amenity has been provided on the development for residents using the both the public and communal outdoor spaces. This is in line with element 3(v) of ProPG.

Based on the measured noise levels at the site it is predicted that the internal and external noise levels will achieve the targeted noise levels in line with BS 8233:2014 and Propg 2017 guidance.

Construction Noise Impact

The construction noise impact is predicted to achieve the BS 5228 requirements **without any mitigation** measures for any stages of the project except for NSL4 and NSL5 during the substructure stage. Recommendations have been outlined in this report to further reduce the noise impact from construction.

In addition to the recommendations, guidance has been provided in this report for consideration to construction noise monitoring during the construction period to manage noise levels to manage construction noise.

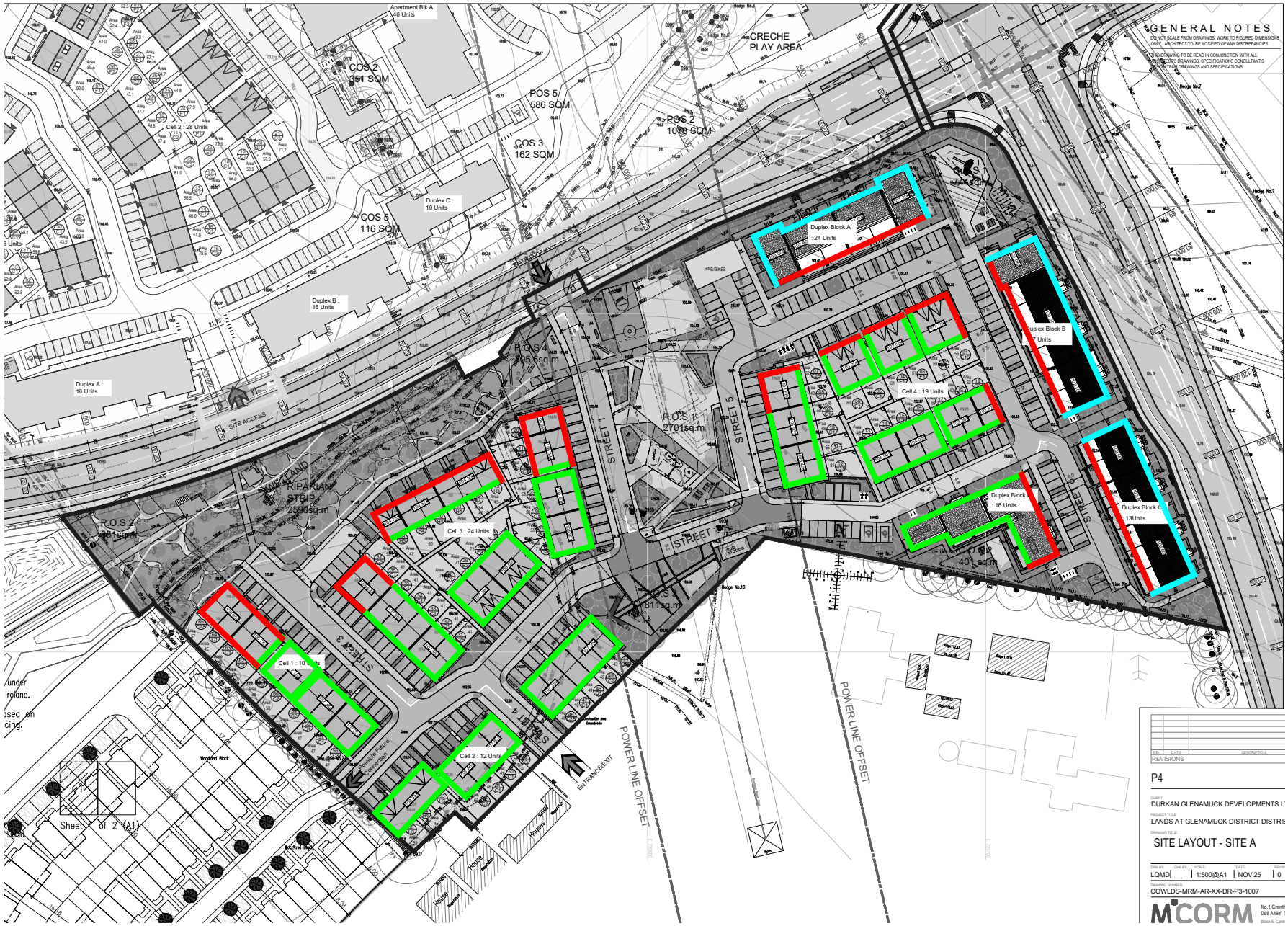
Operational Noise

An operational noise impact assessment has been conducted to assess noise generated from the public and communal open spaces, and the outdoor play area. It is predicted that operational noise from the proposed development will not cause a negative noise impact on the nearby noise sensitive locations during both daytime and nighttime operations The mechanical plant and equipment specification is not available at this stage of the project. Specific noise limits have been provided in this report for mechanical plant and equipment, at design development stage once the plant and equipment information are available it should be assessed for compliance with the criteria outlined in this report.

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 Markup



Glazed Elements Specification

- Standard Double Glazing
- 32 dB R_w
- 37 dB R_w

WAVE DYNAMICS
ACOUSTIC CONSULTANTS
DUBLIN WEXFORD CORK LONDON

Project:	Glenamuck North - Southern Site
Title:	Glazing Markup - Site Layout
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Date:	24/11/2025