Bothar an Choiste Galway

Planning Stage Acoustic Design Statement

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Document Information

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Revision Table

Report revision	Date	Description	Author	Reviewer
DRAFT	22 July 202227 July 2022	DRAFT for comments	James Cousins	Dr Emmet English
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Glossary

A-weighting	A spectrum adaption that is applied to measured noise levels to represent human hearing. A-weighted levels are used as human hearing does not respond equally at all frequencies.
dB	Decibel—a unit of measurement used to express sound level. It is based on a logarithmic scale which means a sound that is 3 dB higher has twice as much energy. We typically perceive a 10 dB increase in sound as a doubling of that sound level.
dB(A)	Units of the A-weighted sound level.
Frequency (Hz)	The number of times a vibrating object oscillates (moves back and forth) in one second. Fast movements produce high frequency sound (high pitch/tone), but slow movements mean the frequency (pitch/tone) is low. 1 Hz is equal to 1 cycle per second.
L_{eq}	Equivalent Noise Level—Energy averaged noise level over the measurement time.
L_{90}	Noise level exceeded for 90 % of the measurement time. The L_{90} level is commonly referred to as the background noise level.
R_W	Weighted Sound Reduction Index—A laboratory measured value of the acoustic separation provided by a single building element (such as a partition). The higher the R_W the better the noise isolation provided by a building element.
Reverberation Time (RT)	Of a room, for a sound of a given frequency or frequency band, the time that would be required for the reverberantly decaying sound pressure level in the room to decrease by 60 decibels.
$D_{n,e,w}$	Element normalised level difference, weighted - A laboratory measured value of the acoustic separation provided by a small building element.
L_{den}	(day-evening-night noise level) is the A-weighted, Leq (equivalent noise level) over a whole day, but with a penalty of +10 dB(A) for night-time noise (22:00-07:00) and +5 dB(A) for evening noise (19:00-23:00).
L_{day}	(day noise level), is the A-weighted, Leq (equivalent noise level) over the 16-hour day period of 07:00-23:00 hours, also known as the day noise indicator
L_{night}	(night noise level), is the A-weighted, Leq (equivalent noise level) over the 8-hour night period of 23:00-07:00 hours, also known as the night noise indicator.

Executive Summary

Amplitude Acoustics have been engaged to conduct a planning stage acoustic assessment for the planning application of a proposed new residential development consisting of 170 new residential dwellings and creche at Bothar an Choiste, Castlegar, Co. Galway. The development will be composed of 84 houses, 86 apartments and a creche.

As the proposed site is located immediately south of the proposed N6 Galway City Ringroad, an acoustic design statement is required to be submitted to Galway County Council. The report summarises a noise assessment of the site in accordance with the relevant regulation and guidance. Implementing the acoustic design guidance in this report is predicted to achieve acceptable internal noise levels for the proposed use of the site.The criteria for the project have been developed with regard to the requirements of:

- Galway County Council Noise Action Plan 2019-2023
- ProPG: Planning & Noise – New Residential Development, May 2017, and
- British Standard BS8233:2014 'Guidance on sound insulation and noise reduction for buildings.

The existing noise levels on the site have been established from attended noise measurements which were conducted on 30th June 2022, and an unattended noise logger deployed to continuously record noise levels from 30th June to 5th July 2022.

Using the measured noise levels, an assessment has been completed in accordance *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*.

Based upon the above, the acoustic performance requirements for the building have been developed to achieve the internal noise levels defined in BS 8233 and ProPG.

Interior noise levels for the whole development are predicted to comply with interior noise level criteria (L_{Aeq}) from BS 8233 and ProPG provided that the construction requirements detailed in Section 7 are implemented. The L_{AFmax} noise levels in the existing environment and those due to occur from the development of the proposed Galway Ring Road have been assessed and are predicted to remain within the criteria outlined in Table 1.Therefore, sleep disturbance due to the predicted internal noise levels is unlikely to occur.

The external noise levels across the majority of the site are predicted to comply with the desirable external amenity noise levels of 55dB L_{day} ($L_{Aeq,16hr}$). There are 24 rear gardens along the northern boundary of the site closest the proposed GCRR which are predicted to exceed the recommended levels by 1-8dB, in addition to 20 balconies and terraces on the southern boundary of the site due to traffic noise from Bothar an Choiste. This is however offset by the provision of 4 large public open spaces on the site which combine to an area of circa 6012sqm which all naturally comply with the desirable external amenity noise levels.

Based on the above the overall development complies with the relevant requirements of the ProPG: Planning & Noise and the British Standard BS 8233:2014.

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1 Introduction

Amplitude Acoustics have been engaged to conduct a planning stage acoustic assessment for the planning application of a proposed new residential development consisting of 170 new residential dwellings and creche at Bothar an Choiste, Castlegar, Co. Galway. The development will be composed of 84 houses, 86 apartments and a creche.

As the proposed site is located immediately south of the proposed N6 Galway City Ringroad, an acoustic design statement is required to be submitted to Galway County Council. The report summarises a noise assessment of the site in accordance with the relevant regulation and guidance. Implementing the acoustic design guidance in this report is predicted to achieve acceptable internal noise levels for the proposed use of the site.

2 Site Description

The proposed development is located on lands along Bothar an Choiste, Castlegar, Co. Galway. The development will consist of the construction of 170 new dwellings made up of both houses and apartments ranging in height from two to four storeys in height. The site is bounded by:

- Agricultural land (location of the proposed Galway City Ringroad (GCRR)) to the north and east.
- Agricultural land and commercial premises to the west.
- Bothar an Choiste and residential dwellings to the south.

Figure 1 below shows an aerial view showing site boundary in relation to the surrounding area and the adjacent roads. The location of attended noise measurements and a noise logger deployed on the site boundary is also included in the figure. Figure 2 further below shows the location of the site in relation to the proposed GCRR.

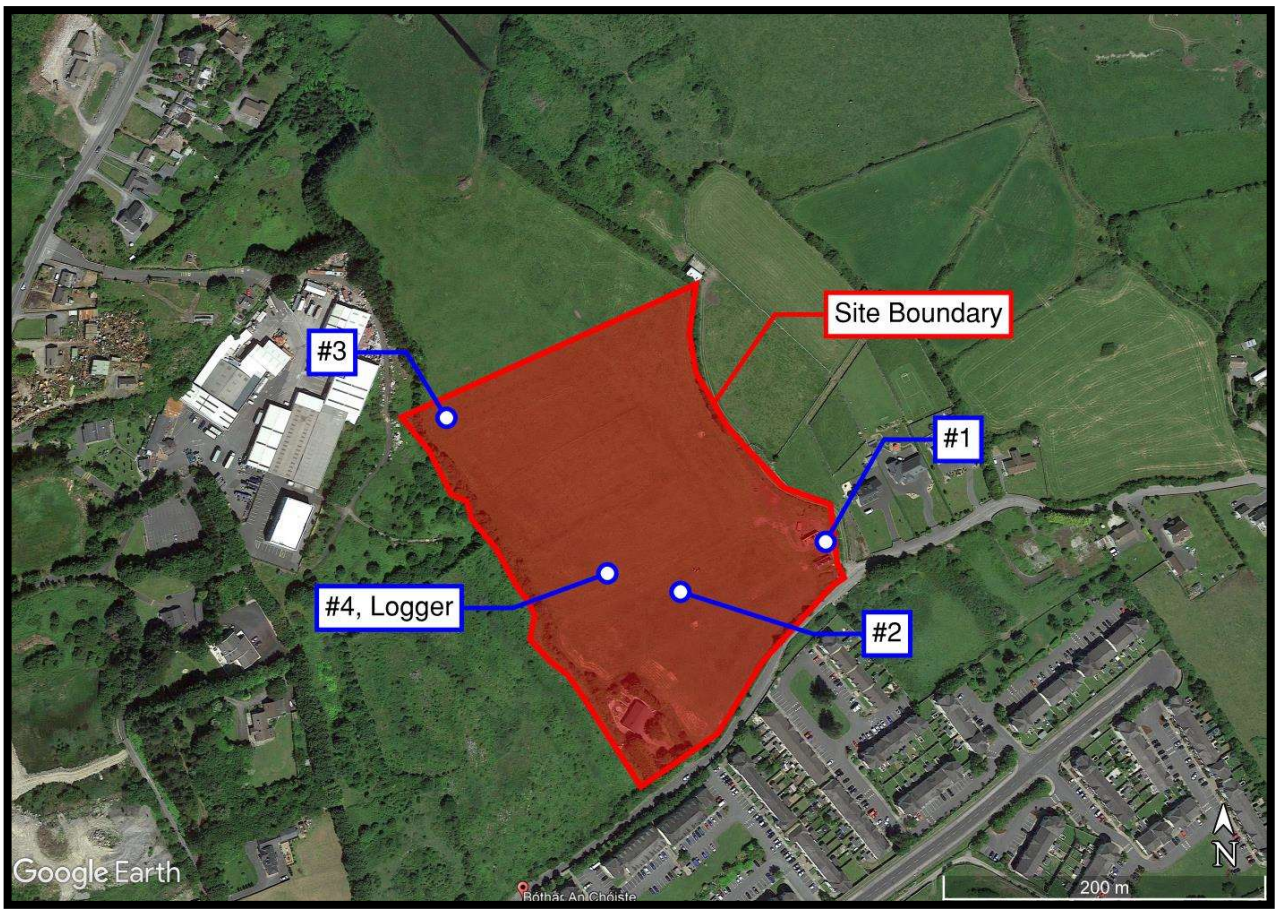

Figure 1: Aerial view showing site boundary and location of attended measurements and noise logger.

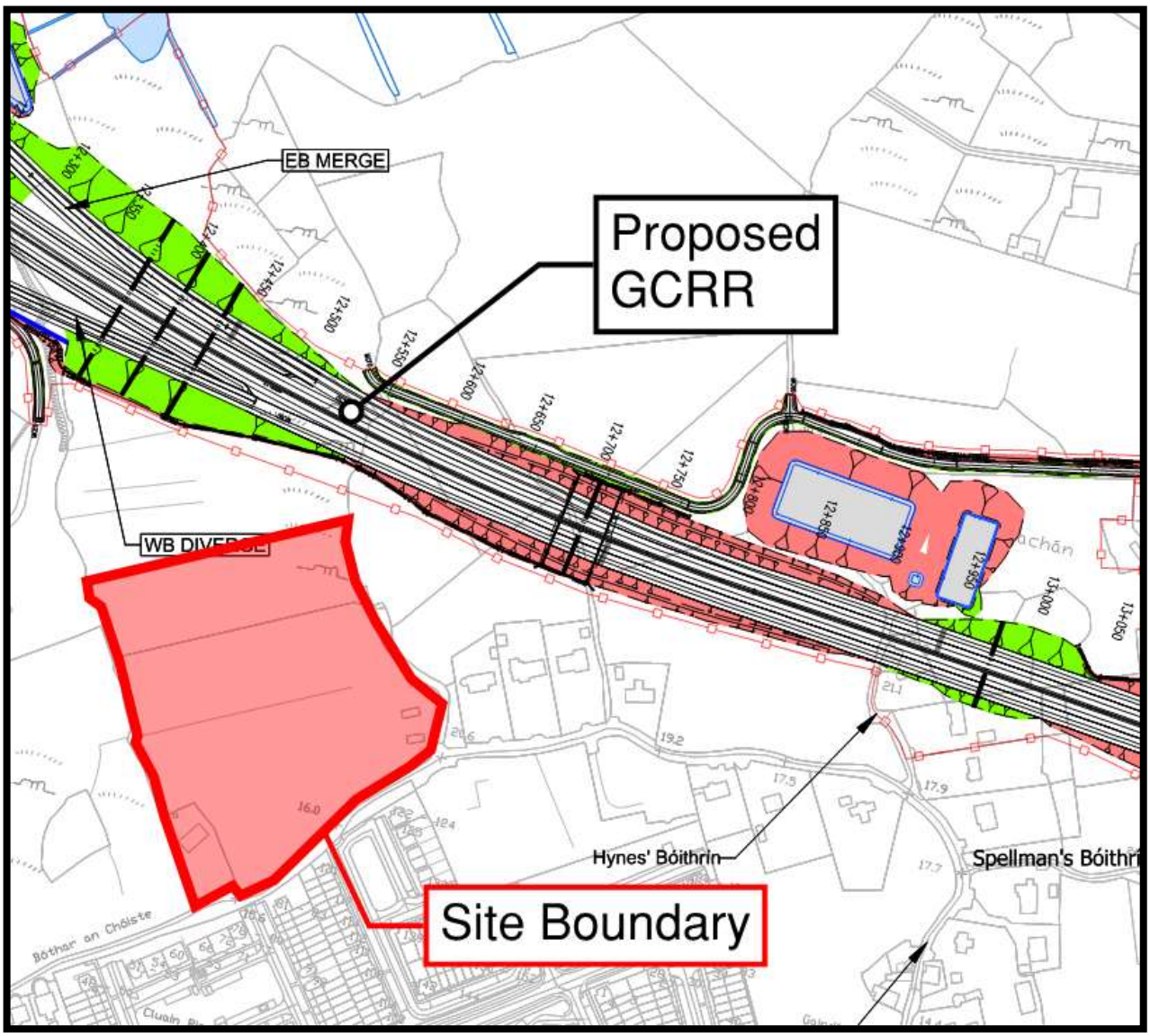

Figure 2: Proposed site boundary in relation to newly proposed GCRR (Galway City ring road)

3 Acoustic Criteria

A summary of the relevant policy, standards and guidance documents used to inform the noise impact assessment of the scheme is provided below.

- Galway County Council Noise Action Plan 2019 — 2023
- BS 8233: 2014 Guidance on Sound Insulation and Noise reduction for Buildings.
- ProPG Professional Practice Guidance on Planning & Noise.
- ISO 1996-1:2016 Acoustics — Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures

3.1 ProPG: Professional Practice Guidance on Planning & Noise

ProPG was published on 22 June 2017 and the scope is restricted to new residential development exposed predominantly to airborne noise from transport sources. The guidance encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise. The guidance was prepared by the Institute of Acoustics, the Association of Noise Consultants and the Chartered Institute of Environmental Health. It encourages a holistic design process where acoustics is integral to the living environment. This covers careful site layout and better orientation of rooms within dwellings. Although the guidance is largely designed for residential developments such as apartments, flats and houses ProPG states that it can also be applied to other types of residential developments such as residential institutions, care homes etc.
The recommended approach for new residential development is in two stages; Stage 1 is an initial noise risk assessment of the proposed development site for an early indication of the initial suitability of the site for new residential development. Stage 2 is a systematic consideration of the proposed development that should be completed if the Stage 1 assessment indicates that the site is at increased risk of higher noise levels.

3.1.1 Stage 1 Assessment

For reference, the indicative noise levels for the initial site noise risk assessment as presented in ProPG are illustrated below.

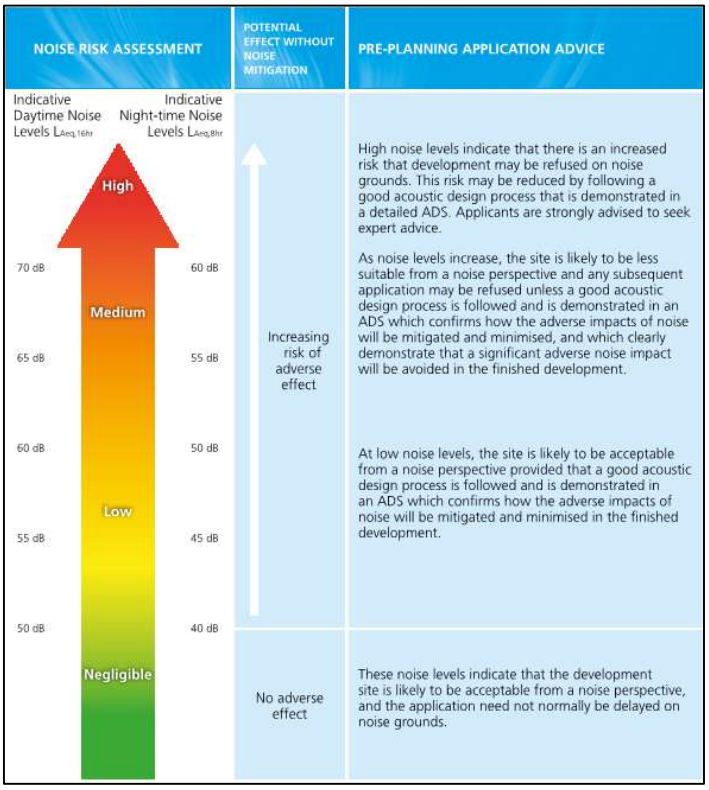

Figure 3: Stage 1 – Initial Site Noise Risk Assessment

3.1.2 Stage 2 Assessment

Stage 2 is a systematic consideration of four key elements:

a) Demonstrating a “Good Acoustic Design Process”.
b) Observing internal “Noise Level Guidelines”.
c) Undertaking an “External Amenity Area Noise Assessment”.
d) Consideration of “Other Relevant Issues”.

Good Acoustic Design Process

General principles (in order of preference):

e) Maximising spatial separation of noise sources and receptors.
f) Reducing existing noise levels or relocating noise sources, if possible.
g) Using existing topography and existing structures.
h) Incorporating noise barriers as part of the scheme.
i) Using layout to reduce noise propagation across the site.
j) Using orientation to reduce noise exposure of sensitive rooms.
k) Using building envelope to mitigate noise.

3.1.3 Internal Noise Levels

The relevant internal noise criteria for the development have been based on the requirements of BS 8233:2014 Guidance on sound insulation and noise reduction for buildings and *ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development May 2017*. Table 1 below provides relevant internal L_{Aeq} target levels for overall noise in the design of a building:

Table 1: BS 8233:2014 internal noise criteria – Commercial and Residential Buildings.

Activity	Location	07:00 to 23:00 Hrs	23:00 to 07:00 Hrs
Resting	Living Room	35 dB $L_{Aeq,\ 16\ hour}$	-
Dining	Dining Room/Area	35 dB $L_{Aeq,\ 16\ hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,\ 16\ hour}$	30 dB $L_{Aeq,\ 8\ hour}$
Working	Office	40 dB $L_{Aeq,\ 16\ hour}$	-

Note 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 $L_{Amax,F}$ more than 10 times a night.

For the purposes of this assessment, we have determined glazing requirements on the basis of achieving internal noise criteria as shown in Table 1 the living, sleeping and working areas of the proposed development.

3.1.4 External Amenity Areas

Guidance on noise levels for external amenity areas is provided by BS 8233:2014, ProPG 2017 and *Galway County Council Third Noise Action Plan 2019 - 2023*. 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 LAeq,16hr".* The standard continues… *"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."*

It should be noted that both BS8233:2014 and ProPG 2017 do not advise that development should be restricted in areas with undesirable noise levels, however it does recommend that appropriate mitigation measures are put in place and planning should not be restricted on this basis. Where required, design guidance has been provided to ensure lowest practicable external noise levels are achieved in line with ProPG 2017.

3.1.5 Consideration of Other Relevant Issues

The fourth and final element of Stage 2 is an assessment of other relevant issues. This element seeks to build upon relevant national and local planning and noise policies (item 4(i)) to provide a systematic list of recommendations for the issues that should be considered before making a judgement about the noise aspects of a particular planning proposal for new residential development. Other issues also considered as part of this assessment:

l) Compliance with relevant national/local policy.
m) Magnitude and extent of compliance with ProPG.
n) Likely occupants of the development.
o) Acoustic design versus unintended adverse consequences.
p) Acoustic design versus planning objectives.

4 Noise Measurements

4.1 Details

Attended noise measurements were conducted between 12:00hrs and 16:30hrs on 30th June 2022. An unattended noise logger was deployed to continuously record noise levels at the noise logger position #4 as indicated in Figure 1 from 30th June – 5th July 2022.

4.2 Instrumentation

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

Table 2: Measurement Equipment

Description	Manufacturer	Model	Serial No.
Noise Monitor	Svantek	SVAN971	87014
Sound Level Meter	Norsonic	NOR140	1402707
Acoustic Calibrator	Norsonic	NOR1251	35275

All equipment has calibration certificates traceable back to the relevant Standard. A calibration check of the sound level meter was conducted prior to and following the assessment using an external acoustic calibrator, with no significant drift in calibration measured.

4.3 Procedure

Noise measurements were undertaken in accordance with the following:

- Attended measurements were taken at the proposed site to assess the level of noise across the site and existing background noise levels.
- Attended measurements were taken for a duration of 15 minutes at locations outlined in Figure 1.
- The noise monitor was positioned at location #4 as shown in Figure 1 above. The noise monitor was positioned approximately 1.5 meters above the ground.
- A wind shield was used during all measurements, and the attended measurements were undertaken during a calm, still period (for which the wind velocity did not exceed 5 m/s).
- Extraneous noise due to wind exceeding 5m/s and/or rain was filtered from the logger data.
- Care was taken to avoid any effect on the measurement of extraneous noise, acoustic vibration or electrical interference.

4.4 Weather Conditions During Survey

Weather conditions during the attended survey were as follows:

- Wind: light to moderate wind from south observed/measured.
- Precipitation: Moderate rainfall during the day of 1st July and heavy rainfall during the night of 1st July into the morning of 2nd July 2022 during unattended survey, otherwise none.
- Other: no additional weather effects noted.

4.5 Unattended Noise Monitoring Results

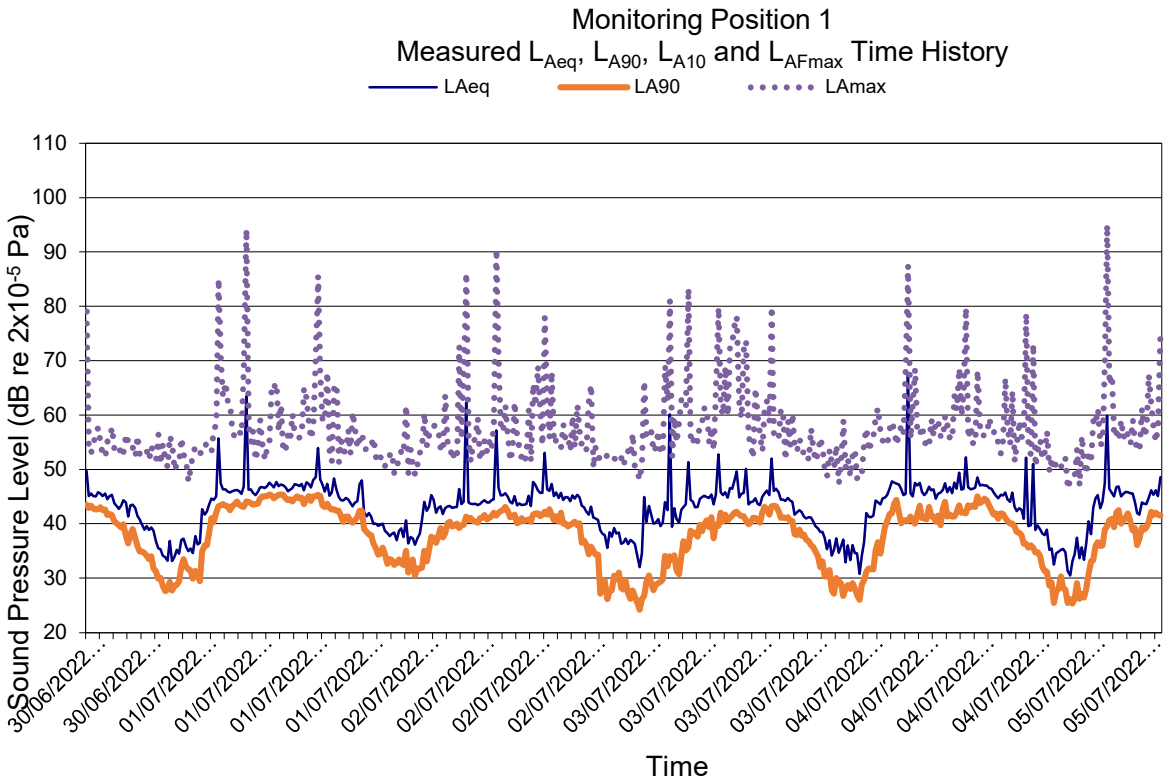

Figure 4: Results of the unattended noise monitor indicated L_{Aeq}, L_{AFmax} and L_{AF90} noise levels for each 15 minute interval over the monitoring period.

Figure 4 above displays the results of the unattended noise monitor including L_{Aeq}, L_{AFmax} and L_{AF90} noise levels for each 15-minute interval over the monitoring period. Examination of results indicate a typical diurnal profile with higher noise levels during the daytime and lower noise levels at night-time. The maximum noise levels are associated with traffic passes.

Using the monitoring results, the L_{day}, L_{night} and 10th highest L_{AFmax} noise levels at the monitoring location have been determined and are summarised in Table 3 below. Examination of the data in Table 3 indicates that the maximum noise level typically does not exceed L_{AFmax} 55dB more than 10 times (as per ProPG criteria) in a given night-time period (23:00 – 07:00).

Table 3: Summary of unattended noise measurements at the noise monitor location (#1)

Day & Date	Daytime L_{Aeq} (07:00 – 23:00) (dB)	Night-time L_{Aeq} (L_{night}) (23:00 – 07:00) (dB)	10th Highest Night-time L_{Amax} (23:00 – 07:00) (dB)
Thursday 30/06/2022	44[1]	43	55
Friday 01/07/2022	49	41	54
Saturday 02/07/2022	48	40	53
Sunday 03/07/2022	47	40	55
Monday 04/07/2022	51	46	54
Tuesday 05/07/2022	45	43	--

Day & Date	Daytime L_{Aeq} (07:00 – 23:00) (dB)	Night-time L_{Aeq} (L_{night}) (23:00 – 07:00) (dB)	10th Highest Night-time L_{Amax} (23:00 – 07:00) (dB)
Weekday Average	**48**	**48**	**N/A**

1: Reduced measurement period 16:30hrs – 23:00hrs
2: Reduced measurement period 07:00hrs – 12:30hrs

Error! Reference source not found. highlights the distribution of magnitude of L_{AFmax} events recorded during the night-time period from

4.5.1 30th June – 5th July 2022. Attended Noise Survey Results

A summary of the attended measurements taken on 30th June 2022 to establish noise levels across the site can be seen in Table 4.

Table 4: Summary of attended noise measurements on 30th June 2022

Time hrs	Date	Location	Duration	Noise Levels		
				L_{Aeq} dB	L_{AFmax} dB	L_{A90}dB
12:30	30/06/22	#1	15 min	48	71	43
12:58	30/06/22	#2	15 min	49	59	63
13:19	30/06/22	#3	15 min	42	55	40
13:39	30/06/22	#2	15 min	46	55	44
13:57	30/06/22	#1	15 min	46	61	43

Observations taken during the site attended survey indicate the following:

- Traffic noise from Bothar an Choiste was the dominant source

5 Road Traffic Noise Modelling

Noise emissions from the adjacent Bothar an Choiste and proposed N6 GCRR have been modelled using SoundPLAN 8.2 software. The model accounts for the following factors:

- Source sound pressure levels.
- Source directivity and orientation.
- Distance attenuation, including source and receptor heights.
- Barrier effects due to facility structures and other buildings.
- Ground effects and absorption
- Atmospheric attenuation.
- Meteorological effects.

The model has been calibrated and validated using the results of both the unattended monitoring, and the spatially distributed attended calibration measurements for the existing roads and noise levels at the site. Once calibrated the proposed GCRR was added into the model. AADT Traffic volumes and traffic speed for Design Year 2039 (Medium Growth) for the proposed GCRR have been used as detailed within the N6 Galway City Ring Road EIAR dated 28 September 2018 and listed below:

- N6 GCRR 49,876 (5% HGV) 100km/hr

Using the model, the noise levels across the proposed site have been predicted during the daytime ($L_{Aeq,\ 16hrs}$) and night-time ($L_{Aeq,8hrs}$), with noise contours for the same now included in Appendix A – Predicted Noise Contours.

6 ProPG Stage 1 – Initial Noise Risk Assessment

The results of the noise model have been used to plot the daytime and night-time $L_{Aeq,T}$ noise levels across the proposed development site in the absence of any existing buildings. The risk assessment has included both existing road traffic noise and predicted noise from the proposed GCRR.
The noise maps shown in Figure 5 and Figure 6 (Appendix A – Predicted Noise Contours) identify the noise risk categories across the site for day and night-time period due to the noise emissions from the adjacent roads.
Examination of the monitoring results and predicted noise contours indicate:

- During the daytime the risk categories range from low to medium for the majority of the site, with the highest risk at the north-western corner of the site.

- During the night-time the risk categories range from low to medium for the majority of the site, reaching highest level of risk at the same north-western site boundary.

From this initial noise risk assessment, it can be concluded that the site is acceptable from a noise perspective, provided that a good acoustic design process is followed.

7 Assessment Methodology

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 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.
- The geometry and finishes of the receiving space.

The assessment been conducted with regard to the $L_{Aeq,16hour}$ (07:00 – 23:00) and Lnight (23:00 – 07:00) levels, as well as the maximum noise levels, L_{AFmax} during the night-time period.

7.1.1 Future Noise Levels

The current average rate of growth of vehicles on Irish roads is 3.9%[1] based on this the noise levels across the development are expected to rise by 1-2 dB over the next 10 years. A 1-2dB change in noise levels is generally considered an imperceivable change and therefore is not considered significant.

7.2 Predicted Internal Noise Levels

The proposed development is predicted to achieve the internal noise limits defined Table 1, subject to implementing the construction details outlined in Section 8 of this report.

7.3 Assessment of L_{AFmax}

ProPG states:

> *In noise-sensitive rooms at night (e.g., bedrooms) individual noise events (from all sources) should not normally exceed 45dB L_{AFmax} more than 10 times a night as this represents a threshold below which the effects of individual noise events on sleep can be regarded as negligible*.

. Amplitude experience of similar national roads and empirical models[2] indicate that the 10th highest L_{AFmax} is on average 19dB higher than the $L_{Aeq,\ 8hr}$ noise levels during the night time period. Examination of Figure 8 indicates that the $L_{Aeq,\ 8hr}$ is predicted to achieve an upper value of 56dB $L_{Aeq,\ 8hr}$, indicating an external level of 75dB L_{AFmax} will not be exceed more than 10 times per night. Based on the façade construction details outlined in Section 8, an external level of 82dB L_{AFmax} is required at the facades closest the proposed GCRR to produce an internal level of 45dB L_{AFmax}. Consequently, the L_{AFmax} noise levels are predicted to remain within the criteria outlined in Table 1 so long as the design guidance outlined in Section 8 is implemented in full, with sleep disturbance unlikely to occur as a consequence.

[1] https://www.tii.ie/tii-library/strategic-planning/nra-road-network-indicators/TII-National-Roads-Network-Indicators-2017.pdf .

[2] Proceedings of the Institute of Acoustics – Vol. 43. Pt. 1. 2021 - Conlon Et Al Empirical Relationship Between L_{night} and L_{Aeq}

7.4 External Amenity Area Noise Levels

7.4.1 Public Open Spaces

The development includes four large public open spaces providing a combined area of circa 6012sqm of public amenity and greenspace. All four of these have been assessed and all are predicted to comply with the ProPG recommended external amenity noise level 55dB $L_{Aeq,16hour}$. These large open spaces offer suitable alternate amenity for rear gardens and balconies which exceed the recommended levels.

7.4.2 Rear Gardens

Some of the rear gardens along the northern boundary of the site are predicted to exceed the recommended desirable external amenity noise levels of 55dB $L_{Aeq,16hour}$, falling in the range 55-63dB as can be seen in Figure 7 despite implementing a 1.8m high boundary wall to the rear. Along this boundary there are a total of 24 rear gardens, which exceed the recommended criteria, all other rear gardens across the site meet the recommended external amenity levels.

7.4.3 Balconies and Terraces

The noise levels across the majority of the site are predicted to meet the desirable external amenity noise level criteria of 55dBA L_{day} as seen in Figure 7 of Appendix A – Predicted Noise Contours. There are a total of 20 balconies on the southern elevations of the apartment blocks which are predicted to marginally exceed the recommended external amenity noise levels by 0-5dB due to road traffic noise from Bothar an Choiste road. All other apartments and all duplexes have been assessed and are predicted to meet the desirable levels set out in ProPG.

However, ProPG 2017 also states:

> *3(v) 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, 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 proposed development includes four large public open spaces within 5 minutes walking distances of the residential properties that has relatively quiet noise levels within the 50 – 55dB L_{day} ($L_{Aeq,16hr}$) criterion. Consequently, any residual impact due to the external noise levels is considered to be off-set by this publicly accessible external amenity space.

8 Construction Requirements

8.1 Proposed Glazed Elements, Windows and External Doors

The indicative façade glazing requirements for the development are shown in Table 5. It is a requirement that the full composite system including the window frame has as a minimum, the same sound insulation performance as the glazing specified.

Table 5: Glazed elements, windows and external doors requirements.

Type	Glazed Elements, Windows and External Doors Acoustic Performance R_w[1]	1/1 Octave Band Indicative Performance Requirements (equal or approved) R dB					
		125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Type A	38	34	31	34	37	41	38
Type B	33	20	24	28	36	40	25
Type C	30	14	18	26	36	45	21

1. The performance of a double and triple-glazed system is significantly improved by varying the pane thicknesses, e.g. 1 x 4mm pane + 2 x 6 mm panes. Different glazing options which achieve the acoustic performance requirements can be considered.
2. The performance of different glazing types varies for different manufacturers. Any glazing type to be installed should demonstrate that it achieves the composite acoustic performance requirements to the satisfaction of the acoustic consultant.

Internal noise level predictions are based on the sound transmission loss performance of typical glazing where no manufacturer is nominated. The glazing configurations presented in Table 5 are indicative only. Glass from various manufacturers is available that will meet the acoustic performance requirements, however any proposed glazing should be approved by an acoustic consultant prior to selection.

It is acoustically preferable for windows to be of a hinged (awning) construction and have cam locks to ensure a compression seal is achieved. In this case, windows are to have compression rubber seals around the perimeter.

Where glazed sliding doors and windows are located on facades, the glazing and framing of the doors is required to match the acoustic performance of fixed glazing.

8.2 Ventilation Systems

Ventilation systems have the potential to impair the acoustic performance of a façade system. Open windows have been considered but provide insufficient attenuation to achieve the internal design levels. Standard passive ventilation grilles offer minimal acoustic performance and are not suitable for some facades on this development. Should natural ventilation be selected on the facades all ventilation will need to be acoustically rated. Ventilation systems (including trickle and room vents) will be required to achieve:

- Facades with Type A glazing should have ventilation systems which achieve a $D_{n,e,w}$ of 41 dB
- Facades with Type B glazing should have ventilation systems which achieve a $D_{n,e,w}$ of 36 dB
- Facades with Type C glazing should have ventilation systems which achieve a $D_{n,e,w}$ of 32 dB

All facades are suitable for mechanical ventilation. For natural ventilation the façade and ventilation requirements are based on the achieving the ventilation requirements with the windows closed and a maximum of one (1) trickle vent in the bedrooms and a maximum of two (2) for all other spaces with the above referenced acoustic performance. Should any additional vents be required to achieve the ventilation requirements the acoustic consultant should be advised.

8.3 External Wall Constructions

The external wall construction of the proposed development should be designed to achieve an acoustic performance of R_W 60dB or above. Typical brick and timber framed constructions normally achieve this value.

8.4 Roof Constructions

The roof construction should be designed to achieve an acoustic performance of R_W 55 dB or above. All penetrations through the roof/ceiling system should be filled with insulation, faced with plasterboard and sealed with a resilient acoustic sealant.

9 Conclusions

Amplitude Acoustics have been engaged to conduct a planning stage acoustic assessment for the planning application of a proposed new residential development consisting of 170 new residential dwellings and creche at Bothar an Choiste, Castlegar, Co. Galway. The development will be composed of 84 houses, 86 apartments and a creche.

Road traffic noise levels have been assessed from both attended and unattended noise measurements conducted from 30th June to 5th July 2022.

Interior noise levels for the whole development are predicted to comply with interior noise level criteria (L_{Aeq}) from BS 8233 and ProPG provided that the construction requirements detailed in Section 7 are implemented. The L_{AFmax} noise levels in the existing environment and those due to occur from the development of the proposed Galway Ring Road have been assessed and are predicted to remain within the criteria outlined in Table 1.Therefore, sleep disturbance due to the predicted internal noise levels is unlikely to occur.

The external noise levels across the majority of the site are predicted to comply with the desirable external amenity noise levels of 55dB L_{day} ($L_{Aeq,16hr}$). There are 24 rear gardens along the northern boundary of the site closest the proposed GCRR which are predicted to exceed the recommended levels by 1-8dB, in addition to 20 balconies and terraces on the southern boundary of the site due to traffic noise from Bothar an Choiste. This is however offset by the provision of 4 large public open spaces on the site which combine to an area of circa 6012sqm which all naturally comply with the desirable external amenity noise levels.

Based on the above the overall development complies with the relevant requirements of the ProPG: Planning & Noise and the British Standard BS 8233:2014.

Appendix A – Predicted Noise Contours

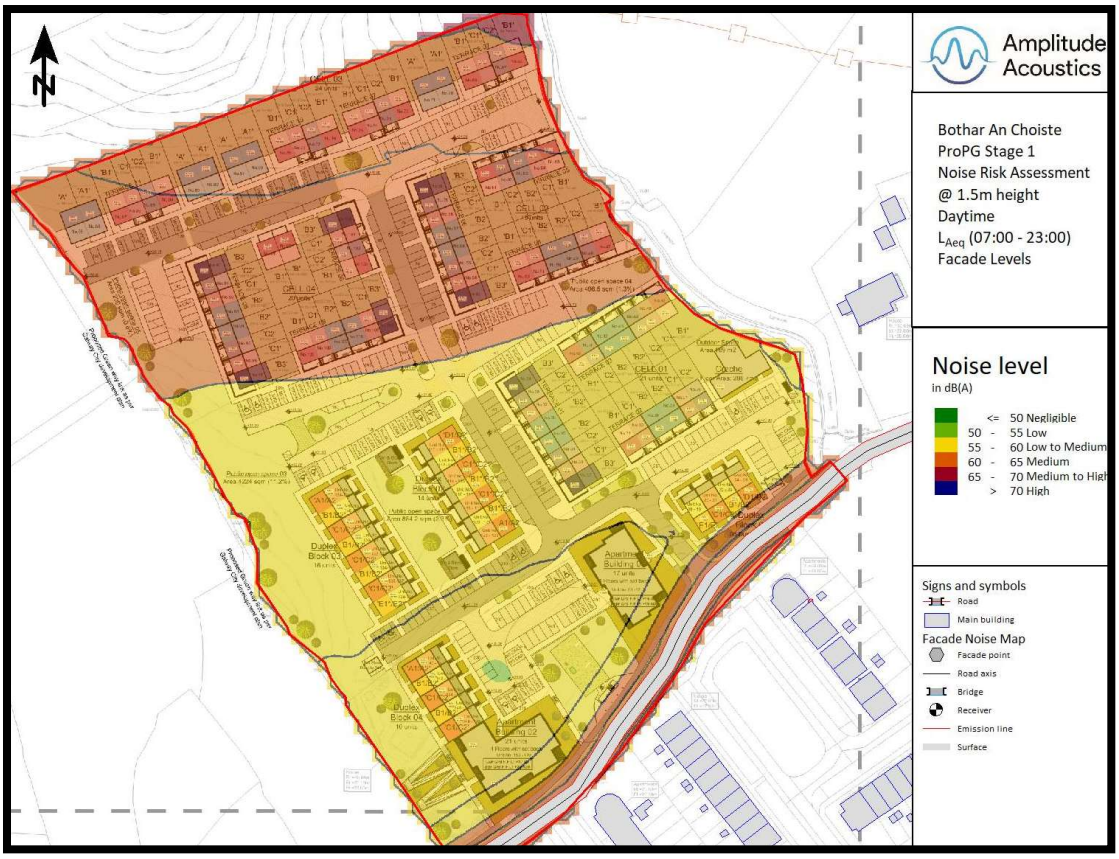

Figure 5: $L_{Aeq,\ 16hour}$ daytime noise levels across the site for use in Pro PG Stage 1 risk assessment including existing road traffic noise and noise from proposed GRCC.

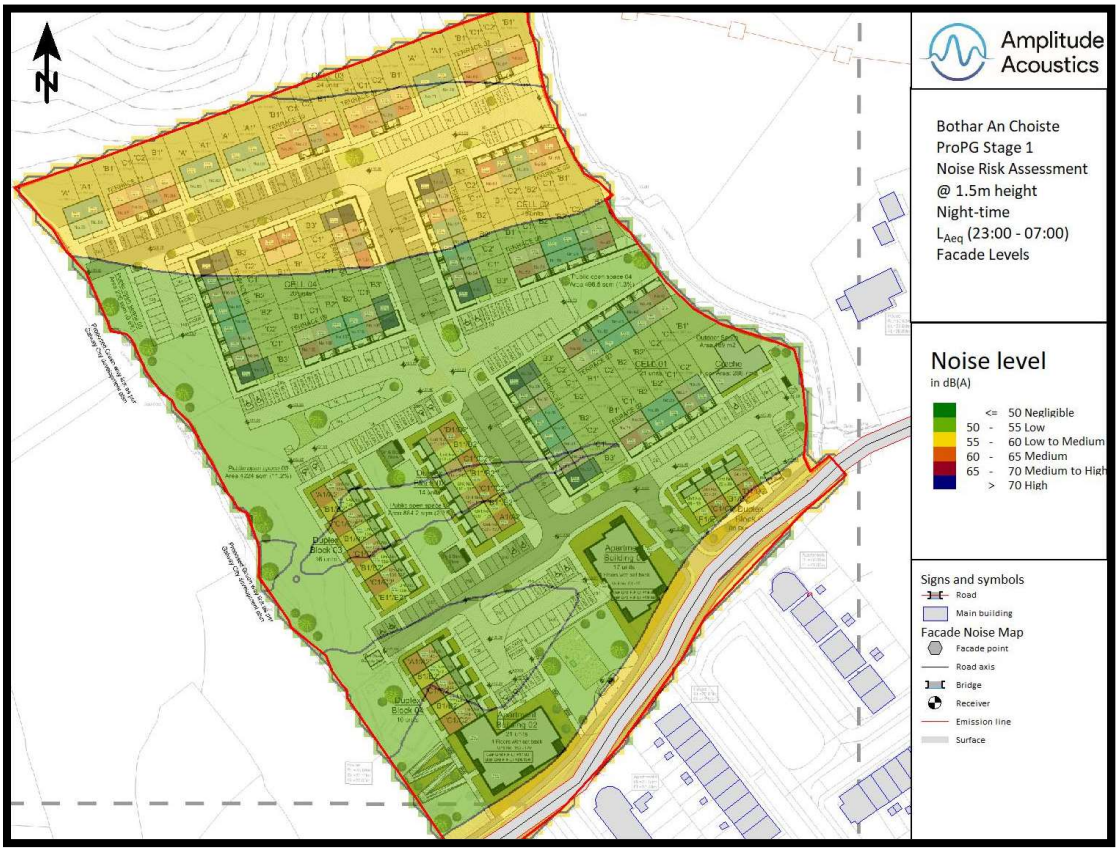

Figure 6: L_{night} (23:00 – 07:00) noise levels across the site for use in Pro PG Stage 1 risk assessment including existing road traffic noise and noise from proposed GRCC.

Figure 7: Daytime noise levels, $L_{Aeq,16hr}$, predicted across the proposed development site including the acoustic screening effect due to the proposed buildings and boundary walls.

Figure 8: Predicted $L_{Aeq,\ 8hr}$ noise levels across the proposed development site including the acoustic screening effect due to the proposed buildings and boundary walls.

Appendix B – Marked Up Drawings

Amplitude Acoustics

Title:
Glazing Mark Up
Bothar an Choiste Part 1
All Levels
Client:
MKO

Legend

Glazing Performance

- Rw 38 dB
- Rw 33 dB
- Rw 30 dB

AMPLITUDE REVIEW
Date: 21/07/2022
Revision: 0
Project Number: D220522

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Amplitude Acoustics

Title:
Glazing Mark Up
Bothar an Choiste Part 2
All Levels
Client:
MKO

Legend

Glazing Performance

- Rw 38 dB
- Rw 33 dB
- Rw 30 dB

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