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PROPOSED RESIDENTIAL DEVELOPMENT

GORDON PARK, OLD NAAS ROAD, KINGSWOOD, DUBLIN 22

INWARD NOISE IMPACT ASSESSMENT

Technical Report Prepared For

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EXECUTIVE SUMMARY

AWN Consulting has been commissioned to carry out a study in relation to the potential inward noise impact on the proposed residential development at Gordon Park, Old Naas Road, Kingswood, Dublin 22. This document presents the noise review of the proposed development site with respect to the inward noise impacts.

Baseline noise levels have been measured across the development site in order to assess the potential for noise impacts on the proposed development.

The majority of habitable rooms within the development achieve a good internal noise environment with standard double glazing. For those facades overlooking the Old Naas Road, it will be necessary to provide appropriate glazing and vents to ensure that when windows are closed and vents open, the internal noise environment achieves the adopted noise design criteria within BS 8233: 2014: *Guidance on sound insulation and noise reduction for buildings.*

Review of predicted noise levels determines that all inhabitants will have access to quiet external areas that are screened from road traffic and other noise sources by the on-site development buildings.

CONTENTS

		Page
	Executive Summary	3
1.0	Introduction	5
2.0	Relevant Criteria and Guidance	6
2.1	South Dublin County Council Development Plan	6
2.2	Dublin Agglomeration Environmental Noise Action Plan	6
2.3	ProPG: Planning & Noise	7
2.4	British Standard BS 8233:2014	8
3.0	Stage 1 – Noise Risk Assessment	10
3.1	Methodology	10
3.2	Baseline Noise Environment	11
3.3	Assessment Noise Levels	14
3.4	Noise Risk Assessment Conclusion	15
4.0	Stage 2 – Full Acoustic Assessment	17
4.1	Element 1 – Good Acoustic Design Process	17
4.2	Element 2 – Internal Noise Levels	19
4.3	Element 3 – External Amenity Areas	23
4.4	Element 4 – Assessment of Other Relevant Issues	23
7.0	Conclusion	25
	Appendix A – Glossary of Acoustic Terminology	26

1.0 INTRODUCTION

AWN Consulting has been commissioned to carry out a study on the potential inward noise impacts on the proposed residential development at Gordon Park, Old Naas Road, Kingswood, Dublin 22.

Figure 1 presents the proposed development site and context.

Figure 1 Location of Proposed Development

The proposed development consists of 77 no. dwellings, comprised of 63 no. 2 storey houses, and 14 no. apartments & duplex units accommodated in 1 no. 3 storey building. The proposed houses are comprised of 8 no. 2 bed houses & 55 no. 3 bed houses. The proposed apartments & duplex units are comprised of 7 no. 1 bed apartments at ground floor & 7 no. 3 bed duplex units overhead. The proposed development also provides for all associated site development & infrastructural works, car & bicycle parking, open spaces, hard & soft landscaping, boundary treatments, bin & bicycle storage. Access to the development will by via a new vehicular entrance at the south-west corner of the site, off the Old Naas Road. Permission is also sought to demolish the existing building on site, approx. 455m².

Appendix A presents a glossary of acoustic terminology that is used throughout this report.

2.0 RELEVANT CRITERIA AND GUIDANCE

2.1 South Dublin County Council Development Plan (2016 – 2022)

Section 11.6.3 of the South Dublin County Council Development Plan (2016-2022) provides the following discussion in relation to *Environmental Hazard Management*:

> *(ii) Noise*
>
> *The Planning Authority will have regard to the Dublin Agglomeration Environmental Noise Action Plan 2013 – 2018, Dublin Local Authorities (2013) when assessing development proposals along major road and rail transport corridors, with a view to reducing noise from new sources and to identify and protect areas of low sound levels.*

The guidance calls for developments to have a good level of sound insulation in accordance with best Irish practice. There is no Irish standard guidance that is directly applicable to this scenario, hence it is proposed to make reference to best practice international guidance (i.e. BS8233:2014, for example) for the purposes of arriving at appropriate design goals.

The NAP quoted above has been superseded by the Dublin Agglomeration Noise Action Plan 2018 – 2023 Volume 4: South Dublin County Council Public Consultation Document which is discussed in Section 2.2 below.

2.2 Dublin Agglomeration Environmental Noise Action Plan

Here, consideration has been given to the content of the Dublin Agglomeration Noise Action Plan 2018 – 2023 Volume 4: South Dublin County Council Public Consultation Document (NAP) was published in December 2018. The NAP states the following with respect to assessing the noise impact on new residential development:

> *"In the scenario where new residential development or other noise sensitive development is proposed in an area with an existing climate of environmental noise, there is currently no clear national guidance on appropriate noise exposure levels. The EPA has suggested that in the interim that Action Planning Authorities should examine the planning policy guidance notes issued in England titled, 'ProPG Planning and Noise: Professional Practice Guidance on Planning and Noise'. This has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England".*

In addition, the following is provided

> *"In advance of any national guidance relating to noise in the planning process, the following actions relating to planning and development will be considered for implementation:*
>
> *a. To review existing guidelines and policy relating to Noise in the County Development Plan and to ensure noise is a consideration in Local Area Plans and Part 8's and enhanced in the next County Development Plan.*
> *b. To develop guidance note on Noise considerations in the planning process that can be issued to developers at pre-planning stage.*
> *c. To require developers to produce a sound impact assessment and mitigation plans, where necessary, for any new development where the Planning Authority considers that any new development will impact*

negatively on pre-existing environmental noise levels within their Council area.

d. *To ensure that future developments are designed and constructed in accordance best Irish practice to minimise noise disturbances through good acoustic design and take into account the multifunction uses of street (e.g. movement, recreation) and to ensure central areas of large mixed used developments area quiet."*

As per the NAP reference has also been made to guidance note *ProPG Planning and Noise: Professional Practice Guidance on Planning and Noise.*

2.3 ProPG: Planning & Noise

The *Professional Guidance on Planning & Noise*: New Residential Development (ProPG) and associated supplementary documents[1] were published in May 2017. The document was prepared by a working group comprising members of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH). Although not a government document, since its adoption it has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.
The ProPG outlines a systematic risk based 2 stage approach for evaluating noise exposure on prospective sites for residential development. The two primary stages of the approach can be summarised as follows:

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

A key component of the evaluation process is the preparation and delivery of an Acoustic Design Statement (ADS) which is intended for submission to the planning authority. This document is intended to clearly outline the methodology and findings of the Stage 1 and Stage 2 assessments, so as the planning authority can make an informed decision on the permission. ProPG outlines the following possible recommendations in relation to the findings of the ADS:

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 3.0 of the ProPG provides a more detailed guide on decision making to aid local authority planners on how to interpret the findings of an accompanying Acoustic Design Statement (ADS).

1 PropG Supplementary Document 1 (May 2017) on Planning and Noise Policy and Guidance and PropG Supplementary Document 2 (May 2017) on Good Acoustic Design for Residential Development

A summary of the ProPG approach is illustrated in Figure 2.

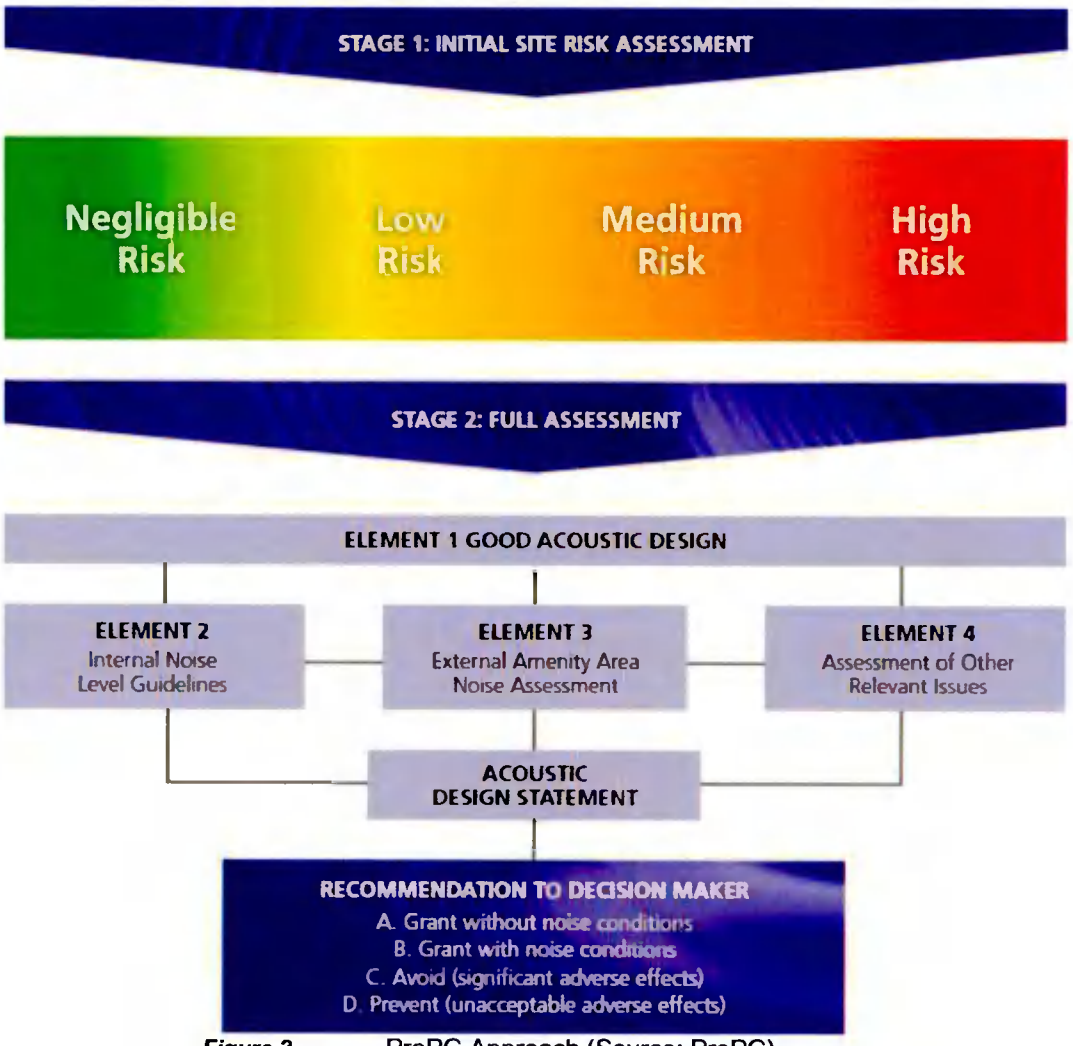

Figure 2 ProPG Approach (Source: ProPG)

2.4 British Standard BS 8233:2014

2.4.1 Internal Noise

There are no statutory guidelines or specific local guidelines relating to appropriate internal noise levels in dwellings. In this instance, reference is made to BS 8233: 2014: *Guidance on sound insulation and noise reduction for buildings*.

BS 8233 sets out recommended internal noise levels for several different building types from external noise sources such as traffic. The guidance is primarily for use by designers and hence BS 8233 may be used as the basis for an appropriate schedule of noise control measures. The recommended indoor ambient noise levels for residential dwellings and other spaces are set out in Table 1.

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

Activity	Location	Day (07:00 to 23:00hrs) dB $L_{Aeq,16hr}$	Night (23:00 to 07:00hrs) dB $L_{Aeq,8hr}$
Commercial	Open plan office	40	-

Table 1 Indoor Ambient Noise Levels for Dwellings from BS8233: 2014

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

> *"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or L_{AFmax}, depending on the character and number of events per night. Sporadic noise events could require separate values."*

Typically, a 45 dB L_{AFmax} criterion is applied to individual noise events within bedrooms at night. This criterion is generally considered a noise level that should not typically be exceeded.

2.4.2 External Noise

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

> *"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."*

3.0 STAGE 1 – NOISE RISK ASSESSMENT

3.1 Methodology

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk based on the pre-existing noise environment. Figure 3 presents the basis of the initial noise risk assessment, it provides appropriate risk categories for a range of continuous noise levels either measured and/or predicted on site.

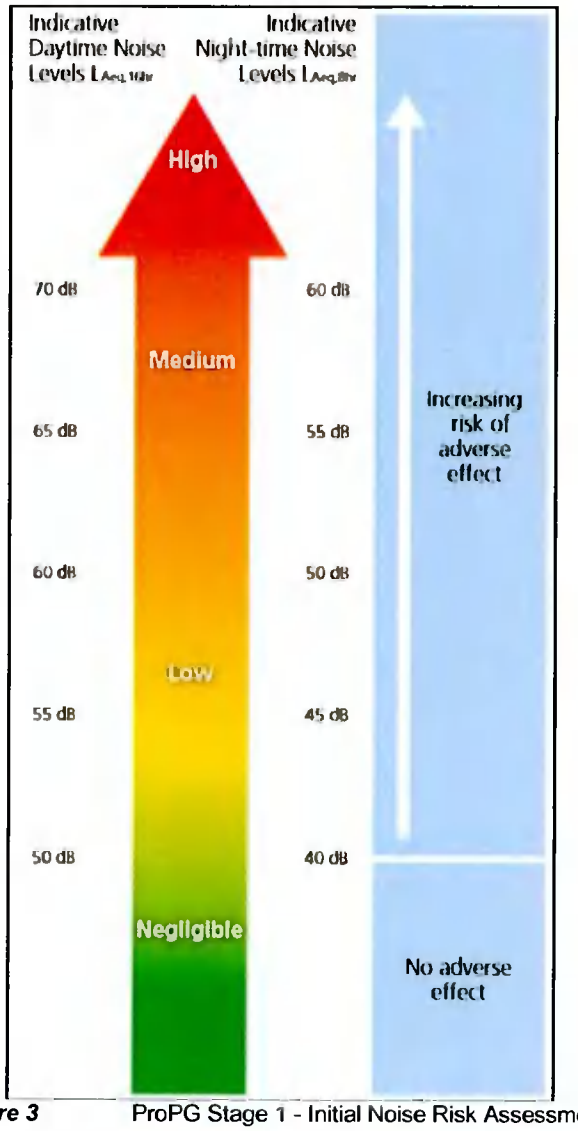

Figure 3 ProPG Stage 1 - Initial Noise Risk Assessment

It should be noted that a site should not be considered a negligible risk if more than 10 no. L_{AFmax} events exceed 60 dB during the night period and the site should be considered a high risk if the L_{AFmax} events exceed 80dB more than 20 times a night.

Paragraph 2.9 of ProPG states that,

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

3.2 Baseline Noise Environment

3.2.1 Baseline Noise Survey

Environmental noise surveys have been conducted in order to quantify noise emissions across the existing site. The external survey was conducted in general accordance with ISO1996-2:2017 *Acoustics - Description, Measurement and Assessment of Environmental Noise -- Determination of Environmental Noise Levels*. Specific details are set out in the following sections.

3.2.2 Survey Methodology

An unattended continuous environmental noise survey was conducted at the site from 31 August to 7 September 2021 by AWN Consulting in order to quantify the existing noise environment. Additional attended 'spot' measurements were undertaken on installation of the unattended noise monitor. The approximate noise measurement locations were selected at the proposed site as shown in Figure 4.

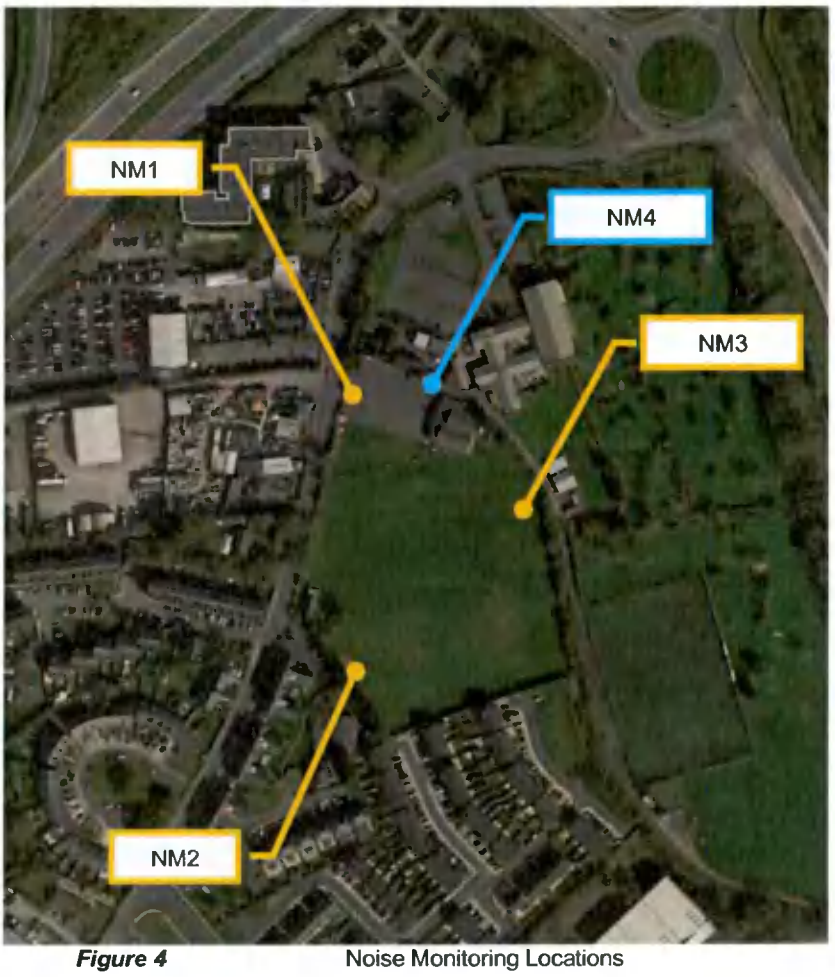

Figure 4 Noise Monitoring Locations

NM1 Attended measurement, inside western site boundary.

NM2 Attended measurement, inside south western site boundary.

NM3 Attended measurement, inside eastern site boundary.

NM4 Unattended noise monitor at 4m height, located at northern site boundary.

3.2.3 Measurement Parameters

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

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

L_{AFmax} is the maximum sound pressure level recorded during the sample period.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

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

3.2.4 Instrumentation

A Brüel & Kjær 2250 sound level meter (SLM) was used for the attended noise survey. Attended surveys were conducted between the hours of 11:25hrs and 14:20hrs on 23 July 2019. Two RION NL-52 SLMs were used for the unattended noise survey. The instrument was set to log overall broadband noise parameters and 1/3 octave spectrum data over 15-minute intervals.

Before and after each survey the SLMs and measurement system was check calibrated using a Brüel & Kjær Type 4231 Sound Level Calibrator.

3.2.5 Survey Results

Location NM1

The table below summarises the attended noise measurements at NM1.

Date	Time	Measured Noise Levels, dB		
		L_{Aeq}	L_{Amax}	L_{A90}
31 August	13:08	62	80	59
	14:02	62	71	60
	14:54	64	76	59

Table 2 Summary of Attended Measured Noise Levels at Location NM1

The noise environment at this location was dictated by local and distant road traffic noise. The N7 dual carriageway, the local Old Naas Road and R136 were observed to contribute to measured noise levels. Other noise sources included bird song and foliage noise. Ambient noise levels were in the range of 62 – 64 dB $L_{Aeq,15min}$. Background noise levels were in the range 59 – 60 dB $L_{A90,15min}$.

Location NM2

The table below summarises the attended noise measurements at NM2.

Date	Time	Measured Noise Levels, dB		
		L_{Aeq}	L_{Amax}	L_{A90}
31 August	13:27	61	67	59
	14:20	63	79	60
	15:12	62	73	60

Table 3 Summary of Attended Measured Noise Levels at Location NM2

The noise environment at this location comprised road traffic noise, bird song and foliage noise. Aircraft passing overhead were also observed. Ambient noise levels were in the range of 61 – 63 dB $L_{Aeq,15min}$. Background noise levels were in the range 59 – 60 dB $L_{A90,15min}$.

Location NM3

The table below summarises the attended noise measurements at NM3.

Date	Time	Measured Noise Levels, dB		
		L_{Aeq}	L_{Amax}	L_{A90}
31 August	13:45	58	62	57
	14:37	60	71	58
	15:30	60	66	58

Table 4 Summary of Attended Measured Noise Levels at Location NM3

The primary noise source observed at this location was traffic noise from the Old Naas Road. The noise environment also included distant traffic noise, bird song and noise from the adjacent playing fields. Ambient noise levels were in the range of 59 – 60 dB $L_{Aeq,15min}$. Background noise levels were in the range 57 – 58 dB $L_{A90,15min}$.

Location NM4

Table 5 presents a summary of noise levels measured during the unattended noise survey at NM4 over the 16-hour daytime period (07:00 to 23:00hrs) and the 8-hour night-time period (23:00 to 07:00hrs) between 31 August and 7 September 2021.

Date	Period	Measured Noise Levels, dB		
		L_{Aeq}	L_{Amax}	L_{A90}
31 Aug	Day	62	67 – 82	60
	Night	55	61 – 67	49
1 Sept	Day	61	62 – 83	59
	Night	55	55 – 67	49
2 Sept	Day	61	63 – 76	59
	Night	53	55 – 64	48
3 Sept	Day	59	62 – 82	57
	Night	57	56 – 88	46
4 Sept	Day	56	60 – 80	53
	Night	50	57 – 61	45
5 Sept	Day	58	58 – 83	54

Date	Period	Measured Noise Levels, dB		
		L_{Aeq}	L_{Amax}	L_{A90}
	Night	55	59 – 65	50
6 Sept	Day	60	62 – 82	58
	Night	54	57 – 64	48
7 Sept	Day	58	62 – 83	56
Average	Day	60	60 – 83	57
	Night	55	55 – 88	48

Table 5 Summary of Unattended Measured Noise Levels at Location NM4

The prevailing noise environment at this location is traffic noise on the Old Naas Road and distant traffic noise from the R136 and N7 dual carriageway.

L_{AFmax} values were measured at 15-minute intervals over the duration of the unattended monitoring survey. Figure 5 presents the number of measured L_{AFmax} events for various decibel levels during the night period.

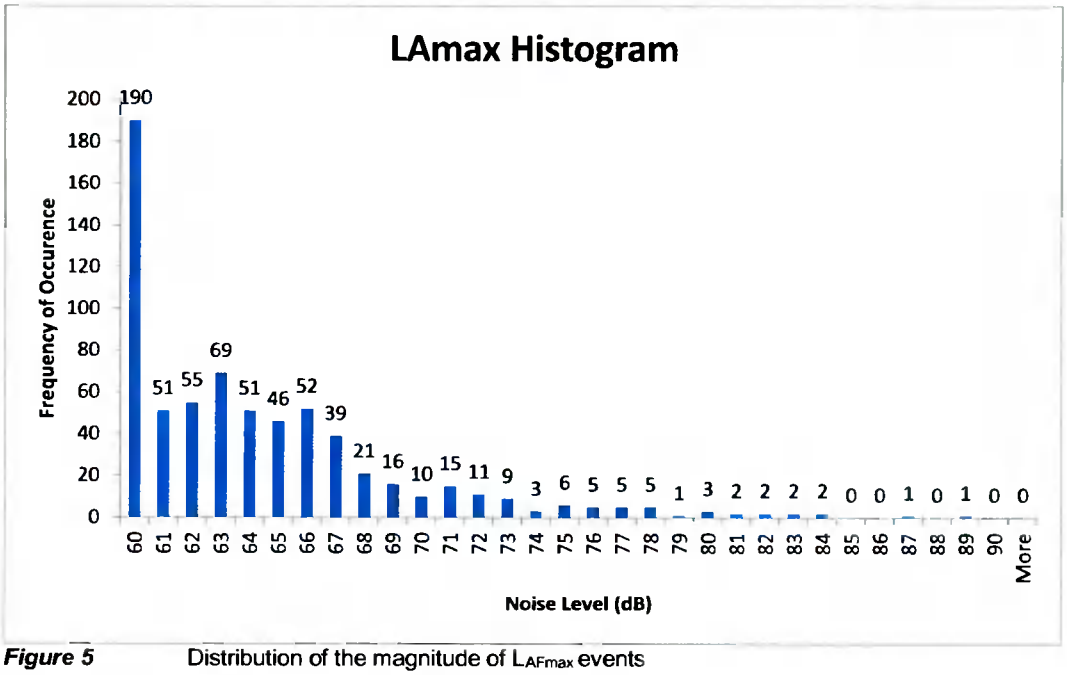

Figure 5 Distribution of the magnitude of L_{AFmax} events

The L_{AFmax} values range from < 60 to 84 dB during the night period, with individual instances of higher maximum noise levels. For the purposes of assessment, the value of 71 dB L_{Amax} is used. Review of the graph above indicates this level is not regularly exceeded on a given night.

3.3 Assessment Noise Levels

The measured noise levels associated with road traffic have been used to derive an assessment noise level at the façades of the proposed development.

A noise spectrum for the assessment noise levels are presented below for daytime and night-time.

Facade	Period	Octave Band Centre Frequency (Hz							$L_{Aeq,T}$ dB
		63	125	250	500	1k	2k	4k	
Units on Western Site Boundary	Day	60.0	62.8	59.8	59.3	60.7	51.2	38.9	63
	Night	54.0	51.7	51.7	54.5	56.4	45.8	29.5	58
Remaining Units	Day	60.0	62.8	59.8	59.3	60.7	51.2	38.9	60
	Night	57.0	59.8	56.8	56.3	57.7	48.2	35.9	55

Table 6 Measured $L_{Aeq,T}$ Noise Levels External to Proposed Development

3.4 Noise Risk Assessment Conclusion

With reference to the Noise Risk Assessment outlined in ProPG the noise levels for relevant periods have been derived in order to classify the proposed development site. Table 7 summarises the predicted noise levels at the most exposed proposed building facades, as per the proposed site layout.

Period	Measured/Predicted Noise Level (dB, $L_{Aeq,T}$)	"Risk Category"
Daytime	63	Low – Medium
Night-time	58	Low – Medium

Table 7 Categorising Proposed Site

Giving consideration to the baseline noise levels presented in the previous sections the initial site noise risk assessment has concluded that the level of risk on the site can be classified as a low to medium noise risk.

Additionally, the Stage 1 Noise Risk Assessment requires analyses of the L_{AFmax} noise levels. The results indicate that the L_{AFmax} noise levels do not exceed 80 dB more than 20 times per night, and therefore does not exceed the threshold whereby ProPG recommends that the site is not considered as high risk, with respect to this aspect.

ProPG states the following with respect to low and medium risks:

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

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

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

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

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

4.0 STAGE 2 – FULL ACOUSTIC ASSESSMENT

4.1 Element 1 – Good Acoustic Design (GAD) Process

4.1.1 ProPG Guidance

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

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

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

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

4.1.2 Application of GAD Process to Proposed Application

Relocation or Reduction of Noise from Source

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

Planning, Layout and Orientation

Review of the site layout shows that the duplex units and two other rows of houses are orientated such that they face the Old Naas Road and while are more exposed to noise levels along the road, the buildings provide screening to the majority of the residential units and external amenity space located further east.

Duplex unit layouts have been designed so that terraces are located on the quiet side of the building, screened from the road.

The external amenity spaces have been located with large set-back distances from the nearby road and therefore less exposure to traffic noise.

Select Construction Types for meeting Building Regulations

Masonry constructions will be used in constructing the external walls of the development. The masonry construction type offers high levels of sound insulation performance. However, as is typically the case the glazed elements and any required

ventilation paths to achieve compliance with Part F of the Building Regulations will be the weakest elements in the façade in terms of sound insulation performance.

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

> "2.22 *Using fixed unopenable glazing for sound insulation purposes is generally unsatisfactory and should be avoided;* ***occupants generally prefer the ability to have control over the internal environment using openable windows, even if the acoustic conditions would be considered unsatisfactory when open****. Solely relying on sound insulation of the building envelope to achieve acceptable acoustic conditions in new residential development, when other methods could reduce the need for this approach, is not regarded as good acoustic design. Any reliance upon building envelope insulation with closed windows should be justified in supporting documents* "
>
> *Note 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded*
>
> 2.34 *Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed,* ***which may be the case in urban areas and at sites adjacent to transportation noise sources****, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment. In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide "whole dwelling ventilation" in accordance with Building Regulations Approved Document F (e.g. trickle ventilators) in the open position (see Supplementary Document 2). Furthermore, in this scenario the internal L_{Aeq} target noise levels should not generally be exceeded."*

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

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

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

Assess Viability of Alternative Solutions

This will be explored as the project progresses and the noise model will be used to assess the acoustic benefit of any alternative solutions.

Assess External Amenity Area Noise

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

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

Noise levels across amenity areas is addressed in Section 4.3 below.

4.2 Element 2 – Internal Noise Levels

Internal Noise Criteria

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

In addition to these absolute internal noise levels, ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered necessary or desirable, and noise levels exceed the external WHO guidelines, then a relaxation of the internal L_{Aeq} values by up to 5 dB can still provide reasonable internal conditions.

Façade Noise Levels

Noise levels have been predicted across the development site during day and night-time periods. Table 8 presents the assigned noise levels for the various facades of the buildings on site.

Façade Ref	Period	$L_{Aeq,T}$ dB
Duplex (western façade)	Day	60 - 63
	Night	55 - 58
Houses #1 - #7, #16 (western façade)	Day	60 - 63
	Night	55 - 58
Houses #8 – #12 (south western façade)	Day	< 57 - 57
	Night	<52 - 52
Houses #17 – #24 (south western façade)	Day	57 - 60
	Night	52 - 55
Remaining units	Day	< 57

Façade Ref	Period	$L_{Aeq,T}$ dB
	Night	< 52

Table 8 Summary of Assigned Façade Noise Levels

Discussion on Open/Closed Windows

The level of sound reduction offered by a partially open window is typically applied as 15 dB[2] to 18 dB.

Considering the design goals outlined in Table 1 and sound reduction across an open window of 15 dB, the free-field noise levels that would be required to ensure that internal noise levels do not exceed 'good' or 'reasonable' internal noise levels have been summarised in Table 9.

Level Desired	Day 07:00 to 23:00hrs	Night 23:00 to 07:00hrs
Good (i.e. at or below the internal noise levels)	50 – 55 dB $L_{Aeq,16hr}$	45 dB $L_{Aeq,8hr}$
Reasonable (i.e. 5 dB above the internal noise levels)	55 – 60 dB $L_{Aeq,16hr}$	50 dB $L_{Aeq,8hr}$

Table 9 External Noise Levels Required to Achieve Internal Noise Levels

Giving consideration to the external noise levels, it will be necessary to use appropriate glazing elements to meet the recommended internal noise levels. Regarding ventilation strategy, background ventilation via in-wall vents/ trickle vents is proposed and therefore there is not a requirement to open windows.

Based on the predicted external noise levels across the site, noise levels in rooms in the vast majority of units will be within the 'Good' and 'Reasonable' ranges set out above. In a small number of units, i.e. those overlooking the Old Naas Road, should an occupant decide to open a window, noise levels internally will increase.

Recommend Façade Treatment

The British Standard BS 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* provides a calculation methodology for determining the sound insulation performance of the external envelope of a building. The method is based on an elemental analysis of the building envelope and can take into account both the direct and flanking transmission paths.

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

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

The principles outlined in BS EN 12354-3 are also referred to in BS8233 and Annex G of BS8233 provide a calculation method to determine the internal noise level within a building using the composite sound insulation performance calculated using the

2 Section 2.33 of ProPG, additional information can be found in the DEFRA NANR116: *'Open/Closed Window Research' Sound Insulation Through Ventilated Domestic Windows'*

methods outlined in BS EN 12354-3. The methodology outlined in Annex G of BS8233 has been adopted here to determine the required performance of the building facades. This approach corrects the noise levels to account for the frequency content of the source in question. In this instance, road traffic noise, depending on the buildings in question.

Glazing

As is the case in most buildings, the glazed elements of the building envelope are typically the weakest element from a sound insulation perspective. In this instance the facades will be provided with glazing that achieves the minimum sound insulation performance as set out in Table 10.

Glazing Specification	Octave Band Centre Frequency (Hz)						R_w
	125	250	500	1k	2k	4k	
Blue	20	21	30	38	36	35	33
No mark up	Standard double glazing						

Table 10 Sound Insulation Performance Requirements for Glazing, SRI (dB)

The glazing performance requirement for the various facades can be confirmed by reviewing the mark up presented in Figure 6.

The overall R_w value outlined above are provided for information purposes only. The over-riding requirement is the Octave Band sound insulation performance values which may also be achieved using alternative glazing configurations. Any selected system will be required to provide the same level of sound insulation performance set out in Table 10 or greater.

It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing system. In the context of the acoustic performance specification the 'glazing system' is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements etc.

It is advised that the window supplier provides laboratory tests confirming the sound insulation performance. It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing system when installed on site.

Figure 6 Assigned Façade Glazing Types (Refer to Table 10)

Wall Construction

In general, all wall constructions (i.e. block work or concrete and spandrel elements) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal. The calculated internal noise levels across the building façade have assumed a minimum sound reduction index of 50 dB R_w for this construction.

Ventilation

The ventilation strategy for the development is for background ventilation via wall/trickle vents. As noted above, on those facades where noise mitigation is provided by the higher specification glazing, the standard vents should be upgraded to achieve a sound insulation performance of 35 dB $D_{n,e,w}$.

Internal Noise Levels

Taking into account the external façade levels and the specified acoustic performance to the building envelope, the internal noise levels have been calculated.

All locations are predicted to achieve good internal noise levels with windows closed.

4.3 Element 3 – External Amenity Areas

For this development the good acoustic design principles employed have ensured that the majority of private external spaces are positioned to benefit from the screening effect of the development buildings. With respect to the current layout, the vast majority of the private outdoor amenity space is predicted to achieve a noise level ≤55 dB $L_{Aeq,16hr}$.

Communal outdoor amenity space is also provided within the development. This space is located inside the eastern site boundary, set back from the Old Naas Road and the influence of traffic noise and also screened by buildings within the development itself. Noise levels in the amenity space are predicted to be < 55 dB $L_{Aeq,16hr}$.

4.4 Element 4 – Assessment of Other Relevant Issues

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

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

Each is discussed in turn below.

4.4.1 Compliance with Relevant National and Local Policy

There are no national policy documents relating to the acoustic design of residential dwellings. Locally the Dublin Noise Action Plan specifies that the guidance contained within ProPG should be used in assessing the noise impact on new residential developments.

This Acoustic Design Statement has been prepared in compliance with the requirements of ProPG and therefore complies with the requirements of local policy.

4.4.2 Magnitude and Extent of Compliance with ProPG

As discussed within this report the following conclusions have been drawn with regards to the extent of compliance with ProPG:

- All dwellings as part of the development have been designed to achieve the good level of internal noise levels specified within ProPG with windows closed and vents open.
- The vast majority of external amenity areas have been determined to have an external noise level that complies with the recommended criterion set out in ProPG.

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

4.4.3 Likely Occupants of the Development

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

4.4.4 Acoustic Design v Unintended Adverse Consequences

Design aspects such as roadside barriers that remove views or prevent crossing roads, sealed facades that affect personal control over the internal environment etc., have been avoided through implementation of Good Acoustic Design principles.

4.4.5 Acoustic Design v Wider Planning Objectives

It is assumed that wider planning objectives have been adhered to during the process of developing the design for the subject development.

7.0 CONCLUSION

AWN Consulting has been commissioned to carry out a study in relation to the potential inward noise impacts on the proposed residential development at Gordon Park, Old Naas Road, Kingswood, Dublin 22. This document presents the noise review of the proposed development site with respect to the inward noise impacts.

A baseline noise survey has been undertaken at the development site to determine the existing noise environment at the site. An inward noise assessment has been undertaken based on the results of the noise survey as recommended in the ProPG: Planning & Noise guidance document.

The measured noise levels on the site have been used to calculate noise levels at specific facades of proposed residential properties and to predict the internal noise levels within living room and bedroom spaces, taking account of the proposed building envelope and conditions in the receiving rooms (e.g. volumes and room acoustic characteristics). Based on these noise levels, appropriate acoustic glazing and ventilators have been recommended to facades overlooking the Old Naas Road.

Based on the implementation of the measures outlined in this assessment, the predicted noise levels conform to the criteria taken from BS8233:2014 for acceptable internal noise levels. It should be noted that the predicted internal noise levels detailed above assume that windows and doors will be closed and vents will be open. As discussed in Section 4.1.2 there is no requirement for assessment of internal noise levels with windows open, however it is expected that a good portion of site will achieve at least 'reasonable' internal noise levels with windows open.

It is predicted that the majority of the amenity space will experience noise levels of ≤55dB $L_{Aeq,16hr}$ in line with the recommended noise level.

APPENDIX A
GLOSSARY OF ACOUSTIC TERMINOLOGY

Ambient noise — The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.

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.

$D_{n,e,w}$ — Weighted element-normalized level difference. This is the value of sound insulation performance of a ventilator measured under laboratory conditions. It is a weighted single figure index that is derived from values of sound insulation across a defined frequency spectrum. Technical literature for acoustic ventilators typically presents sound insulation data in terms of the $D_{n,e,w}$ parameter.

Hertz (Hz) — The unit of sound frequency in cycles per second.

$L_{Aeq,T}$ — This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T).The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.

L_{AFN} — The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.

L_{AF90} — Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.

L_{AF10} — Refers to those A-weighted noise levels in the upper 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period. It is typically representative of traffic noise levels. Measured using the "Fast" time weighting.

L_{AFmax}	is the instantaneous fast time weighted maximum sound level measured during the sample period.
L_{den}	The L_{den} (Day Evening Night Sound Level) is the average sound level over a 24 hour period, with a penalty of 5 dB added for the evening hours or 19:00 to 22:00, and a penalty of 10 dB added for the night-time hours of 22:00 to 07:00.
Octave band	A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000Hz octave band contains acoustical energy between 707Hz and 1,414Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards.