Headford Road, Galway

Planning Stage Acoustic Design Statement

D220218RP1

Wednesday, 23 March 2022

Document Information

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Revision Table

Report revision	**Date**	**Description**	**Author**	**Reviewer**
0	23 March 2023	For Issue	Dominic Parkinson	Dr. Emmet English

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 24no. new dwellings, consisting of 3no. houses and 21 apartments at Headford Road, Galway.

The traffic noise at the site has been measured using a noise logger deployed on site for 5 days, undertaken between Wednesday 9th and Monday 14th March 2022.

A traffic noise model has been developed and calibrated using the measured noise levels and Traffic count data available for Headford Road. The calibrated model was then updated to include the future Galway City Ring Road (GCRR) and proposed development. Noise levels incident on the development were predicted based on the AADT Traffic volumes for the Design Year 2039 (Medium Growth) for the proposed GCRR and Headford Road as detailed within the N6 Galway City Ring Road EIAR dated 28 September 2018.

A 'Stage 1: Initial Site Noise Risk Assessment' and a 'Stage 2: Full Assessment', in line with advice on Professional Practice Guidance (ProPG) – Planning & Noise were undertaken.

Interior noise levels for the whole development are predicted to comply with interior noise level criteria (including both L_{Aeq} and L_{AFMax}) from BS 8233 and ProPG provided that the construction requirements detailed in Section 7 are implemented. Sleep disturbance due to the predicted internal noise levels is unlikely to occur.

The main external amenity area and private balconies/terraces are predicted to comply with the desirable external amenity noise level criteria.

Table of Contents

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 24no. new dwellings, consisting of 3no. houses and 21 apartments. The site is located at Headford Road, Galway, Co. Galway.

As the site is located in proximity to the future Galway City Ring Road (GCRR) and the existing Headford Road (N84), an acoustic report is required assessing the noise intrusion from road traffic noise on the proposed development. This report details the acoustic assessment of the site including internal and external amenity noise levels based on traffic noise levels measured at the site and projected traffic flows for the GCRR design year, 2039.

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 at Headford Road, Galway, Co. Galway. The existing site consists of an open field.

2.1 Existing Site

Immediately east of the site lies the Headford Road (N84), which was noted as the dominant noise source impacting on the development site. The site is bound to the south by a commercial premises, with residential buildings to the east and north.

Figure 1: Site Location Map Image © Google Earth

2.2 Proposed Development and GCRR

The proposed development comprises of 24no. new dwellings, consisting of 3no. houses and 21no. apartments. The development is to be cut into the exisitng land with the proposed GCRR located aproximately 55m to the north. Figure 2 beow presents the proposed development site and Figure 3 presents a 3D image of the site and the GCRR.

Figure 2: Site plan of proposed development

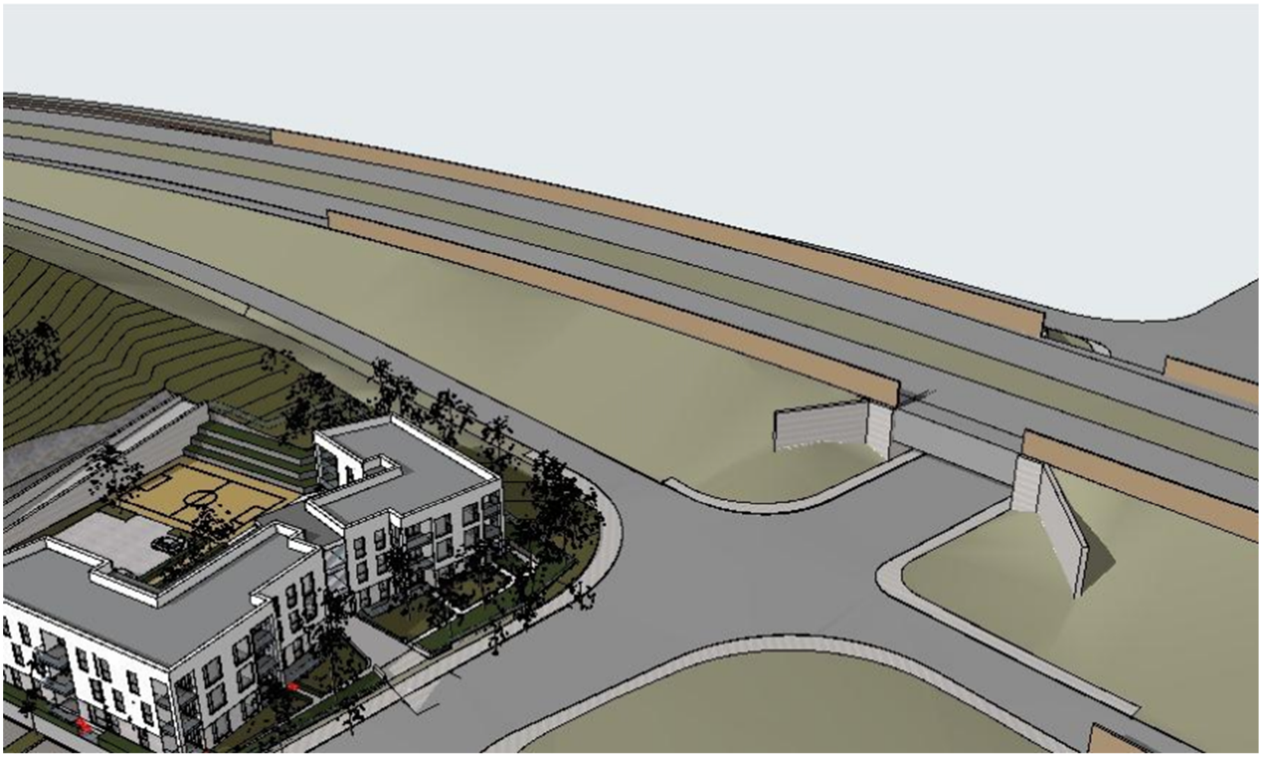


Figure 3: 3D Image of proposed development with proposed GCRR to the North.

3 Acoustic Criteria

The criteria for the project have been developed with regard to the requirements of ProPG 2017, BS 8233:2014, WHO Guidelines, and typical criteria outline in Co. Council noise action plans.

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. ProPG acknowledges and reflects the Noise Policy Statement for England, the National Planning Policy Framework and Planning Policy Guidance – Noise.

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.

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.

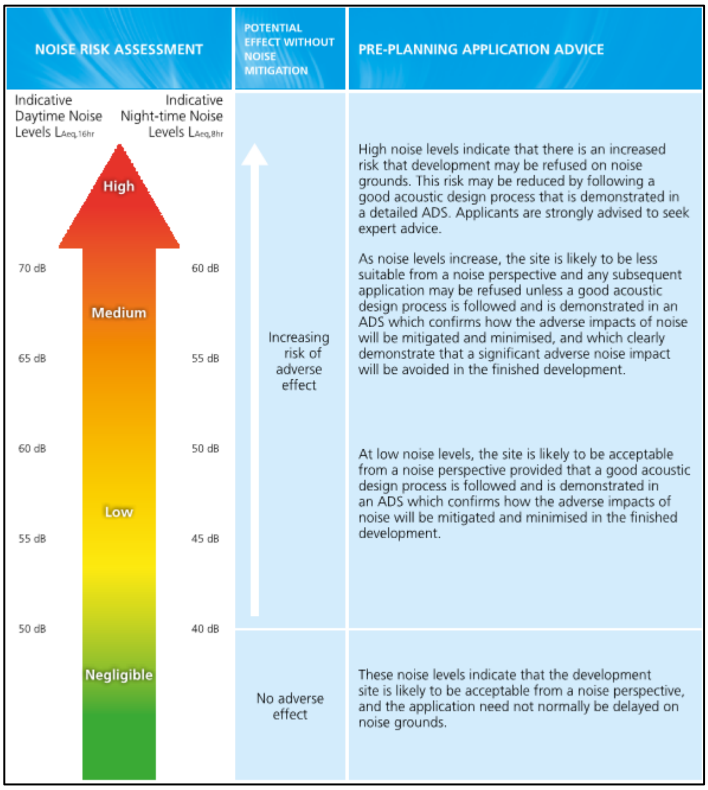


Figure 4: Stage 1 – Initial Site Noise Risk Assessment

3.1.2 Stage 2 Assessment

Stage 2 is a systematic consideration of four key elements:

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

Good Acoustic Design Process

General principles (in order of preference):

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

Internal Noise Level Guidelines

ProPG guidance is based on BS 8233:2014 and World Health Organisation recommendations. Internal ambient noise levels (IANL) are provided in Table 1. In addition to these values, there is a recommendation for individual noise events to not normally exceed 45 dB $L_{Amax,F}$ more than ten times a night in bedrooms.

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 $L_{Aeq,\ 8\ hour}$ 45dB L_{AFmax} (See Note 1)

External Amenity Areas

External amenity areas which are an intrinsic part of the overall design should ideally not be above 50-55 dB $L_{Aeq,16hr}$; or designed to achieve the lowest practicable noise levels (BS 8233:2014).

If significant adverse noise impacts remain on any private external amenity space, then this is partially off-set if residents are provided with access to a “relatively quiet” alternative external amenity space.

BS 8233:2014 provides a much more detailed narrative on noise levels in external amenity areas and acknowledges that it may not always be necessary or feasible to ensure that noise levels remain within these 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.”*

It is clear from the narrative of BS 8233:2014, that proposed development within noisy environments should be designed to ensure that the recommended internal design standards are achieved, and that noise levels in external amenity areas are designed to effectively control and reduce noise levels, although it acknowledges that in certain circumstances meeting the external design recommendations may not be feasible, or necessary, especially where the provision of such spaces is desirable for other technical, planning or policy reasons.

Consideration of Other Relevant Issues

- Compliance with relevant national/local policy.
- Magnitude and extent of compliance with ProPG.
- Likely occupants of the development.
- Acoustic design versus unintended adverse consequences.
- Acoustic design versus planning objectives.

4 Noise Measurements

4.1 Details

The prevailing noise conditions in the area have been determined by a detailed environmental noise survey. Measurements were conducted at an unattended location between Wednesday 9th to Monday 14th March 2022.

4.2 Measurement Location

Unattended sound measurements were undertaken at a fixed location at approximately 20m from Headford Road. The microphone was attached to a pole extending to an approximate height of 2.5m above ground floor. The measurement was considered to be free field.

The measurement position is described below and shown in Figure 5.

Figure 5: Measurement Location Image © Google Earth

4.3 Noise Survey Methodology

As detailed above, the noise survey comprised automated unattended measurements, undertaken at one fixed measurement position. Noise monitoring was undertaken over sequential 15-minute periods for the duration of the survey. A wind shield was used during all measurements, where appropriate extraneous noise due to wind exceeding 5m/s and/or rain was filtered from the measured data.

The sound indices measured during the sound survey are shown below:

- $L_{Aeq,T}$ - The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{Amax,T}$ - The A-weighted maximum sound pressure level that occurred during a given measurement period; Measured using the fast time weighting in accordance with the requirements of BS8233:2014.
- $L_{A10,T}$ - The A-weighted sound pressure level exceeded for 10% of the measurement period.

- $L_{A90,T}$ - The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

Third octave band L_{Aeq} sound pressure levels were also measured during the survey period.

4.3.1 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.
Sound Level Meter	SVAN	971	72287
Acoustic Calibrator	Larson Davis	CAL200	18194

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.

4.3.2 Subjective Impression on Noise Climate

Since the survey was largely unattended it is not possible to comment on the specific nature of the noise climate for the entire duration of the survey, however whilst on site the noise climate was noted as being dominated by local road movements, along Headford Road.

4.4 Noise Monitoring Results

The table presents a summary of the measured daytime and night-time L_{Aeq} noise levels and the 10th highest L_{Amax} night-time noise level.

Table 3: Traffic noise measurements at noise monitor location.

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
Wednesday 09/03/22	67	58	76
Thursday 10/03/22	66	58	74
Friday 11/03/22	66	58	75
Saturday 12/03/22	66	59	74
Sunday 13/03/22	65	58	74
Monday 14/03/22	66	-	75
Average	66	58	75

The measured L_{Aeq}, L_{Amax}, L_{den} and L_{A90} noise levels are also presented in full in tabular and graphical form in Appendix A. Typical spectral noise levels are also shown.

5 Noise Modelling

In order to predict the impact of noise on the proposed development, a detailed 3-dimensional geo-referenced noise model was developed for the site with and without the development. The baseline noise measurement results presented in Section 4 have been used to aid calibration of the model without the development. The measured noise levels at MP1 were compared against the predicted noise emissions from Headford Road based on traffic count data (AADT) available for 2019 (ref trafficdata.tii.ie). The predicted levels were comparable within 2dB during the day and 1dB during the night-time periods.

Using the calibrated model, the development and GCRR were added. AADT Traffic volumes for Design Year 2039 (Medium Growth) for the proposed GCRR and Headford Road have been used as detailed within the N6 Galway City Ring Road EIAR dated 28 September 2018 and listed below:

- N84 South of GCRR 19,788 (5% HGV)
- N6 GCRR - Between N83 and N84 49,876 (5% HGV)

The likely noise levels across the development were predicted using the above information and including the topography of the site. It is noted that along the GCRR a 2m noise barrier is proposed, this has been included in the model.

The predictions have been carried out using the noise-modelling suite SoundPLAN 8.2, in accordance with the CRN, CRTN and ISO 9613 prediction methodologies (where appropriate), which allows the modelling of various road, rail and plant noise sources, whilst taking consideration of the effects of the acoustic screening provided by the as-built structures of the proposed development.

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 buildings.

The noise maps shown in Appendix B identify the noise risk categories across the site for day and night-time period due to the noise emissions from Headford Road.

During the daytime the risk categories range from Medium to High for areas within 30m of Headford Road and Medium for areas beyond.

During the night-time the risk categories is High for areas within 30m of Headford Road and Medium to High for areas beyond.

From this initial noise risk assessment, it can be concluded that the site will require acoustic mitigation to reduce control the noise levels to acceptable levels.

7 ProPG Stage 2 – Full Noise Assessment

In accordance with Stage 2 of Professional Practice Guidance (ProPG) – Planning & Noise, a full noise assessment of the proposed development has been undertaken. Elements 1 to 4 of the Stage 2 Assessment have been addressed in this section of the report.

7.1 Good Acoustic Design Process

ProPG states that *'Good acoustic design should provide an integrated solution whereby the optimum acoustic outcome is achieved, without design compromises.'*

Where feasible and practical, the following measures would provide an acoustic benefit to the scheme and would constitute good acoustic design.

- Maximise the distance between the proposed dwellings and the nearby roads.
- Locate external amenity space behind or between the proposed dwellings, away from the surrounding roads.
- Provide an appropriate ventilation strategy, as detailed later in this report; and
- Provide enough building envelope sound reduction, as detailed later in this report.

It is essential to note that the above recommendations will not be possible in all cases, and that it is possible and acceptable to provide suitable acoustic conditions without having to implement all the guidelines set out above.

Further to the above, in this case further maximising spatial separation of noise sources and receptors is not considered feasible, given the shape and location of the site.

7.2 Predicted Façade Noise Conditions

To assess the impact of noise on the proposed dwellings, the noise model was updated to include the proposed new buildings. Modelling calculations were re-run, providing cumulative daytime and night-time $L_{Aeq,T}$ noise level predictions at the proposed façade locations.

As shown Appendix C, the noise model has been used to determine typical worst-case daytime (07:00 - 23:00) and night- time (23:00 to 07:00) L_{Aeq} noise levels at various façade locations around the site for use in the following assessment. Please note that the façade incident noise level indicators shown in Appendix C indicate the relevant daytime $L_{Aeq,16\ hour}$ and/or night-time $L_{Aeq,8\text{-}hour}$ noise levels respectively.

Night-time L_{Amax} noise levels at each building façade have also been assessed by using the measured 10th highest L_{Amax} levels given for each day and logarithmically averaged as given in Table 3.

7.3 External Building Fabric Assessment

7.3.1 Internal Noise Level Guidelines

In order to achieve appropriate noise levels within internal living spaces, the dwellings themselves need to be considered regarding the level of façade mitigation required. BS 8233:2014 states internal noise level criteria of <35 dB(A) in living rooms and bedrooms during the daytime (07:00 – 23:00) and <30 dB(A) in bedrooms during the night-time (23:00 – 07:00). In addition, ProPG recommends that individual noise events should not normally exceed 45 dB $L_{Amax,F}$ more than 10 times a night in bedrooms.

7.3.2 Assumptions

The assessment assumes the following room sizes (l x w x h):

- Bedroom – 5.2m x 2.9m x 2.7m (l x w x h)
- Living Room/Kitchen – 7.3m x 4m x 2.7m

Glazing dimensions have been taken from the supplied drawings. It has also been assumed that bedrooms are to be acoustically 'soft', with carpets, curtains and other soft furnishings and living rooms to be less acoustically absorptive. For the purposes of analysis, we have assumed the following internal reverberation times:

Table 4: Mid-frequency reverberation time for specific room types.

Room	Mid-Frequency Reverberation Time (Seconds)
Bedroom	0.6
Living Room	0.8

As a reference, the following standard constructions and associated acoustic performance have been considered for the external wall and roof.

Table 5: Sound reduction of example external wall and roof, R (dB)

Description	Sound Reduction Indices (dB) at Octave Band Centre Frequency (Hz)								R_w
	63	125	250	500	1k	2k	4k	8k	
External Wall – Brick/Block Cavity	31	36	40	41	45	52	52	46	52
Roof – Tiled-slated roof, acoustic plasterboard ceiling, sound absorbing layer	31	36	40	41	45	52	52	46	52

7.4 Façade Mitigation

7.4.1 Glazing Requirements

Based on the predicted noise levels incident on the facades, the following glazing types and the corresponding sound reduction indices have been proposed:

Table 6: Proposed glazing sound insulation performance

Glazing Type	Example Configuration	Sound Reduction Indices (dB) at Octave Band Centre Frequency (Hz)								R_w (+C_{tr})
		63	125	250	500	1k	2k	4k	8k	
GL1	10mm/10mm/6.5mm Acoustic laminated	28	30	28	38	43	51	59	57	41 (-5)
GL2	10mm/12mm/6mm	21	26	27	34	40	38	46	46	37 (-4)
GL3	8mm/10mm/5mm	21	28	28	29	38	38	34	34	35 (-3)

The glazing system performance specifications detailed above apply to the glazing package as a whole, inclusive of glazing, framing, spandrel panels, etc. The performance of the glazing systems will depend on many factors, such as the glazing configuration, size of window panels, quality of framing, quality of sealing, etc. Performance specifications are frequency specific. Overall performance values are given for guidance purposes only. Any ventilation element which penetrates the façade will need to be selected to ensure the specified glazing performance values are not compromised.

7.4.2 Background Ventilation Requirements

The table below sets out the performance requirement for the ventilation elements to comply with the 'whole dwelling ventilation' condition when windows need to be closed to avoid noise ingress.

Table 7: Acoustic performance of example ventilation options, D (dB)

Ventilation Type	Element Level Difference at Octave Band Centre Frequency (Hz)								$D_{n,ew}$
	63	125	250	500	1k	2k	4k	8k	
Vent 1 – example Renson AK40	27	32	33	42	45	52	56	56	44
Vent 2 – example Brookvent SM Acoustic	25	30	33	38	37	36	36	36	38

One trickle ventilator or air inlet has been assumed per room. Where more ventilators are used, the acoustic performance of the ventilators would need to be upgraded by 10*log(N); being N the number of ventilators per room.

7.4.3 Opening Windows during Summer Months

Openable windows typically provide a level of 10 to 15dB reduction. Based on the measured and predicted daytime L_{Aeq}, night-time (L_{night}) and L_{Amax} incident noise levels the internal noise criteria is unlikely to be met.

In order to determine the risk of overheating and therefore the likelihood of windows being required to be open on a regular basis an TM59 overheating assessment should be undertaken. TM59 assessment would identify which facades might experience overheating and the necessary measures to mitigate it. If overheating is found to be a frequent risk, then mitigations should be coordinated with acoustics to control excessive noise ingress during the overheating condition.

Typical measures for the mitigation of overheating may include the following:

- Reduced window sizes;
- Increased solar control in the glazing (lower G values);
- Solar shading;
- Enhanced provision of thermal mass.

If additional ventilation is still deemed to be necessary to mitigate overheating, then the following measures may need to be considered:

- Incorporating oversized acoustic ventilators.
- Design a system where windows may be open in unoccupied or quieter rooms.
- Using an MVHR boost system with a heat recovery bypass system for warmer weather.
- Using comfort cooling.

Windows may be openable for purge ventilation purposes at the user's discretion, as this is applicable only to occasional occurrences, such as to remove smoke from burnt food, and not subject to acoustic assessment.

7.4.4 Façade Mitigation Types

Appendix D presents a mark-up drawing of the proposed façade mitigation requirements in order to achieve the indoor Ambient noise levels defined in Table 1

7.5 External Amenity Area Noise Assessment

7.5.1 Dedicated Amenity Space

It is understood that the proposed development will include a dedicated external amenity space.

BS 8233:2014 advise 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 $L_{Aeq,16hr}$. But they also recognise that these guideline values are not achievable in all circumstances where development might be desirable, such as city centres or urban areas adjoining the strategic transport network. In such a situation the guidance advises that the development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.

Appendix E presents the site-wide noise levels in the context of the guidance contained within BS 8233 for external amenity areas. The contours show noise levels at 1.5 metres above existing ground level. It can be seen that the predicted noise levels are typically between 50 to 60 dB $L_{Aeq,16hr}$, with a predicted noise impact in these areas to be low and low to medium. Accordingly, it can be concluded that the future residents would have a suitably quiet amenity space.

7.5.2 Balconies/Terraces

On review of the predicted daytime noise levels across all facades of the development, the majority of balconies and ground floor terraces on the apartment block will have noise levels comply with the recommended ProPG and BS8233 criteria for desirable levels of external amenity. This due to the location of the balconies/terraces being screened by the development itself.

8 Conclusions

Amplitude Acoustics were commissioned to undertake a noise impact assessment of the proposed residential assessment at Headford Road, Galway, Co. Galway.

The traffic noise at the site has been measured using a noise logger deployed on site for 5 days. A traffic noise model has been developed and calibrated using the measured noise levels and traffic count data available for Headford Road. The calibrated model was then updated to include the future Galway City Ring Road (GCRR) and proposed development. Noise levels incident on the development were predicted based on the AADT Traffic volumes for the Design Year 2039 (Medium Growth) for the proposed GCRR and Headford Road as detailed within the N6 Galway City Ring Road EIAR dated 28 September 2018.

A ‘Stage 1: Initial Site Noise Risk Assessment’ and a ‘Stage 2: Full Assessment’, in line with advice on Professional Practice Guidance (ProPG) – Planning & Noise were undertaken.

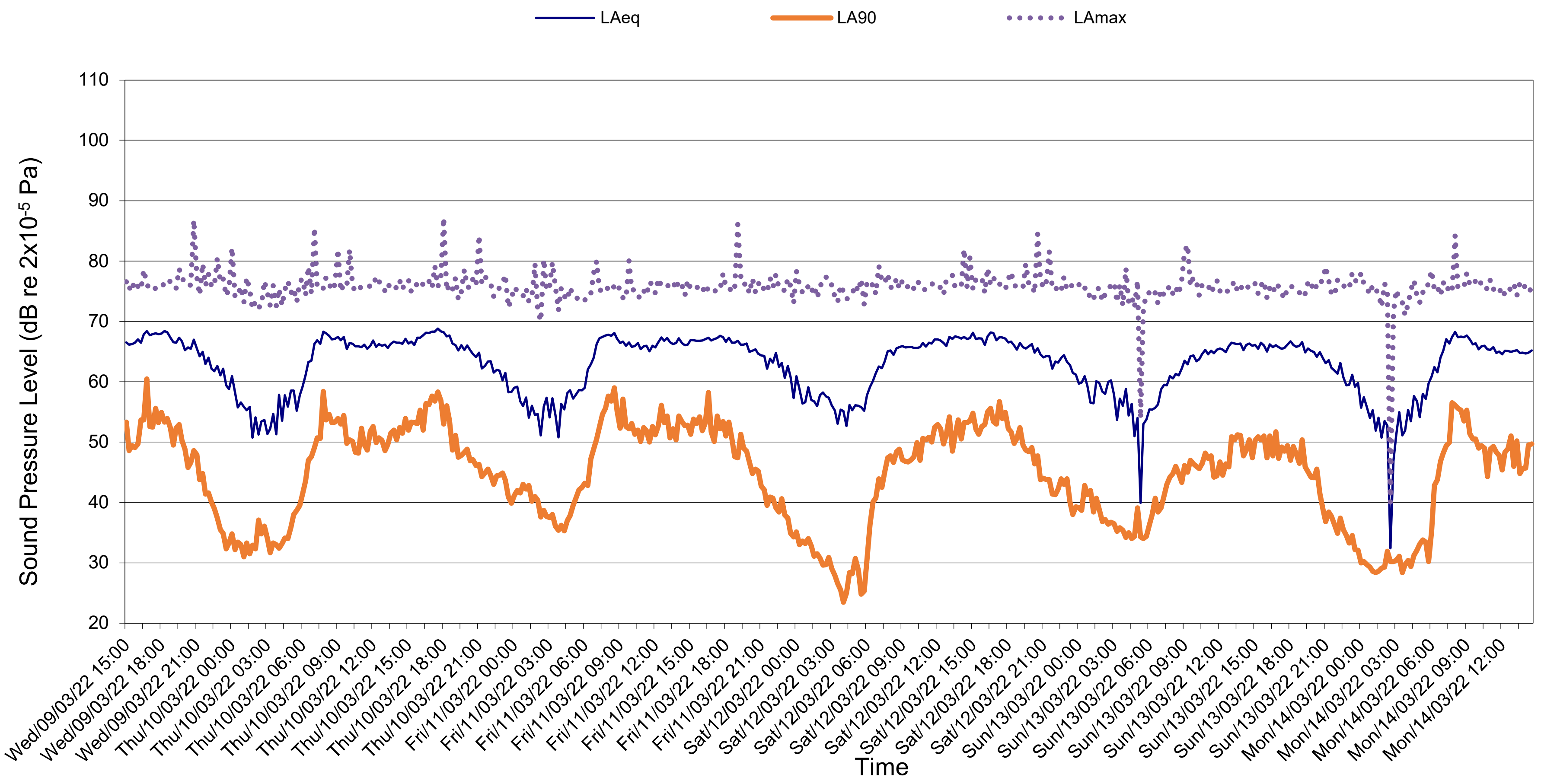
Interior noise levels for the whole development are predicted to comply with interior noise level criteria (including both L_{Aeq} and L_{AFMax}) from BS 8233 and ProPG provided that the construction requirements detailed in Section 7 are implemented. Sleep disturbance due to the predicted internal noise levels is unlikely to occur.

The main external amenity area and private balconies/terraces are predicted to comply with the desirable external amenity noise level criteria.

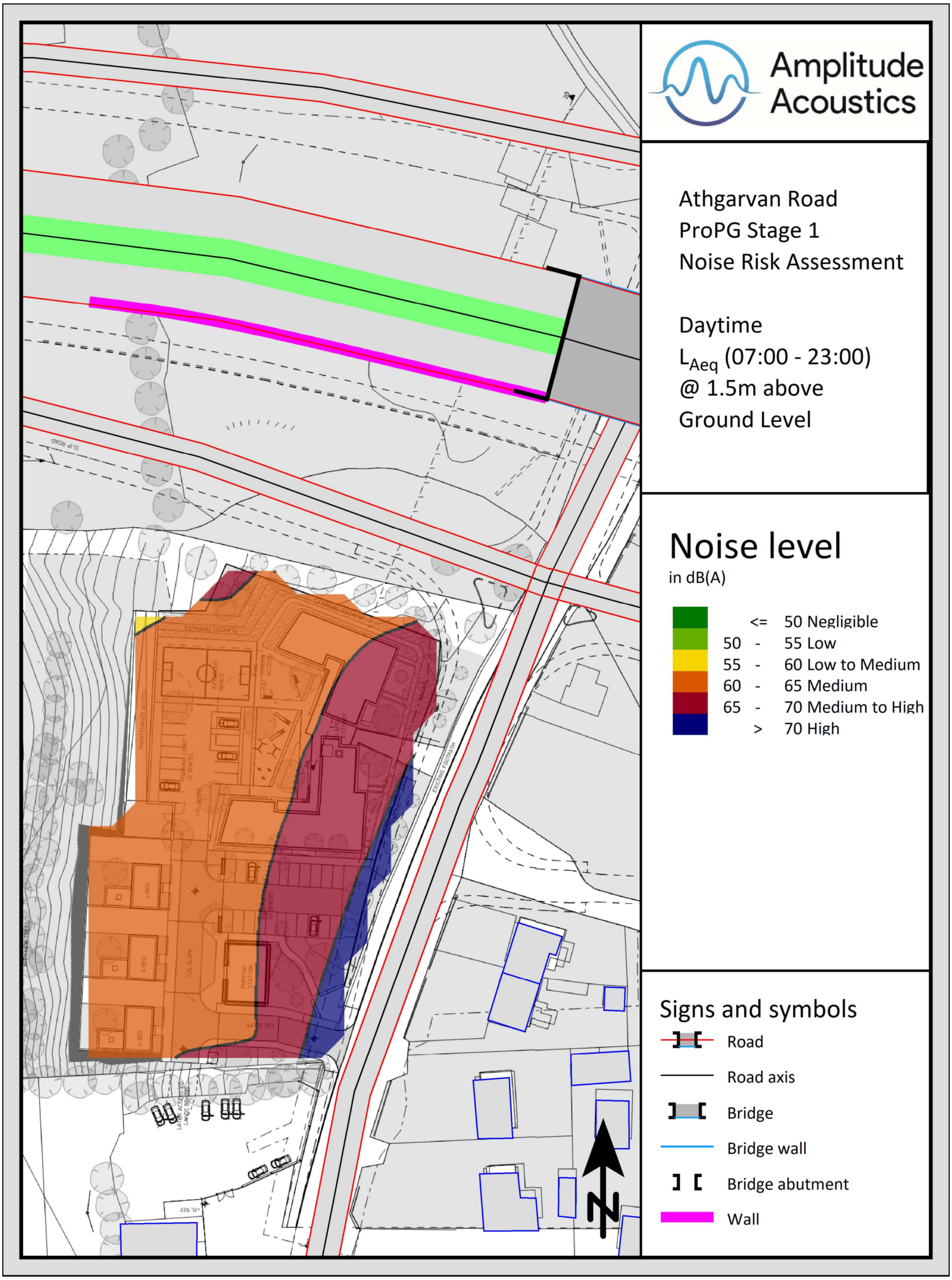
Appendix A –Noise Monitoring Results

Monitoring Position 1

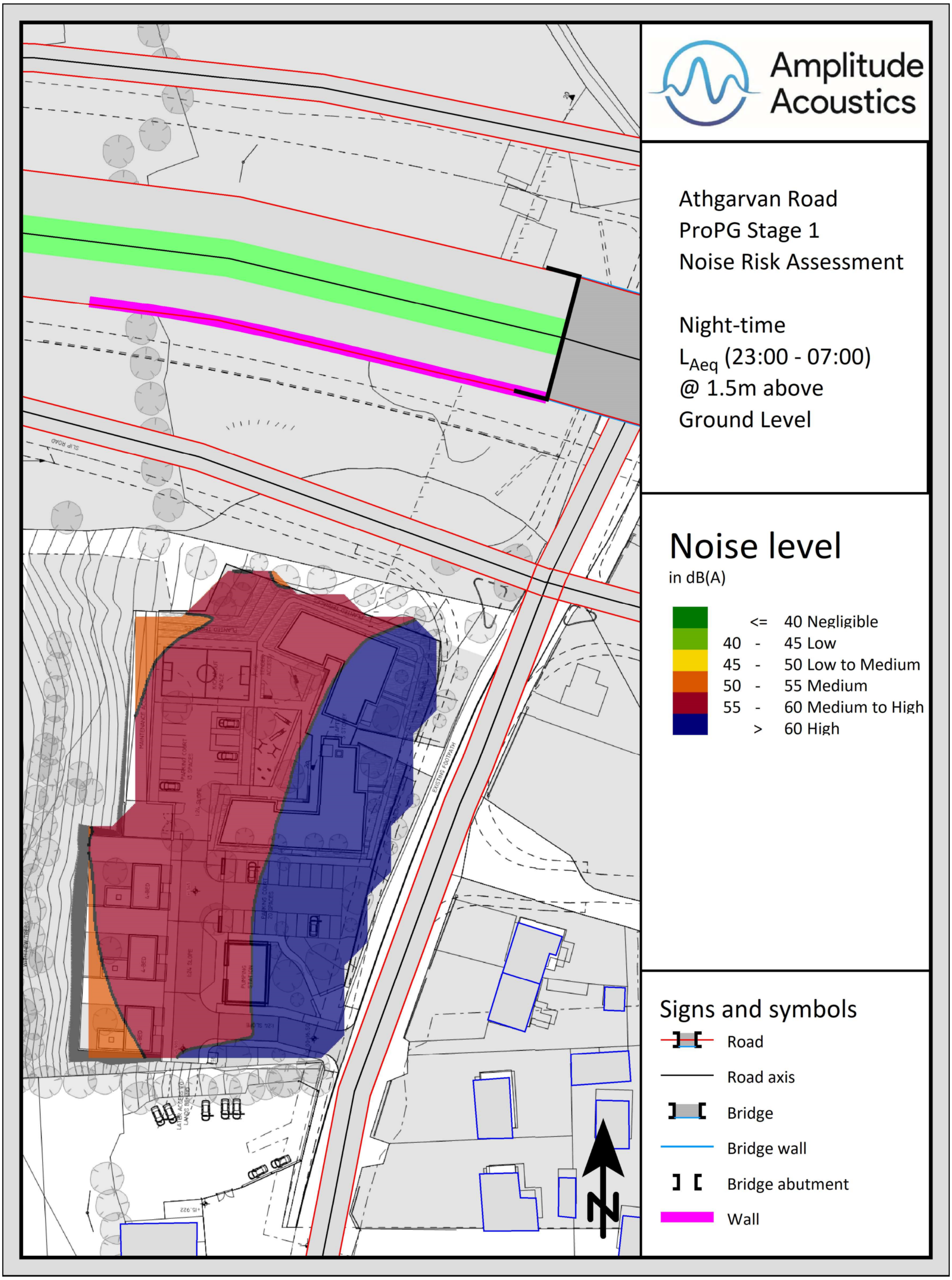
Measured L_{Aeq}, L_{A90}, L_{A10} and L_{AFmax} Time History



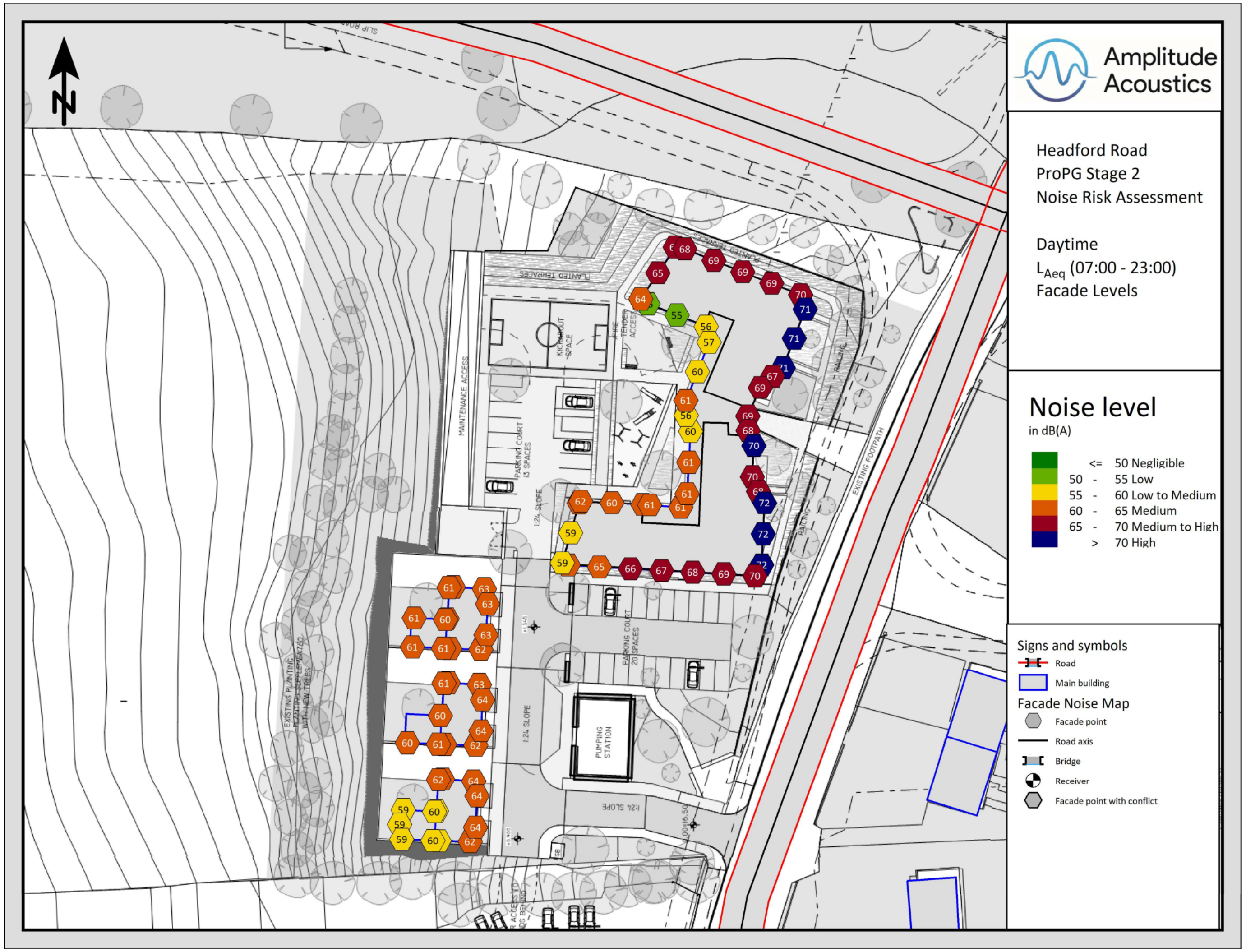
Appendix B – ProPG Stage 1 Assessment

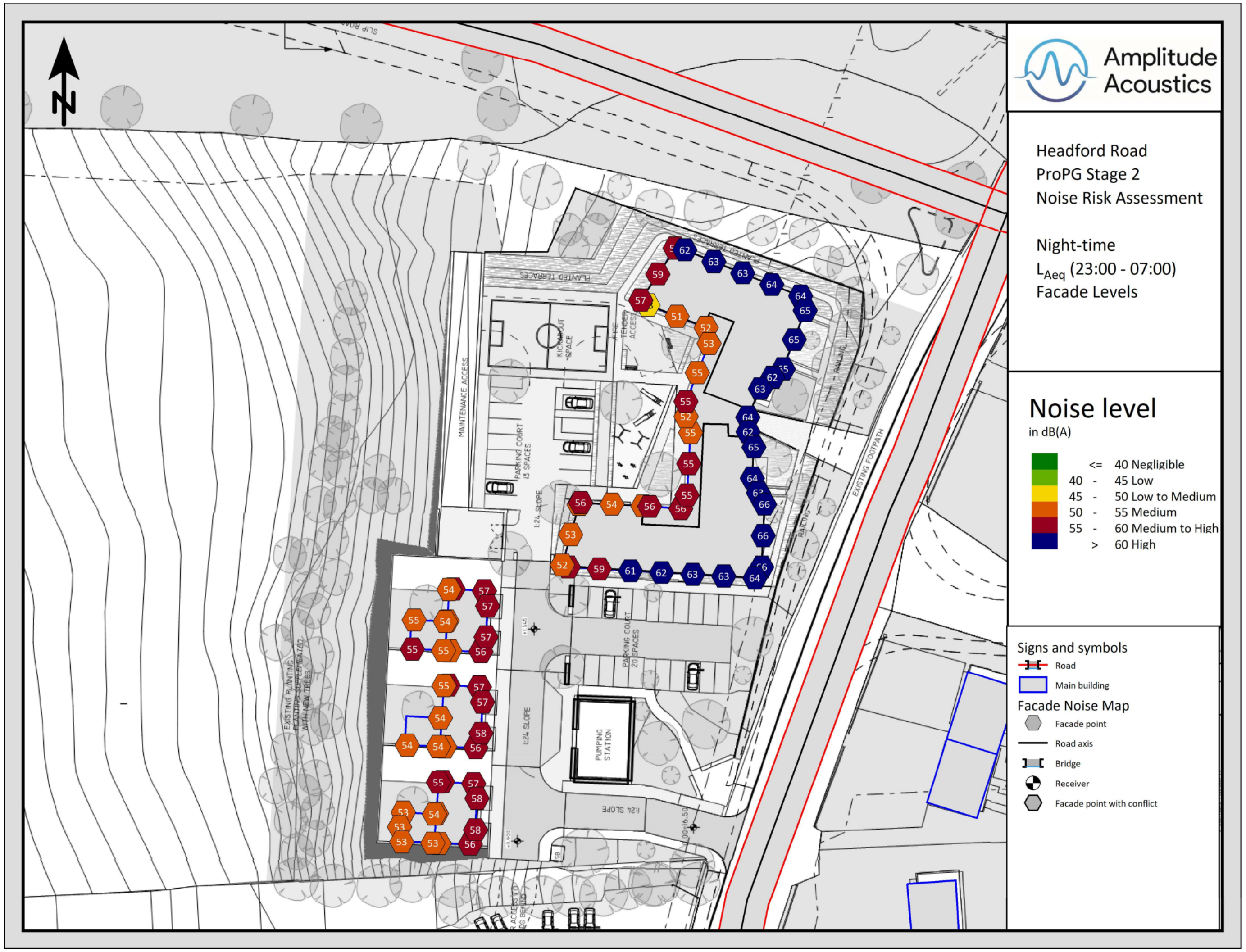


Amplitude Acoustics
Athgarvan Road
ProPG Stage 1
Noise Risk Assessment
Daytime
L_{Aeq} (07:00 - 23:00)
@ 1.5m above
Ground Level
Noise level
in dB(A)
<= 50 Negligible
50 - 55 Low
55 - 60 Low to Medium
60 - 65 Medium
65 - 70 Medium to High
> 70 High
Signs and symbols
Road
Road axis
Bridge
Bridge wall
Bridge abutment
Wall


Amplitude Acoustics
Athgarvan Road
ProPG Stage 1
Noise Risk Assessment
Night-time
L_{Aeq} (23:00 - 07:00)
@ 1.5m above
Ground Level
Noise level
in dB(A)
<= 40 Negligible
40 - 45 Low
45 - 50 Low to Medium
50 - 55 Medium
55 - 60 Medium to High
> 60 High
Signs and symbols
Road
Road axis
Bridge
Bridge wall
Bridge abutment
Wall

Appendix C – Predicted Façade Noise Levels


Amplitude Acoustics
Headford Road
ProPG Stage 2
Noise Risk Assessment
Daytime
L_{Aeq} (07:00 - 23:00)
Facade Levels
Noise level
in dB(A)
<= 50 Negligible
50 - 55 Low
55 - 60 Low to Medium
60 - 65 Medium
65 - 70 Medium to High
> 70 High
Signs and symbols
Road
Main building
Facade Noise Map
Facade point
Road axis
Bridge
Receiver
Facade point with conflict
PUMPING STATION
MAINTENANCE ACCESS
EXISTING FOOTPATH
1:24 SLOPE


Amplitude Acoustics
Headford Road
ProPG Stage 2
Noise Risk Assessment
Night-time
LAeq (23:00 - 07:00)
Facade Levels
Noise level
in dB(A)
<= 40 Negligible
40 - 45 Low
45 - 50 Low to Medium
50 - 55 Medium
55 - 60 Medium to High
> 60 High
Signs and symbols
Road
Main building
Facade Noise Map
Facade point
Road axis
Bridge
Receiver
Facade point with conflict

Appendix D – Façade Mitigation Requirements

Amplitude Acoustics

Amplitude Acoustics

Title:
Glazing Mark Up

Headford Road, Galway

All Levels

Legend	
Glazing Performance	
Red	GL1 - $R_w(+C_{tr})$ 41dB (-5) Vent 1 - $D_{n,ew}$ 44dB
Orange	GL2 - $R_w(+C_{tr})$ 37dB (-4) Vent 1 - $D_{n,ew}$ 44dB
Green	GL3 - $R_w(+C_{tr})$ 35dB (-3) Vent 2 - $D_{n,ew}$ 38dB

AMPLITUDE REVIEW
Date: 22/03/2022
Revision: 0
Project Number: D220218

G2 The Steelworks
Foley St
Dublin 1
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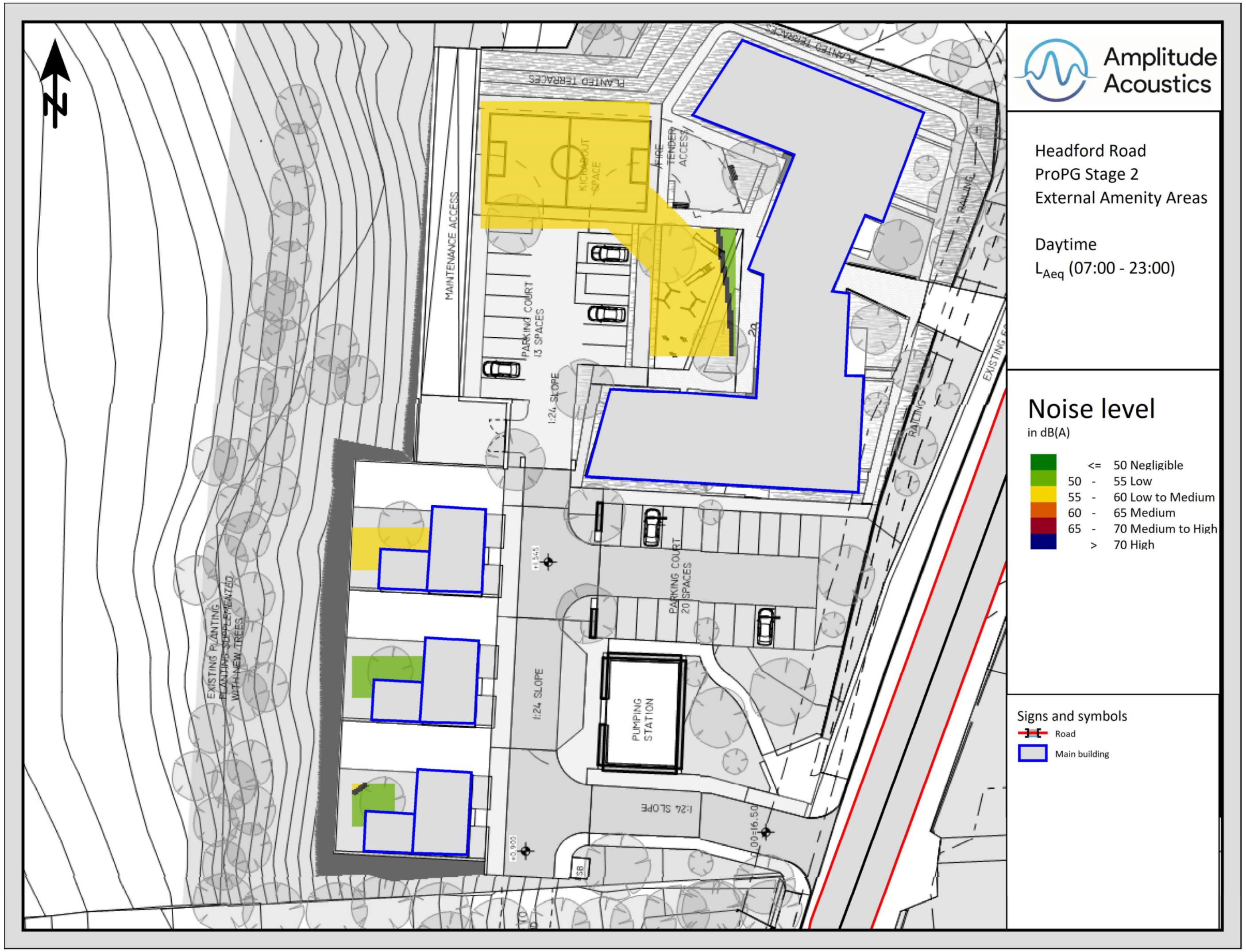
Appendix E – Predicted External Amenity Noise Levels



Amplitude Acoustics
Headford Road
ProPG Stage 2
External Amenity Areas
Daytime
L_{Aeq} (07:00 - 23:00)
Noise level
in dB(A)
<= 50 Negligible
50 - 55 Low
55 - 60 Low to Medium
60 - 65 Medium
65 - 70 Medium to High
> 70 High
Signs and symbols
Road
Main building
MAINTENANCE ACCESS
PARKING COURT 13 SPACES
PARKING COURT 20 SPACES
PUMPING STATION
PLANTED TERRACES
1:24 SLOPE