BS8233 & ProPG Assessment

of

Maes Emlyn

Rhyl

LL18 3SF

February 5th 2026

Prepared by:

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1.0 Introduction

1.01 E2 Consultants have been commissioned to undertake a noise impact survey and assessment for a new development at Maes Emlyn, Rhyl, LL18 3SF.

1.02 The methodology used for this assessment will be BS8233 as this is a new development within the designated area.

1.03 The report will also issue recommendations of acoustic performance of glazing and, if required, ventilation proposals in order for the future dwelling to meet all necessary criteria.

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2.0 Development Description

2.0.1 The proposed development is just off of Churton Road in the centre of Rhyl, Denbigshire.

2.0.2 The development lies in a mainly residential area with a high-speed rail line on the Southern boundary.

2.0.3 The main noise source likely to disrupt the inhabitants of the proposed new dwellings is the passing train traffic along the to line and some road traffic from the residential roads to the North of the proposed development.

2.0.4 With the above sources in mind the monitoring took place both at the North & South boundaries. After an initial 15min attended vibration assessment it was not deemed necessary for a full BS6472 assessment to take place.

2.1 Locations of Monitors

2.1.1 Two Type 1 sound level meters were installed at ground-floor level within the existing development area, both on tripods approximately 1.7m from the ground.

2.1.2 Figures 1& 2 show the areas where the monitors were installed.

2.1.3 All location is displayed on site map in figure 2

Figure 1 – North Boundary

Figure 2 – South Boundary

2.1.4 Measurements were made in 15 minute periods, on 1 second averaging, to allow for the removal of anomalies and increased accuracy. The data was averaged into $L_{Aeq16hr}$ daytime and L_{Aeq8hr} night-time with data also

recorded for L_{AMax} in both day and night periods for the BS8233:2014 assessment.

2.1.5 The monitoring was conducted using 2 x Type 1 NTi XL2 sound level meters, outdoor case with batteries and outdoor microphone protection.

2.1.6 The measurements were taken by a fully qualified engineer with AMIOA status with the institute of Acoustics.

2.1.7 All measurements were taken after a field calibration was undertaken to ensure accuracy and repeatability of measurements. Drift was checked post-measurement to validate the data collected.

2.1.8 Further data such as wind speed, wind direction, rainfall intensity, temperature and cloud cover were all recorded at the beginning and end of the assessment at the monitoring location.

2.1.9 Any anomalies (such as noise by the engineer during setup and collection of the kit) were removed from the survey for a true reflection of the ambient levels in the vicinity. This was done by recording audio throughout the survey at each location and listening back through the files during the analysis process to confirm what was recorded manually during the survey.

2.1.10 Care was taken to inform any residents in the area that audio recording was taking place.

2.2 Plan Views of Site with Designated Work Areas

Figure 3

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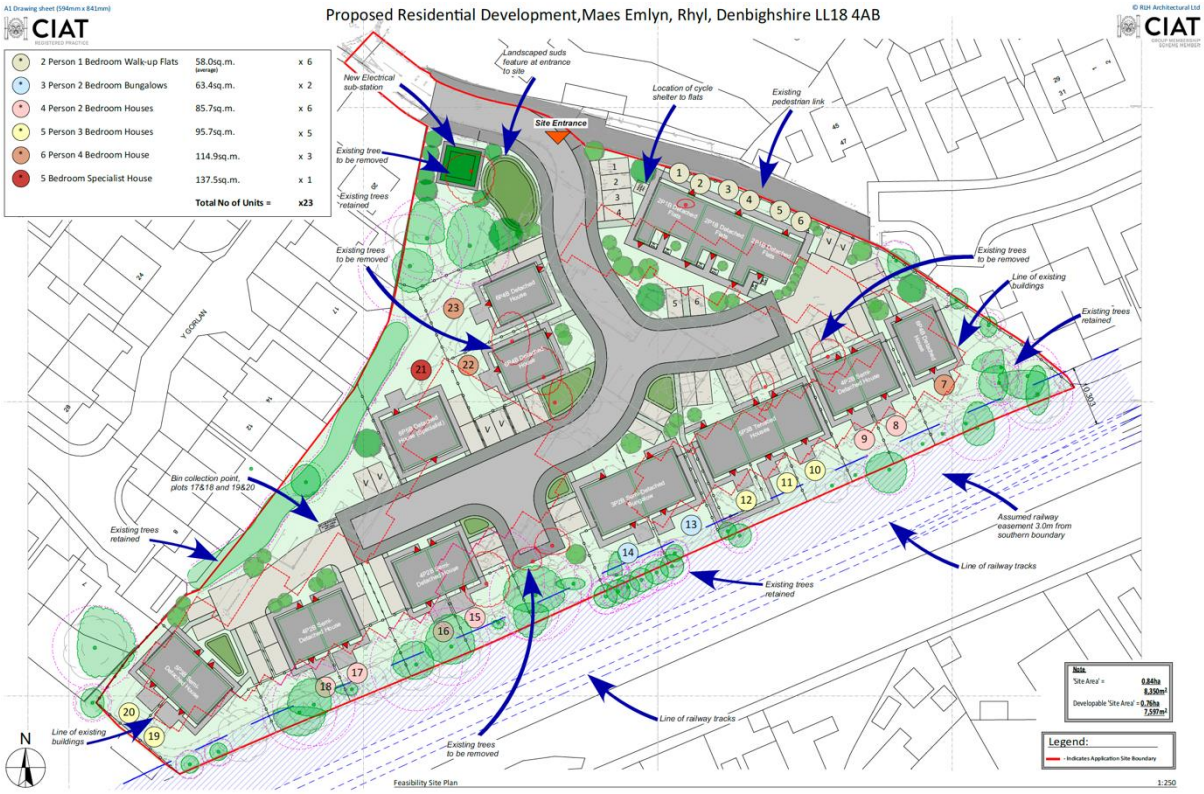
2.3 Proposed Site Layout (example floor)

Figure 4



3.0 Noise Assessment Criteria

3.0.1 The Planning Policy Wales sets out the Government's economic, environmental and social planning policies. Section 3.22 states;

"Planning authorities should develop and maintain places that support healthy, active lifestyles across all age and socio-economic groups, recognising that investment in walking and cycling infrastructure can be an effective preventative measure which reduces financial pressures on public services in the longer term. The way a development is laid out and arranged can influence people's behaviours and decisions and can provide effective mitigation against air and noise pollution."

3.0.2 The guidance also sees traffic consideration and management as key when it comes to noise impact assessments. Section 4.1.45 states

"Local authorities must adopt an integrated approach to traffic management. They should consider how different measures can complement one another and contribute to the achievement of wider planning and transport objectives, implementing the Active Travel Act and reducing exposure to air and noise pollution, taking into account the needs of the disabled and less mobile sections of the community."

3.0.3 Section 6 of the document also tackles the likely social and well-being impacts of the preservation of 'distinctive and natural places'. Section 6.7.1 refers to the need to protect the soundscape of areas;

"Clean air and an appropriate soundscape, contribute to a positive experience of place as well as being necessary for public health, amenity and well-being. They are indicators of local environmental quality and integral qualities of place which should be protected through preventative or proactive action through the planning system. Conversely, air, noise and light pollution can have negative effects on people, biodiversity and the resilience of ecosystems and should be reduced as far as possible."

This is then continued in reference to noise in section 6.7.4;

"The planning system should maximise its contribution to achieving the well-being goals, and in particular a healthier Wales, by aiming to reduce average population exposure to air and noise pollution alongside action to tackle high pollution hotspots. In doing so, it should consider the long-term effects of current and predicted levels of air and noise pollution on individuals, society and the environment and identify and pursue any opportunities to reduce, or at least, minimise population exposure to air and noise pollution, and improve soundscapes, where it is practical and feasible to do so."

3.0.4. It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:

- The effect may be determined by reference to guideline noise values. British Standard (BS) 8233:2014 and World Health Organisation (WHO) "Guidelines for Community Noise" contain such guidelines.

Another method is to compare the resultant noise level against the background noise level (L_{A90}) of the area. This is the method employed by BS 4142:2014 to determine the likelihood of complaint from noise of an industrial nature. It is best suited to the assessment of steady or pseudo-steady noise.

3.0.5 British Standard 8233:2014 is principally intended to assist in the design of new dwellings; however, the Standard does state that it may be used in the assessment of noise from new sources being brought to existing dwellings.

3.0.6 The WHO guideline values are appropriate to what are termed "critical health effects". This means that the limits are at the lowest noise level that would result in any psychological or physiological effect.

The WHO/BS 8233 guideline noise values are summarised in the following table:

Table 1

Guidance Document	L_{AeqT}	L_{AMax}	Outcome
World Health Organisation "Community Noise 2000"	55dB		Serious annoyance, daytime and evening. (Continuous noise, outdoor living areas)
	50dB		Moderate annoyance, daytime and evening. (Continuous noise, outdoor living areas).
	35dB		Moderate annoyance, daytime and evening. (Continuous noise, dwellings, indoors)
	30dB		Sleep disturbance, night-time (indoors)
		60dB	Sleep disturbance, windows open at night. (Noise peaks outside bedrooms, external level).
		45dB	Sleep disturbance at night (Noise peaks inside bedrooms, internal level)
BS 8233:2014 "Sound Insulation and noise reduction for buildings"	55dB		Upper limit for external steady noise. (gardens and patios).
	50dB		Desirable limit for external steady noise. (gardens and patios).
	L_{Aeq} 16 hours = 35 dB		Resting, living room day. (Internal – steady noise)
	L_{Aeq} 16 hours = 40 dB		Dining, dining room day. (Internal – steady noise)
	L_{Aeq} 16 hour = 35 dB		Sleeping, bedroom day (Internal – steady noise)
	L_{Aeq} 8 hours = 30 dB		Sleeping, bedroom day (Internal – steady noise)

3.0.7 For L_{AeqT} criteria the time base (T) given in the documents is 16 hours for daytime limits and 8 hours for night time limits. All surveys are conducted on 1 hour daytime and 15 minute night values – based on 1 second readings on a Type 1 sound level meter. The readings are taken every 5 mins for noise to allow the elimination of erroneous data if required.

3.0.8 The WHO guidelines are also concerned with the L_{AMax} for night-time sleep disturbance. The guideline states:

> "For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night"

3.0.9 On this basis, for the purpose of assessing night-time L_{AFmax} noise events, it is considered appropriate to adopt the 10th highest L_{AFmax} noise event occurring in a typical night-time (23:00 – 07:00) period.

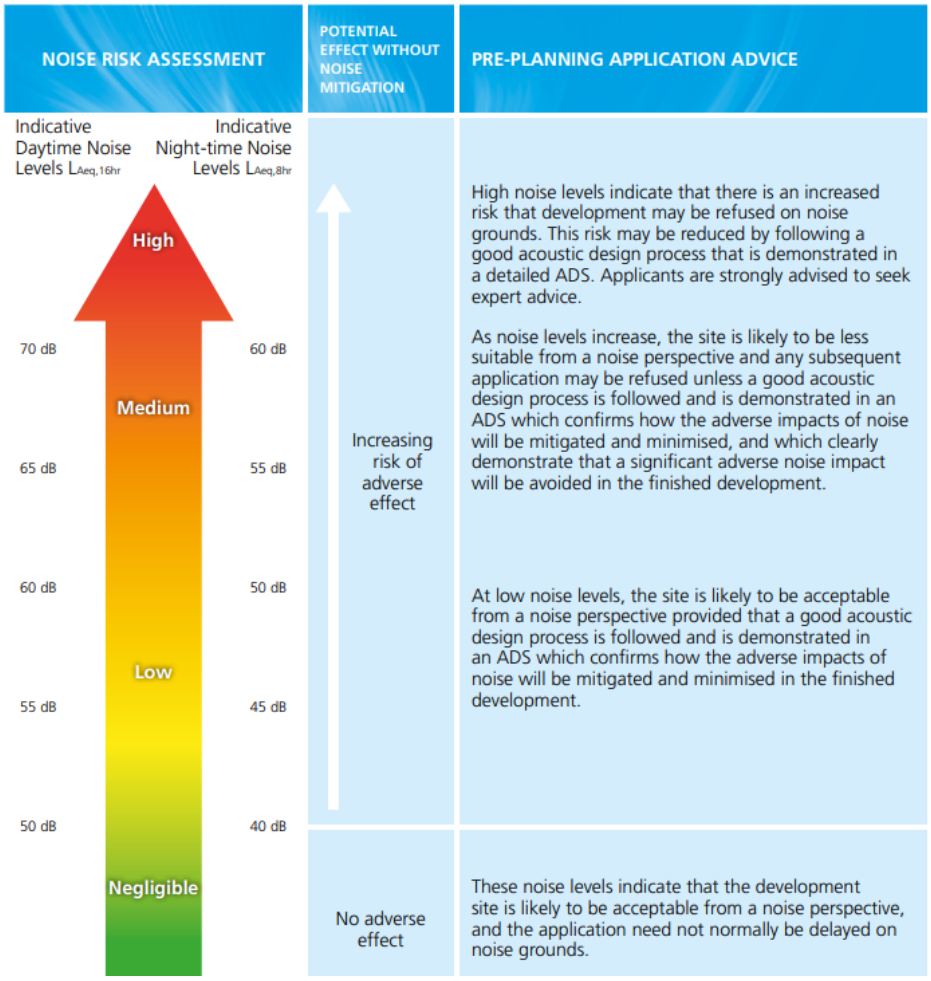
3.0.10 Audio recordings are taken throughout the measurements to allow for further assessments on high levels. Listening to the audio and performing tonal analysis will allow anomalies to be removed from the data, if required.

3.1 ProPG Stage 1 – Assessment

3.1.1 The stage one risk assessment is used to assess the site for potential risks that may occur in terms of noise impact. The ProPG sets out four categories of risk:1) negligible, 2) low, 3) medium or 4) high risk. Information below illustrates the ProPG risk assessment and the values associated with each risk category.

3.1.2 The risk assessment also considers the risk based on the number of L_{AFmax} events per night as follows;
A site should not be considered a negligible risk if more than 10 L_{AFmax} events exceed 60 dB during the night period and;
A site should be considered a high risk if the L_{AFmax} events exceed 80 dB more than 20 times per night.
Paragraph 2.9 of ProPG states that;
"The noise risk assessment may be based on measurements or prediction (or a combination of both) as appropriate and should aim to describe noise levels over a "typical worst case" 24 hour day either now or in the foreseeable future."

3.1.3 To assess the noise impact with the ProPG risk categories a baseline noise survey was undertaken on the site to quantify the existing noise environment.



3.2 TAN 11: October 1997

3.2.1 The Technical Advise Note (Wales) 11, Noise – October 1997 provides some further criteria in relation to noise criteria categories for Noise-sensitive developments. These categories have been derived to assist local planning authorities in their consideration of planning applications. These categories are part of Annex A of the guidance document and are displayed in the tables below.

"Local planning authorities should consider whether proposals for new noise-sensitive development would be incompatible with existing activities, taking into account the likely level of noise exposure at the time of the application and any increase that may reasonably be expected in the foreseeable future. Such development should not normally be permitted in areas which are, or are expected to become, subject to unacceptably high levels of noise and should not normally be permitted where high levels of noise will continue

throughout the night."

Table 2: RECOMMENDED NOISE EXPOSURE CATEGORIES FOR NEW DWELLINGS NEAR EXISTING NOISE SOURCES					
Noise Levels[1] corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,T}$dB					
Noise Source		Noise Exposure Category			
		A	B	C	D
road traffic	0700-2300	<55	55-63	63-72	>72
	2300-0700[2]	<45	45-57	57-66	>66
rail traffic	0700-2300	<55	55-66	66-74	>74
	2300-0700[2]	<45	45-59	59-66	>66

TABLE 1: NOISE EXPOSURE CATEGORIES	
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

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4.0 Results

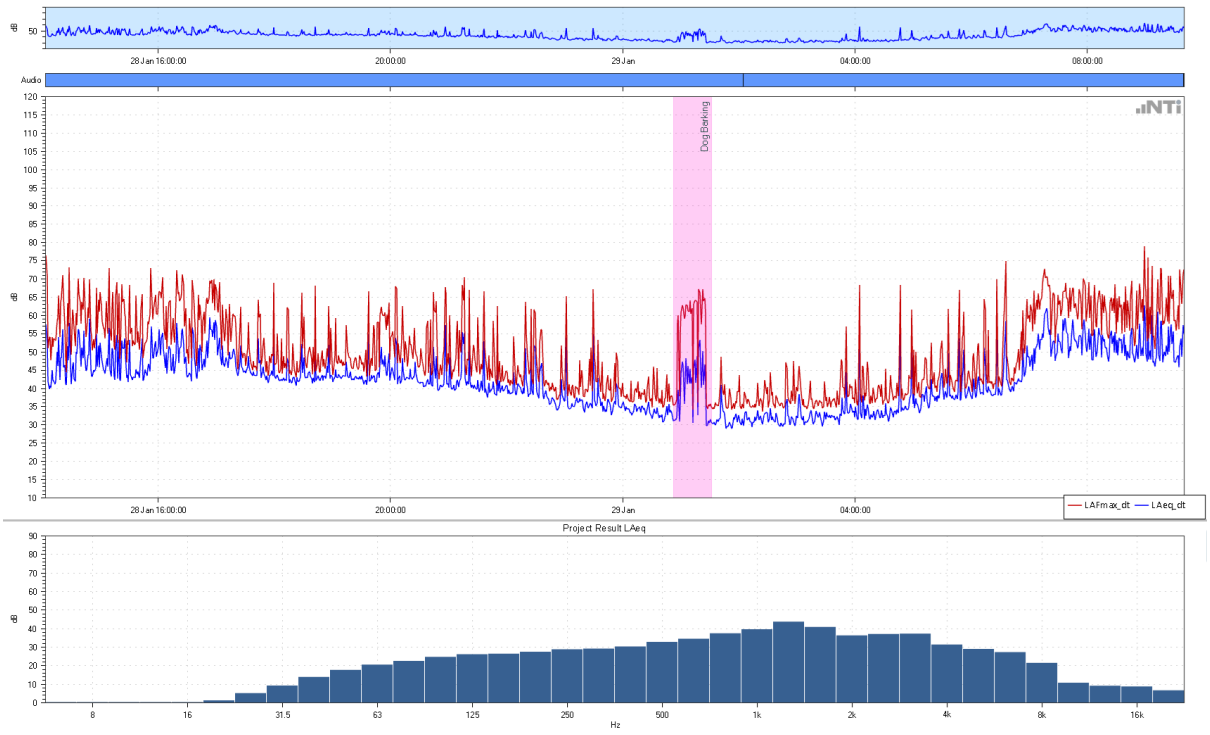
4.1 Front/Maes Emlyn Road – 14.04pm 28/01/26 – 09.39am 29/01/26

Table 2

Time Period	L_{Aeq_16hr}	L_{Aeq_8hr}	L_{Amax} (10th highest)
Day	**48.4dBA**		
Night		**37.9dBA**	**64.4dBA**

4.1.1 Comments: Mainly distant traffic pass-by noise. Some bird song adding to spikes along with barking dogs. No tonal features

Figure 4



Day/Time	Cloud Cover	Temperature (Celcius)	Prescence of fog/snow/ice	Wind Speed (m/s)	Wind Direction
Installation	2	5	No	0.3	NW
Collection	3	6	No	1.4	W

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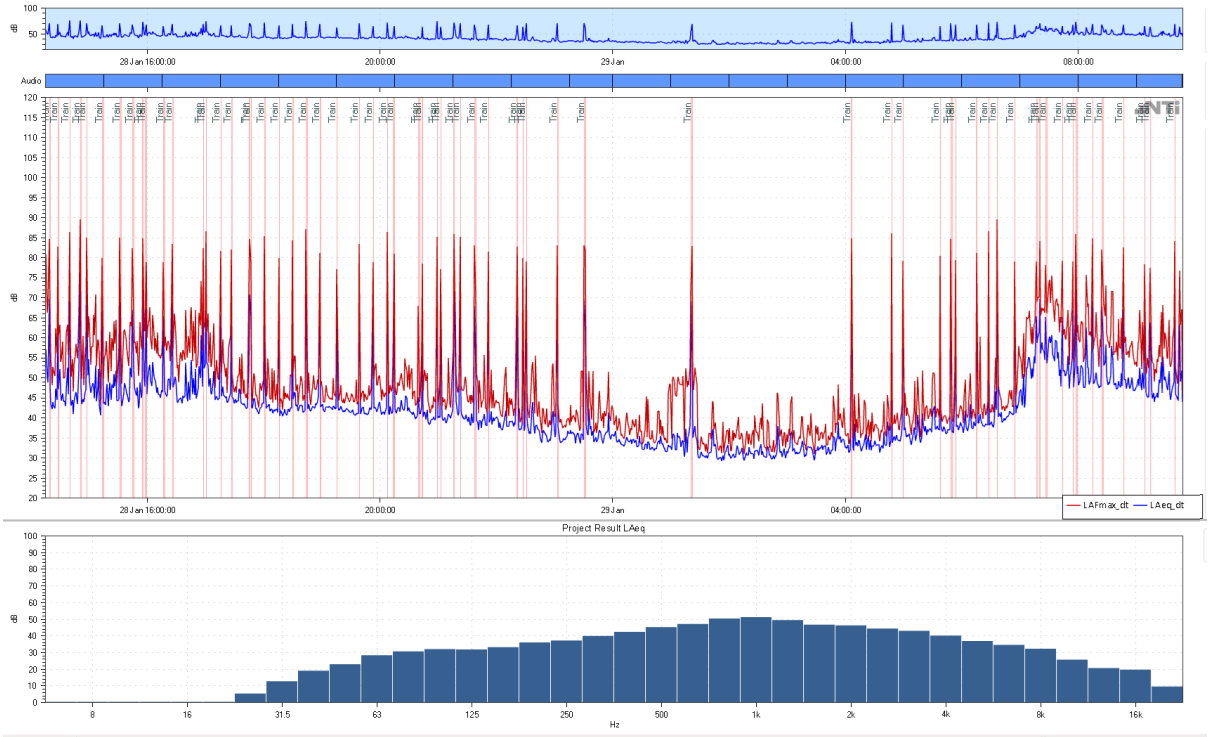
4.2 South Boundary/Train Track – 14.15pm 28/02/26– 09.45am 28/01/26

Table 3

Time Period	L_{Aeq_16hr}	L_{Aeq_8hr}	L_{Amax} (10th highest)
Day	**58.4dBA**		
Night		**41.5dBA**	**79.0dBA**

4.1.1 Comments: Predominantly rail pass-by noise. Signifcant difference to background noise levels

Figure 5



Day/Time	Cloud Cover	Temperature (Celcius)	Prescence of fog/snow/ice	Wind Speed (m/s)	Wind Direction
Installation	2	5	No	2.3	NW
Collection	3	6	No	3.4	W

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5.0 ProPG Stage 1 – Initial Risk Assessment

5.0.1 The measured noise levels on the site and future noise levels have been predicted for the existing noise climate to assess the probability of an adverse impact upon habitation of the proposed development. This includes the predicted levels on shielded facades away from the measured traffic/ambient noise level post construction.

5.0.2 Table 4 below identifies the Noise Risk Categorisation of the site based on the predicted free field façade noise levels. The site has been categorised as low to medium risk. Considering this risk categorisation of the development mitigation measures will be required to mitigate the noise risk in following with ProPG guidance and good acoustic design process.

5.0.3 It should be noted that the ProPG 2017states the following with regard to how the initial site noise risk is to be used:

"2.12 It is important that the assessment of noise risk at a proposed residential development site is not the basis for the eventual recommendation to the decision maker. The recommended approach is intended to give the developer, the noise practitioner, and the decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of the acoustic issues that would be faced. Thus, a site considered to be high risk will be recognised as presenting more acoustic challenges than a site considered as low risk. A site considered as negligible risk is likely to be acceptable from a noise perspective and need not normally be delayed on noise grounds. A potentially problematical site will be flagged at the earliest possible stage, with an increasing risk indicating the increasing importance of good acoustic design."

Table 4: ProPG Stage 1 Risk Assessment of Existing Noise Levels

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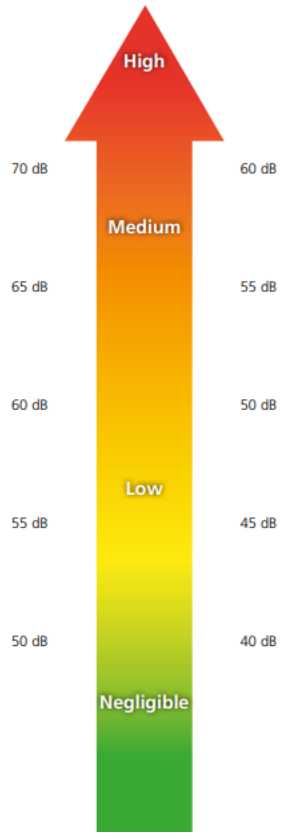
Noise Risk Assessment		Risk Assessment Rating	
Indicative Daytime Noise Levels $L_{Aeq,16hour}$	**Indicative Night-time Noise Levels** $L_{Aeq,8hour}$	**Daytime Noise Levels**	**Night-time Noise Levels**
		**High Risk** N/A	**High Risk** N/A
		Medium Risk The South boundary of the site is in the medium to low risk. Good acoustic design should be considered.	**Medium Risk** The South boundary of the site is in the medium to low risk. Good acoustic design should be considered.
		Low Risk The majority of the site is at low risk at daytime. Good acoustic design should be considered.	**Low Risk** Most of the site is at low risk at nighttime. Good acoustic design should be considered.
		Negligible Risk N/A	**Negligible Risk** N/A

5.1 ProPG Stage 2- Full Assessment

5.1.1 This section outlines the full stage 2 acoustic design assessment in line with ProPG guidance.

5.2 Element 1: Good Acoustic Design Process

5.2.1 ProPG States the following in relation to Good Acoustic Design Process:

"A good acoustic design process takes a multi-faceted and integrated approach to achieve optimal acoustic conditions, both internally (inside

noise-sensitive parts of the building(s)) and externally (in spaces to be used for amenity purposes)."

"Good acoustic design should avoid "unreasonable" acoustic conditions and prevent "unacceptable" acoustic conditions (these terms are defined in Element 2). Good acoustic design does not mean overdesign or gold plating of all new development but seeking to deliver the optimum acoustic outcome for a particular site"

5.2.2 The following considerations are recommended by ProPG:

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

5.2.3 Discussion of Good Acoustic Design

5.2.3.1 The development is located close to the existing rail noise source on the South boundary of the site, therefore it is not possible to reduce or relocate the relevant noise sources other than through the erection of noise barriers..

5.2.4 Site Layout and Orientation

5.2.4.1 The proposed site consists of 23 properties within the footprint, with all properties benefiting from garden areas as the outdoor amenity spaces. The design maximises the available space on the existing plot to provide comfortable luxury spaces for the dwellings.

5.2.5 Construction Methods

5.2.5.1 Section 5.3.6 considers the construction methods required to meet the building performance control measures. The construction measures are in general robust, providing standard external wall and façade details to meet thermal, fire and weathertightness requirements will in general provide adequate performance to achieve good levels of sound insulation.

5.2.6 Impact of Noise Control Measures

5.2.6.1 The effects for noise control measures on other building elements including ventilation are considered in Section 5.3.6. It is generally impractical to provide ventilation via openable windows in urban/built up areas. An open window will provide 10-15dB of attenuation which in built-up urban areas is not practical. In general, the good acoustic design process in these areas is to provide ventilation via attenuated natural vents or mechanical ventilation. This allows the occupants to have adequate ventilation with adequate noise levels.

5.2.7 External Amenity

5.2.7.1 ProPG states the following with regard to external amenity spaces:

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

5.2.7.2 The external amenity source noise levels are considered in section 5.10

5.3 Element 2 – Assessment of Internal Noise Levels

5.3.1 This section outlines the assessment of the building envelope including the façade noise modelling, and specification of the glazing requirements.

5.3.2 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 road traffic noise.

5.3.3 The calculation method accounts for multiple factors including:

- The external noise level at the affected building façade.
- The frequency characteristics of the specific noise source (i.e. Road traffic noise).
- The sound insulation performance of each façade element (i.e. Windows, Walls, Roof…).
- The area of each façade element.
- Direct and flanking transmission paths.

5.4 Predicted Internal Noise Levels

5.4.1 Following the survey, a computational noise model of the development using CadnaA modelling software was developed to establish the noise levels from the development in a worst-case scenario. The software

implements the algorithms contained in ISO 9613-1 and ISO 9613-2. The noise model considers:

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

5.4.2 The noise model has been calibrated against the attended and unattended noise measurements. CadnaA software predicts road traffic noise levels in accordance with *Calculation of Road Traffic Noise* (UK Department for Transport, 1998) and industrial noise propagation in line with ISO9613-2.

5.4.3 The following information was input into the model:

- Development layout provided by architect's drawings.
- Google Maps terrain and elevation data of surrounding area.
- Traffic speed of 30mph as per local signage and onsite observation.
- Percentage of HGV based on assessment of similar local roads.
- Annual traffic growth rate of 3%.
- Train pass-by levels on numbers based on assessment plus 3%.

5.5 Predicted Façade Levels

5.5.1 Incident noise levels have been predicted across all facades of the development for both the day and night-time period. Figure 7 and Figure 8 below outline the existing noise impact across the site prior to the demolition of the existing buildings.

5.5.2 The predicted noise levels across the proposed site for the daytime and night-time periods respectively, based on the calibrated levels from the measurement positions, are shown in figures 9 & 10.

5.5.2 As a large number of the properties have the same noise impact figure the areas have been split into noise impact zones. The split is shown in figure 9 below. These splits have then been used to calculate the required glazing specification initially based on the linear calculation methodology.

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Figure 7 – existing daytime façade impact levels for the site pre-demolitio

Figure 8 – existing night-time façade impact levels for the site pre-demolition

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Figure 9 – Predicted daytime noise impact values post-construction of the new development

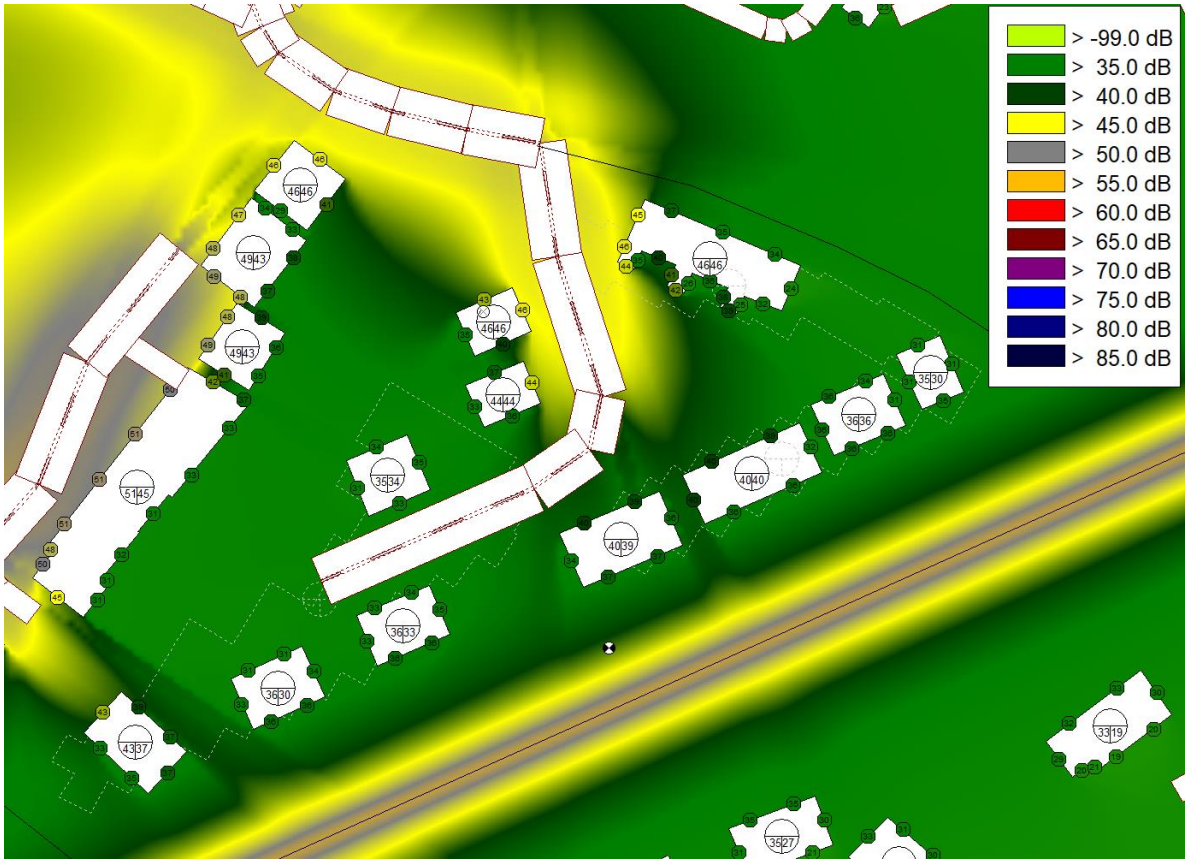
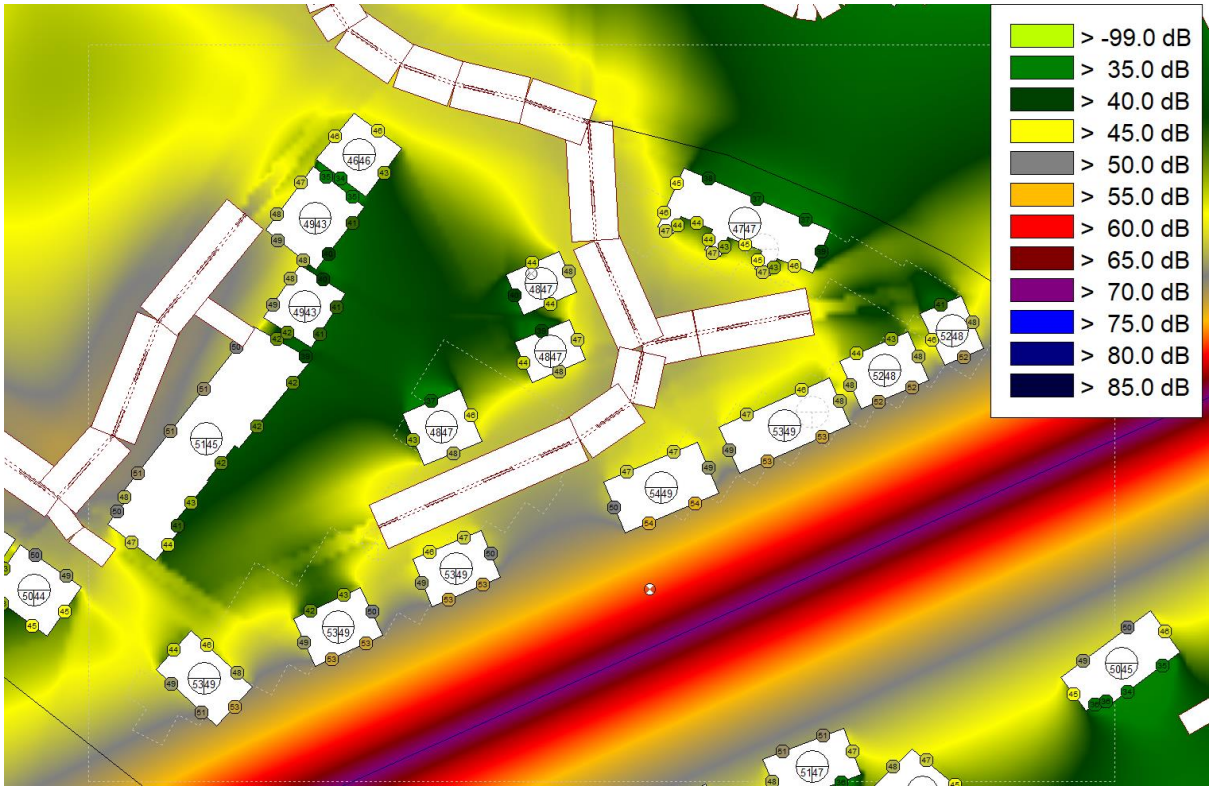


Figure 10 – Predicted night-time noise impact values post-construction of the new development



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5.6 Building Envelope Specification

5.6.1 This section outlines the building envelope requirements based on the measurements outlined above. Facade, wall, glazing, roof and ventilation specifications have been determined to achieve the internal noise level criteria for the development. The specification has been determined in accordance with BS8233:2014 Annex G and EN ISO 12354-3: 2017 based on the predicted façade day and night noise levels, the room and facade dimensions from the drawings provided.

5.6.2 Table 5 below provides the basic guidance calcs for each area and the classification of property type greatest affected within each area. For a robust guideline the highest value in each category has been used for the initial linear calculation in table 5. The plot numbers are the assumed numbers based on figure 4.

Table 5: Linear calcs based on modelled impact

Boundary Location	**L_{AeqT} (16hr Day & 8hr Night)**	**L_{AMax}**	**BS8233 & WHO Internal noise**	**BS8233 & WHO External Noise**	**Difference to L_{Aeq} & L_{AMax} (internal/external)**
North-East Boundary (Plots 1-6)					
Front					
Day (0700-2300)	47dBA		35dBA	55dBA	(12dBA/ -8dBA)
Night (2300-0700)	44dBA	64dBA (10th Highest)	30dBA (45dBA L_{AMax})	(60dBA L_{AMax})	(14dBA) (19dBA)
Rear					
Day (0700-2300)	37dBA		35dBA	55dBA	(2dBA/ -18dBA)
Night (2300-0700)	35dBA	64dBA (10th Highest)	30dBA (45dBA L_{AMax})	(60dBA L_{AMax})	(5dBA) (19dBA)
South Boundary (Plots 7-20)					

Front					
Day (0700-2300)	47dBA		35dBA	55dBA	(12dBA/ -8dBA)
Night (2300-0700)	37dBA	64dBA (10th Highest)	30dBA (45dBA L_{AMax})	(60dBA L_{AMax})	(7dBA) (+19dBA)
Rear					
Day (0700-2300)	54dBA		35dBA	55dBA	(19dBA/ -1dBA)
Night (2300-0700)	40dBA	79dBA (10th Highest)	30dBA (45dBA L_{AMax})	(60dBA L_{AMax})	(10dBA) (34dBA)
North-West Boundary (Plots 21-23)					
Front					
Day (0700-2300)	48dBA		35dBA	55dBA	(13dBA/ -7dBA)
Night (2300-0700)	44dBA	64dBA (10th Highest)	30dBA (45dBA L_{AMax})	(60dBA L_{AMax})	(14dBA) (+19dBA)
Rear					
Day (0700-2300)	39dBA		35dBA	55dBA	(4dBA/ -16dBA)
Night (2300-0700)	34dBA	64dBA (10th Highest)	30dBA (45dBA L_{AMax})	(60dBA L_{AMax})	(14dBA) (+19dBA)

5.6.3 Based on the details from Table 5 the North-East and North-West area (Plots 1-6 and 21-23)can be fitted with standard double glazing with a Rw specification typically of 29dB for the red section of the site. This will also apply to the front (north-facing) glazing for the properties across the Southern boundary (plots 6-20).

5.6.4 The Rw29 figure is based on the lowest available specification from Pilkington for double-glazed windows. All of these areas would only need to exceed Rw20 for the actual specification.

5.6.5 The Southern-facing glazing for plots 6-20 will need more advanced attenuation. This should be in the form of a specification of at least Rw35.

5.6.6 This can be further checked by looking at the combined break-in noise impact using the BS8233:2014 Annex G / EN ISO 12354-3: 2017 calculations. The results of this and the exact recommended glazing type/example for the site are shown in table 6.

5.7 Glazed Elements and Ventilation

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

5.7.2 It is required that the glazing, frame and seals as a whole achieve the performance when the window is in the closed position. The performance requirements outlined in table 6 below are considered to provide more than adequate sound insulation to achieve the relevant day and night internal design goals respectively. This is based on existing modern double-glazing. The North-facing areas and the North-East & North-West plot areas have all been provided with a minimum Rw value in case the chosen manufacuturer can provide double-glazing below the example Pilkington product. The glazing for the rear/South of plots 6-20 will need to meet the suggested specification in table 6 as a minimum requirement. This is to make sure that the L_{AMax} values from the train pass-by noise does not cause any form of sleep disturbance during the night, or during the daytime for any future inhabitants that may work night-shifts.

Table 6: Example Sound Insulation performance requirements for glazed elements and ventilation

		Glazed Elements (Frame & Glazing) Sound Insulation Requirements (Indicative requirements equal or approved)						
Section Area	**Description**	**Octave Band Frequency Requirements[1] R dB**						**Glazing Acoustic Performance dB Rw (C, Ctr)**
		125 Hz	**250 Hz**	**500 Hz**	**1 kHz**	**2 kHz**	**4 kHz**	
South of Plots 7-20	8mm/ (6-16mm) /6mm	22	21	28	38	40	47	35 (-2;-6)
Front & Rear of Plots 1-6	-	-	-	-	-	-	-	20
Front & Rear of Plots 21-23	-	-	-	-	-	-	-	21

Natural ventilation assumed throughout. Should this change to mechanical ventilation the above specification may be reduced. An acoustic consultant should be engaged to assess the level of reduction appropriate to maintain the internal noise level criteria. The calculation assumes a maximum of 1 ventilation opening per bedroom at the specification outlined in Table .

5.7.3 It is important to note that the requirements outlined above are an over-specification if the standard double-glazing of Rw29 is used site-wide.

5.7.4 We understand the ventilation strategy for the development has not been confirmed at this stage of the design. It has been assumed that ventilation will be provided via natural ventilation system. Typically, the use of a natural ventilation strategy will lead to an enhanced glazing specification compared to a sealed mechanical ventilation system. This assessment is based on the windows in closed position and ventilation elements in the open position. Should mechanical ventilation be used this will need to be of the same specification, or greater, than the figures provided in table 7 but these can be used as a guide. However, the levels across the site are so low for all but the Southern facades that acoustics should not be the determining factor when considering how many vents are required and where they are to be placed.

5.7.5 The calculations for the glazing figures in Table 6 are based on the use of basic non-acoustic trickle vents. The values used in the Annex G calculations are based on the example figures from table 7 below.

Table 7: Recommended ventilation specification

Location	**Description**	**Octave Band Centre Frequency (Hz) Sound Reduction Index $D_{n,e}$ dB**					
		125	**250**	**500**	**1k**	**2k**	**4k**
South Façade of Plots 7-20	Standard acoustic trickle ventilator typically ≥ $D_{n,e,w}$ 35dB	33	33	34	35	32	31
All Other facades	Standard non-acoustic trickle ventilator typically ≥ $D_{n,e,w}$ 30dB	30	30	30	30	30	28

5.8 External Wall Construction

5.8.1 The façade wall construction has been assumed to achieve a minimum sound insulation performance of 56dB R_W. Typical façade construction such as concrete, blockwork, timber frame and brick offer high levels of sound insulation and will meet this requirement.

5.9 Roof Construction

5.9.1 The roof construction has been assumed to achieve a minimum sound insulation performance of 54dB R_W. Any skylights and glazing in the roof system to corridor or communal areas should be of standard double-glazed construction to meet a minimum performance as specified for the plots in table 6.

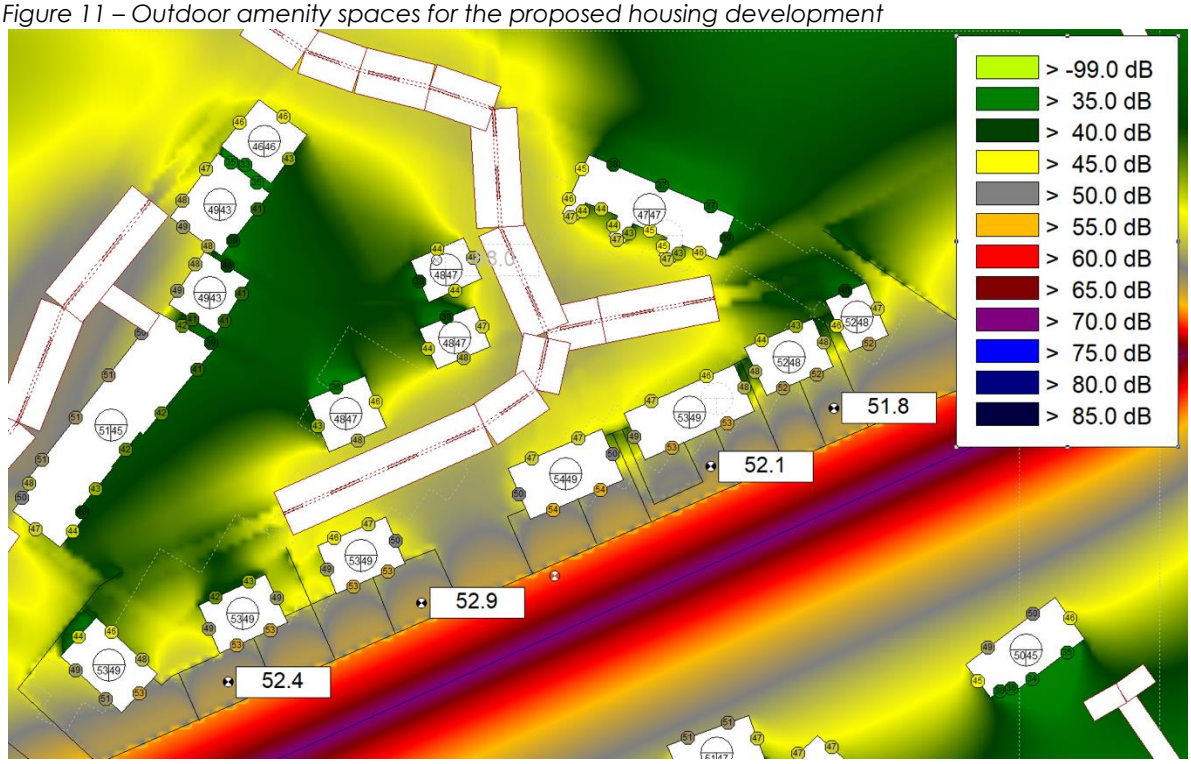
5.10 Element 3- External Amenity Spaces

5.10.1 Based on the measured noise levels at the site and the noise model it is predicted that the gardens for plots 1-6 and 21-23 will fall below the

required limit of 55dBA L_{Aeq_16hr} in accordance with BS8233:2014. In most cases they will also be below the 'desirable' limit of 50dBA L_{Aeq_16hr}.

5.10.2 The Southern boundary (plots 7-20) garden spaces will all require further attenuation in order to achieve the required values for outdoor amenity spaces in accordance with BS8233:2014. This will need to be in the form of garden fencing that is at least 2m in heigh and with a density of at least 10kg/m^3. Figure 11 shows the map of the area and expected garden areas for the various plots once these fences have been installed.

Figure 11 – Outdoor amenity spaces for the proposed housing development



5.11 Element 4- Assessment of Other Relevant Issues

5.11.1 This section of the acoustic design report considers the other relevant issues. Element 4 considers other issues which may remain relevant to the assessment, these issues are as follows:

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

5.12 Compliance with Relevant National and Local Policy

5.12.1 There are no specific noise guidance or policy documents for residential developments other than the ProPG and BS8233:2014 guidance that has been used throughout this document.

5.13 Magnitude and Extent of Compliance with ProPG

5.13.1 This report demonstrates that all dwellings will meet the specified internal noise level requirements provided the guidance in this report is followed. External amenity spaces have been provided in line with the guidance set out in ProPG. Based on this the development is in general compliance with the ProPG requirements.

5.14 Likely Occupants of The Development

5.14.1 Additional needs of the future occupants are not known at this stage however the needs of all potential occupants have been considered with the assessment of adequate internal noise levels and provision of adequate external amenity spaces to meet the needs of potential occupants.

5.15. Acoustic Design v Unintended Adverse Consequences

5.15.1. The design has considered the impact of adverse consequences, mitigation has been provided by specification of the sound insulation and ventilation requirements. The design has also considered the external amenity noise levels on balconies and outdoor spaces.

5.16 Acoustic Design v Wider Planning Objective

5.16.1 Where possible the wider planning objectives have been considered including the need for residential housing with good transport links. It is assumed that the winder planning objectives have been adhered to by following the ProPG guidance.

5.17 Stage 2 Assessment Conclusion

5.17.1 The stage 2 assessment considers all four (4) elements, the principals of good acoustic design have been followed.

5.17.2 The element 2 assessment has considered the measures required to provide an adequate acoustic environment with appropriate noise levels for internal spaces. The sound insulation and ventilation requirements have been specified based on the predicted façade noise levels.

5.17.3 The element 3 assessment of external amenity spaces has considered the noise impact on the development and the external amenity spaces. Appropriate provision of external amenity space has been provided in line with the ProPG guidance.

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

6.0 Observations and Further Discussions

6.0.1 The day values measured over the course of the measurement period show that the garden noise levels are below the 'upper limit' and shown in table 1 as part of the guidelines from WHO and BS5223 of 55dBA L_{Aeq_16hr} for all proposed properties, once the 2m fencing has been installed on the Southern boundary.

6.0.2 With the proposed construction, glazing and ventilation strategy all properties will meet BS8233:2014 guidelines.

7.0 TAN 11: 1997 Assessment

7.0.1 The TAN Guidelines provided would mean the following categorisation of the measured data, shown in table 8

Table 8

Location	Daytime Noise Category (Road)	Night-time Noise Category (Road)	Daytime Noise Category (Rail)	Night-time Noise Category (Rail)
North-East (Plots 1-6)	A	A	A	A
Southern (Plots 7-20)	A	A	B	A
North-West (Plots 21-23)	A	A	A	A

7.0.2 All areas, with the exception of the Southern plots during the daytime, fall into category A. The Southern area (Plots 6-20) falls into category B for rail – which means that 'noise should be taken into account when determining planning'. These levels are without the recommended solid fenceline that would stretch the length of the boundary with the railway.

7.0.3 Based on the findings of this report – noise should not be considered a hindering factor when planning permission is considered providing the recommendations of this report are followed.

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8.0 Credentials

Name	Title	Credentials
James Flitton BSc AMIOA	**Acoustic Consultant**	**IOA Diploma in Acoustics & Noise Control**
		Associate Member Institute of Acoustics
		CSCS Professionally Qualified person
		Affiliate Member of IDE
Signed		

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Appendix A – Acoustic Terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near (LAeq,T).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. Generally used to describe background noise level.

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Appendix B - Noise Survey Instrumentation

Type	Manufacturer	Model	Serial Number	Last Cal	Cal Due
SLM	NTi	XL3-TA	A3A-1773-FO	09/07/2025	09/07/2027
Pre-amp	NTi	MA220	15205	09/07/2025	09/07/2027
Microphone	NTi	MC230A	A31329	09/07/2025	09/07/2027
SLM	NTi	XL3-TA	A3A-01774-FO	10/07/2025	10/07/2027
Pre-amp	NTi	MA220	15221	10/07/2025	10/07/2027
Microphone	NTi	MC230A	A31393	10/07/2025	10/07/2027
Calibrator	NTi	CAL200	19829	12/11/2024	12/11/2025

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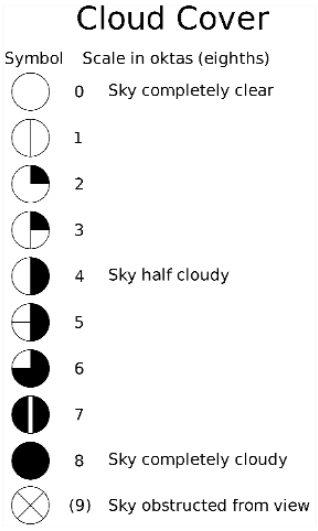
Appendix C – Weather Conditions Chart Used

(Blank Version)

<table>
<tr><th colspan="5">Weather Conditions</th></tr>
<tr><th>Measurement Location</th><th>Date/Time</th><th>Description</th><th>Beginning of Survey</th><th>End of Survey</th></tr>
<tr><td></td><td></td><td>Temperature:</td><td></td><td></td></tr>
<tr><td colspan="2" rowspan="8"> 
</td><td>Precipitation:</td><td></td><td></td></tr>
<tr><td>Cloud cover (oktas - see guide)</td><td></td><td></td></tr>
<tr><td>Presence of fog/snow/ice</td><td></td><td></td></tr>
<tr><td>Presence of damp roads/wet ground</td><td></td><td></td></tr>
<tr><td>Wind Speed (m/s)</td><td></td><td></td></tr>
<tr><td>Wind Direction</td><td></td><td></td></tr>
<tr><td>Conditions that may cause temperature inversion (i.e. calm nights with no cloud)</td><td></td><td></td></tr>
</table>

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Appendix D – CadnaA Noise Modelling Calculations

Availbel upon request due to the large number of additional pages