

Acoustic Report

Environmental Noise Survey Proposed Residential Development on Land Between No 12 and 14 Knowl Road, Mirfield, WF14 8DQ.

Our Reference – J3257

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Survey and Report by – Paul Horsley MIOA

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Limitations

The assessments and interpretation have been made in line with legislation and guidelines in force at the time of writing, representing best practice at that time.

All of the comments and opinions contained in this report, including any conclusions, are based on the information obtained by Paul Horsley Acoustics Ltd during our investigations.

There may be other conditions prevailing on the site which have not been disclosed by this investigation and which have not been considered by this report. Responsibility cannot be accepted for conditions not revealed by the investigation.

Any diagram or opinion of the possible configuration of the findings is conjectural and given for guidance only and confirmation of intermediate ground conditions should be considered if deemed necessary.

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- b) the date on which the final report is delivered.

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1.0 Agent

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2.0 Subject

Residential development of land between No 12 and 14 Knowl Road, Mirfield, WF14 8DQ.

3.0 Aims

The aim of this report is to determine the existing baseline background noise environment levels affecting the proposed development location in relation to noise to inform and allow discharge of Condition No 4 relating to noise for the planning number 2021/62/91246.

Condition No 4 states:

4. Before construction work commences a report specifying the measures to be taken to protect the development from noise from the nearby nursery/commercial premises shall be submitted to and approved in writing by the Local Planning Authority.

The report shall:

- a) Determine the existing noise climate*
- b) Predict the noise climate in gardens (daytime), bedrooms (night-time) and other habitable rooms of the development.*
- c) Detail the proposed attenuation/design necessary to protect the amenity of the occupants of the new residences (including ventilation if required).*

The development shall not be occupied until all works specified in the approved report have been carried out in full and such works shall be thereafter retained.

Provide an assessment of the results in accordance with the recommendations laid down in the National Planning Policy Framework, NPPF, for the proposed development site with respect to noise.

Provide mitigating noise control advice relating to the achievement of an acceptable internal environment for the development as recommended with World Health Organization's "Guidance for Community Noise, 1999" and relevant Standards and Guidelines.

4.0 Location and Description of Existing Noise Sources

The development site is located on land between No 12 and No 14 Knowl Road, Mirfield.

The planning application No 2021/62/91246 is for the development of the land with the erection of 1 No detached residential property. Access to the site will be from Knowl Road to the west of the site via an existing access slip road. The existing detached garage positioned on site will be demolished accordingly to allow development of the land.

The site is positioned on flat land, with the sites best described as rectangular occupying an area measuring approximately 17m x 8m.

The site is bounded to the north by the access road and residential premises on the opposite side of the road, with Crowlees Infant and Junior school beyond. The eastern and southern boundaries are formed by existing residential premises. There is a public footpath positioned along the southern side of the property which is bounded by a 2.2m high stone wall. The A644, Huddersfield Road leading to Mirfield town centre is located approximately 120m south of the site. The western boundary is formed by an existing Kirklees Council office building and yard.

The primary noise source within the vicinity of the site is predominantly due to traffic noise emanating from the A644, Huddersfield Road and Knowl Road. Residential activity was also observed during daytime periods. Owls and periodic aircraft were audible at night. Children playing outside at the nearby nursery and school were audible during daytime periods.

5.0 Guidance on the Assessment of Noise Levels

The purpose of any criterion or standard for environmental noise should be to safeguard against unacceptable levels of community response, deemed as a feeling of annoyance during daytime or disturbance at night. WHO defines annoyance as “a feeling of displeasure evoked by noise”.

The main source of information relating to noise and the community response are field studies including noise measurements and social surveys. These surveys attempt to establish a correlation between the two sets of results.

In the absence of any definitive guidance and to establish suitable noise criteria, it is necessary to rely on general guidance and assessment methods used for community noise sources. Discussions on the current methods are given below.

5.1 BS4142:2014 'Method for Rating and Assessing Industrial and Commercial Sound'

This recently revised standard provides a method for rating and assessing sound of an industrial and/or commercial nature. The method uses outdoor sound levels to assess the likely effect of sound on people who might be inside or outside a dwelling or premises used for residential purposes. It is limited to applicable sounds and is not intended for noise amounting to nuisance or rating noise outside the scope of the Standard.

Unlike the previous version of the Standard, rating levels are not prescriptive, but more context based, with the following applicable to rating values:

- Typically, the greater this difference (variance between impact of background and rating level), the greater the magnitude of impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending upon the context.
- A difference of around +5 dB is an indication of an adverse impact, depending upon the context.
- The lower the rating level is relative to the measured sound level, the less it is that the specific sound source will have an adverse impact or a significant impact. Where the rating does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon context.

The Standard introduces additional rating elements, these being subject assessments of tonality, and impulsivity of a sound source, with weighted rating values accordingly applied at the judgment of the assessor.

The introduction of Uncertainty has been applied to the measured values; again, consideration of this is left to the professional executing the survey and assessment. However, steps are provided within the Standard for the reduction of uncertainty in both measurement and calculations of the sound source and rating value.

Actual meteorological conditions are now required to be recorded and reported upon for the survey and report.

5.2 British Standard 8233:2014

The scope of British Standard 8233: 2014: *Sound insulation and noise reduction for buildings* is the provision of guidance for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations; the primary intention of these is to guide the design of new buildings or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the external noise climate.

The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table below.

Indoor Ambient Noise Levels in Spaces When They Are Unoccupied

Activity	Typical Situations	Design Range LAeq, T dB	
		0700h to 2300h	2300h to 0700h
Resting	Living rooms	35	--
Dining	Dining Room / Area	40	--
Sleeping	Bedrooms	35	30

BS8233 states in Note 4 that:

"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."

As such it has been considered appropriate to define a limit for regular maximum indoor noise levels of 45 dB(A) with sporadic events not exceeding 50 dB(A).

BS8233 also suggests noise limits for external areas or a property such as gardens or balconies. It states that:

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

5.3 National Planning Policy Framework, NPPF.

The newly incumbent National Planning Policy Framework, NPPF, provides advice to planning authorities in England on how they must seek to minimise the adverse impact of noisy activities on noise sensitive receptors. This NPPF, replacing PPG 24, and is not prescriptive with respect to specific noise levels, and is mainly concerned with the advising on good practice for environmental noise assessment.

In the absence of definitive noise criterion within the NPPF most Local Authorities in England default to the daytime noise levels inside dwellings not to exceed NR 35; and NR 25, to be achieved inside dwellings at night to avoid sleep disturbance, based upon ingress of external noise sources.

5.4 Noise Policy Statement for England, NPSE.

The document "Noise Policy Statement for England" sets out the following vision for ongoing noise policy: *"Promote good health and a quality of life through the effective management of noise within the context of Government policy on sustainable development."*

This vision should be achieved through the following Noise Policy Aims:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:"

"avoid significant adverse impacts on health and quality of life;"

*"mitigate and minimise adverse impacts on health and quality of life; and"
"where possible, contribute to the improvement of health and quality of life."*

To achieve this vision the Noise Policy Statement sets three noise levels to be defined by the assessor:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The Noise Policy Statement considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable. Where the assessed noise levels fall between the LOAEL and the SOAEL Noise levels, the Policy Statement requires that:

"all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development.... This does not mean that such adverse effects cannot occur."

Where noise levels are below the LOAEL it is considered there will be no adverse effect. Once noise levels are below the NOEL there will be no observable change.

5.5 Pro-PG Planning and Noise: New Residential Development

Pro-PG Planning and Noise: New Residential Development (Pro-PG) was published in May 2017 by the Association of Noise Consultants, Institute of Acoustics, and the Chartered Institute of Environmental Health.

Stage 2: Element 2 of Pro-PG sets indoor ambient noise levels for residential dwellings based on the guidance contained in British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (see table above in Section 5.2).

Note 4 to the above table states:

“A guideline value may be set in terms of SEL or LAFmax, 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 **45 dB LAFmax more than 10 times a night.**”

Note 5 to the above table states:

“Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g., trickle ventilators) should be assessed in the “open” position and, in this scenario, the internal LAeq target levels should not normally be exceeded, subject to the further advice in Note 7’.

This is consistent with the guidance contained within the PPG, which states that:

‘... consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations’.

Based on the above, the following criteria (with windows closed and an alternative means of ventilation provided) are considered appropriate for the proposed residential development and considered to represent good resting and sleeping conditions:

* ≤ 35 dB LAeq (0700-2300) during the daytime.

* ≤ 30 dB LAeq (2300-0700) and 45 dB LAFMax not regularly exceeded during the nighttime.

5.6 World Health Organization 1999 “Guidance for Community Noise”

This document provides a review of the effects of noise and a description of the principles of the WHO health criteria and guidelines for Community Noise.

The effects of noise in dwellings are identified as sleep disturbance, annoyance, and speech interference. For bedrooms, the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30 dB LAeq for continuous noise and 45 dB LAMax for sound events. At nighttime, outside sound levels about 1 metre from facades of living spaces should not exceed 45 dB LAeq, so that people may sleep with

bedroom windows open. This value is equivalent to that specifies in the Criteria 12 document; however, it is now assumed that the noise reduction from outside to inside with the window open is 15 dB.

To enable casual conversation indoors during the daytime, the sound level of the interfering noise should not exceed 35 dB LAeq.

To protect the majority of people from being **seriously** annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB LAeq on balconies, terraces and in outdoor living areas. To protect the majority of people from being **moderately** annoyed during the daytime, the outdoor sound level should not exceed 50 dB LAeq.

Table 1 of the document summarises the guideline values for community noise in specific environments and includes the noise indices to be adopted. Significantly, the corresponding time base to be used for the assessment is also included.

The relevant extracts of Table 1 are reproduced thus:

Specific Environment	Critical health effect (s)	LAeq dB	Time Base hours	LAMax dB
Outdoor living area	Serious annoyance, daytime, and evening	55	16	-
	Moderate Annoyance, Daytime, and evening	50	16	-
Dwelling, Indoors	Speech intelligibility & moderate annoyance daytime & evening.	35	16	-
	Sleep Disturbance, night-time.	30	8	45
Outside Bedroom	Sleep disturbance, window open. (Outdoor Values)	45	8	60

5.7 Building Regulations AD-O, 2021 – Overheating Mitigation

The latest version of the Building Regulation 2010 includes a section 'Overheating' Approved Document O, as per 2021 edition – for use in England.

Section 3 of the Regulation relates to noise and the mitigation strategy to be considered as part of the planning and design stage of the development.

Below is the relevant section relating to noise included within Building Regulations AD-O

O1(2)(a)
ONLINE VERSION

Section 3: Ensuring the overheating mitigation strategy is usable

3.1 The standards in this section may mean that the standards of the simplified method cannot be met. For example, if external noise is an issue, it is unlikely that windows would be opened by an occupant and therefore the minimum free areas of the simplified method cannot be met. In such cases, *dynamic thermal modelling* should be used.

Noise

3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

3.3 Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- a. 40dB $L_{Aeq,T}$ averaged over 8 hours (between 11pm and 7am).
- b. 55dB $L_{A,Tmax}$, more than 10 times a night (between 11pm and 7am).

3.4 Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants' *Measurement of Sound Levels in Buildings* with the overheating mitigation strategy in use.

NOTE: Guidance on reducing the passage of external noise into buildings can be found in the *National Model Design Code: Part 2 – Guidance Notes* (MHCLG, 2021) and the Association of Noise Consultants' *Acoustics, Ventilation and Overheating: Residential Design Guide* (2020).

Where noise is likely to be considered detrimental to opening a window, i.e., where noise exceeds those values noted above, an alternative method of ventilation is required to avoid overheating within the dwelling.

Guidance on ventilation and associated acoustic considerations is also indicated in Acoustic Ventilation and Overheating – Residential Design Guide [AVO] issued jointly by the Association of Noise Consultants and the Institute of Acoustics.

In this guide, the need for ventilation (as falls under the requirements of Approved Document F [ADF] are covered in three main requirements as follows:

- Whole Dwelling Ventilation**
 General ventilation – continuous ventilation of rooms or spaces at a relatively low rate
- Extract Ventilation**
 Removal of air from a space or spaces (typically stale air from bathrooms or kitchens) to outside
- Purge Ventilation**
 Manually controlled removal of air at a high rate to eliminate fumes and odours, e.g., during painting and decorating or from burnt food. May be provided by natural or mechanical means.

Four main template systems for providing each of the above AD-F ventilation requirements are summarised in the AVO guide as shown in the table below.

Ventilation System	Method of Whole Dwelling Ventilation	Method of Extract Ventilation	Method of Purge Ventilation
System 1 <i>[Background ventilators and intermittent extract fans]</i>	Background ventilators (trickle vents)	Intermittent extract fans	Typically provided by opening windows
System 2 <i>[Passive Stack]</i>	Background ventilators (trickle vents) & passive stack	Continuous via passive stack	Typically provided by opening windows
System 3 <i>[Continuous Mechanical Extract (MEV)]</i>	Continuous mechanical extract (low rate), trickle vents provide fresh air	Continuous mechanical extract (high rate), trickle vents provide fresh air	Typically provided by opening windows
System 4 <i>[Continuously mechanical supply and extract with heat recovery (MVHR)]</i>	Continuous mechanical supply and extract (low rate)	Continuous mechanical supply and extract (high rate)	Typically provided by opening windows

Where possible, natural forms of ventilation are typically preferred. However, in high noise areas, it may be necessary to recommend System 3 or 4 installation, to minimise penetrations through the external building façade, which weaken the overall sound reduction performance.

Ventilation requirements will be assessed with consideration to the above systems.

5.8 Subjective Impression of Noise Changes

The following Table provides a semantic scale that may be used to “subjectively” rate changes in sound pressure level.

Table 1: Subjective effect of changes in sound pressure level

Change in sound level dB	Change in Power		Change in apparent loudness
	Decrease	Increase	
3	1/2	2	Just perceptible
5	1/3	3	Clearly noticeable
10	1/10	10	Half / Twice as loud
20	1/100	100	Much quieter / louder

After Bies and Hansen

This table is taken from Professor Colin H Hansen’s publication “Fundamentals of Acoustics” page 41, for the Department of Mechanical Engineering, University of Adelaide.

This table also appears in “Engineering Noise Control” by Colin Hansen and David Bies, a comprehensive reference book, amongst others.

6.0 Survey Equipment

Castle MIRUS GA117 Sound Level Meter, S/N 35781

Castle Calibrator GA607, S/N 039459

Castle Barometer GA690, S/N 068449

Windshield

Tripod

Weatherproof Case

Cabling

Security Chains and Locks

7.0 Survey Method

The writer carried out a remote baseline noise survey between 17th to 19th April 2024 to ascertain a representative “Baseline” noise climate for the site locations selected. This assessment was executed in

accordance with the requirements of BS4142:2014+A1:2019, "Methods for Rating and Assessing Industrial and Commercial Sound".

The monitoring was executed at 1 No fixed location on the site.

LA_{eq} , LA_{10eq} , LA_{90} and LAF_{Max} indices sound measurements were taken using the sound analyser.

The measurement indices noted above are defined as follows:

- $LA_{eq, T}$ the "A" weighted equivalent continuous noise level of sample period T.
- $LA_{10, T}$ the "A" weighted level exceeded for 10% of sample period T.
- $LA_{90, T}$ the "A" weighted level exceeded for 90% of sample period T.
- LAF_{max} The "A" weighted maximum level during the sample period T.

The sound level meter was calibrated before and after the measurements using the calibrator to ensure accuracy of the results. No relevant variations were noted between calibrations and the results obtained can be deemed to be an accurate representation of the levels recorded.

Pre-Survey Calibration Reading 94.0 (-0.37) dB.

Post-Survey Calibration Reading 94.0 (-0.30) dB.

Refer to Appendix A for a marked up locational plan of the survey points.

8.0 Prevailing Weather Conditions

Date	Period	Temp °C	Relative Humidity Rh %	Barometric Pressure mb	Wind Speed mph	Wind Direction	Precipitation	Cloud Cover %
17.04.24	Day	9	59%	1017	0-5	N	None	25%
	Night	3	85%	1023	0-2	NE	None	5%
18.04.24	Day	10	69%	1024	0-4	W	None	20%
	Night	8	83%	1016	0-6	W	None	20%
19.04.24	Day	10	79%	1017	0-6	WNW	None	30%

9.0 Noise Survey Results

During the monitoring period noise samples were recorded using a 1/1 Octave Centre Band analysis. These monitoring samples were collected from the site location described below. This was to establish the baseline noise climate for the site.

The tables of results on the following pages indicate the noise levels recorded during the monitoring period, with a brief description of the noise sources contributing to the monitored noise levels recorded.

An overview of monitoring positions is given below: -

1. Location 1 relates to the position to the mid-eastern side of the site.

The above monitoring location should be read in conjunction with the site layout appearing in Appendix A of this report.

Refer to Appendix C for the survey results frequency analysis table.

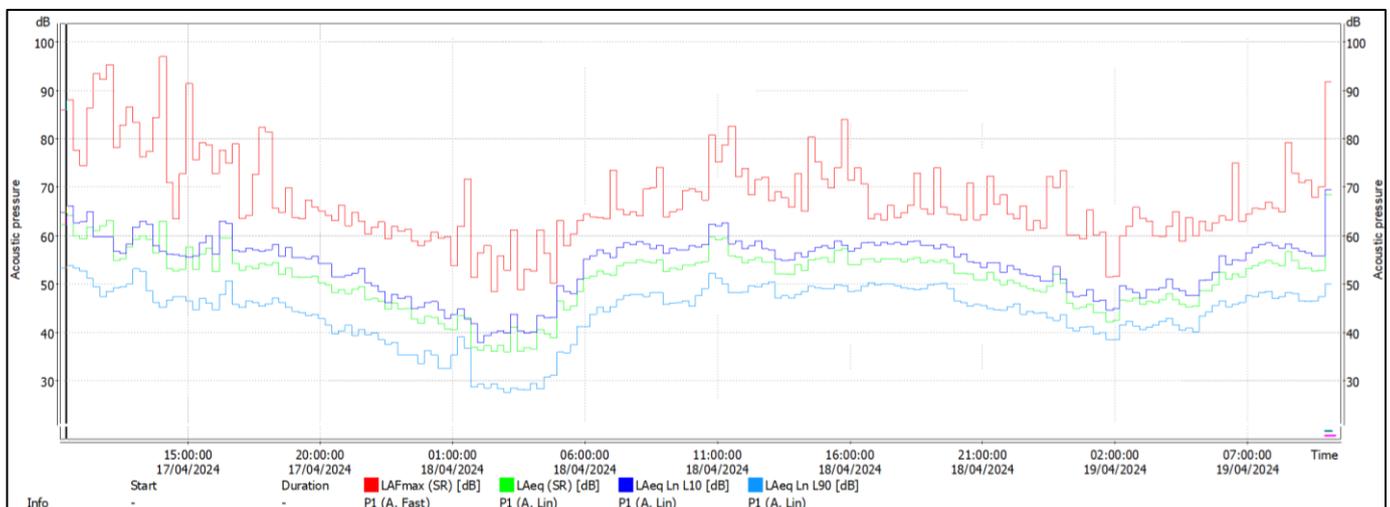
10.0 Noise Survey Results Table Overview

The data table below is a logarithmic average of the monitoring periods derived from the raw data collected during the assessment sessions.

Table 1 Overview Results

Location	Period	LAMax dB	11th Highest LAMax dB	LAeq dB	LA10 dB	LA90 dB
1	Daytime (07.00 - 23.00)	84	N/A	55	57	47
	Nighttime (23.00 - 07.00)	75	60	47	49	41

Table 2 Time History



Refer to Appendix C for frequency analysis details.

11.0 Results Analysis

The above noise survey, carried out between 17th and 19th April 2024, was chosen as a representative weekday period to reflect the typical noise climate for the area surrounding the development site.

The noise survey results obtained for the site can, therefore, be deemed to be representative of normal activities for the area and will be used as the base for analysis and assessment purposes below.

Assessments of the individual results indicate that the monitoring positions selected are affected primarily by traffic noise sources from the movements along the local road network. Aircraft were audible at night, with intermittent traffic passing the site. Children at play was also audible during daytime periods.

From the data acquired during the various assessment periods the following exposure noise levels have been established for the site.

Table of Exposure Levels

Location	Period	Noise Level
1	Daytime (0700 – 2300 Hrs)	LAeq, 16 Hours - 55 dB
	Night-time (2300 – 0700 Hrs)	LAeq, 8 Hours - 47 dB LAFmax – 60 dB (11 th Highest Value) ⁽¹⁾

(1) As recommended within Pro-PG

12.0 Mitigating Circumstances

The proposal for the development site is for the demolition of the existing property and the erection of 1 No detached residential property as indicated on the site proposal sketch. See Appendix B for details.

There are 5 main areas to consider within the development to ensure that the building provides adequate attenuation against the ingress of external noise sources that are likely to affect the comfort and amenity of the residents.

- Construction Phase (Temporary)
- Building Fabric Construction
- Ventilation
- Glazing Units
- External Recreational Areas

12.1 Construction Phase Noise (Temporary)

It is common practice that construction will take place during typical daytime hours only, assumed to be 07.30 to 18.00 hours during weekdays only and Saturday 08.00 to 13.00 hours. No construction work assumed for Sunday or Public Holidays.

There are items of plant, such as generators that may operate 24 hours dependent upon their function and these plant items may unduly affect the existing amenity of the nearby residential premises.

Noise generated by construction work has the potential to increase the noise levels at the nearby noise sensitive residential premises due to the operation of plant and equipment associated with the construction phase of the development. The level of potential increase will depend on many factors, including locality of the activities on site relative to the recipient, type of activity being undertaken, and control measures implemented.

To minimize the potential impact of the noise impact mitigation measures are proposed for the construction phase as noted below.

12.1.1 Construction Noise Mitigation

Construction noise is an inevitable part of any development, however, the change in noise levels is usually short term and temporary during the construction phase of the project only.

12.1.2 Noise Action Plan

It is recommended that a Noise Action Plan is implemented for the development, addressing all aspects of the construction, including mitigation measures and procedures for dealing with on-site activities and complaints, should any arise.

The Control of Pollution Act and BS 5228 define a set of Best Practice working methods and mitigation measures, referred to as Best Practicable Means (BPM).

The following are examples of what could be included within a Noise Action Plan.

- Selective location temporary plant so that it is screened by on-site structures, such as site cabins.
- Using modern equipment and ensuring such equipment is properly maintained and correctly operated by trained staff.
- Acoustically enclosing noisy equipment if possible
- Ensure that mobile plant is well maintained and there are no excessive rattles or vibrations that can be addressed.
- Ensuring plant machinery is turned off when not in use.
- Provide local residents with 24-hour contact details for a site representative.
- Inform local residents about the works advising of any specific noisy events and provide a contact telephone number, as noted above.
- Keep noisy deliveries to the midday period where possible.

12.1.3 Site Training / Instruction

The site training and induction programme, including site specific rules will include good working practice instructions for site staff, managers, visitors, and contractors to minimise noise whilst working on the site. Good working practice guidelines/instructions should include the following points as a minimum requirement:

- Avoid unnecessary revving of plant and equipment engines.
- Intermittently used plant should be isolated between operational periods.
- Avoid reversing unnecessarily using tonal reverse horns, fit broad band warning horns where possible.
- Report any defective equipment/plant immediately so that corrective maintenance can be completed.
- Minimise noise when handling or moving materials on site.

12.1.4 Plant Maintenance

All temporary plant items arriving on site should be in good working order and have written proof of maintenance prior to use.

Maintenance of temporary plant on site should be carried out routinely and in accordance with the manufacturers' guidance and recommendations.

Regular inspection of all plant and equipment must be undertaken to ensure that:

- all plant is in a good state of repair and operating correctly.
- any plant found to require maintenance has been identified and isolated until maintenance has been completed.
- acoustic enclosures fitted to plant are in a good state of repair and correctly fitting.
- doors and covers remain closed during operation.
- all repairs should be completed by a fully qualified maintenance engineer for the specific plant item under consideration.

Although the above are mainly procedural recommendations and not fully quantifiable it is possible that they could reduce perceived noise levels on the site by about -5 dB.

12.2 Building Fabric Construction

The Building Regulation, relating to the minimum acoustic requirements for the various areas of the development, must be met.

12.2.1 External Building Envelope

Based upon the external baseline noise levels recorded, primarily due to traffic noise, the minimum weighted sound reduction, R_w , of the external façades will need to be R_w 45 dB to ensure that an internal specification of 30 $L_{Aeq, 8\text{hours}}$ dB maximum, (equivalent to NR 25), is met within the noise sensitive dwelling areas during nighttime periods, as determined within the WHO recommendations. The worst case LAF_{max} of 61 dB will be attenuated such that the internal level will be up to a maximum value of 16 LAF_{max} dB, again in line with the specific requirements of WHO.

Based upon the proposed wall construction, the envelope will comprise of a stone cavity block external envelope, the following performance would be expected from the external façade construction:

Frequency in Hz	63	125	250	500	1000	2000	4000
R _w of Facade	40	41	45	45	54	58	65

12.2.2 Glazing Units

The primary weakness in any building envelope is usually due to windows, ventilation louvres and other apertures.

The development will not be noted as having air conditioning installed within the noise sensitive residential areas of this development, other than extraction from bathrooms which are not within the noise sensitive bedroom areas and therefore the only area of concern are the proposed window systems.

In order to provide adequate attenuation against the sound levels in the area and achieve the Building Regulations and WHO criteria, it is recommended that the formed apertures are fitted with suitable acoustic glazing units.

Using the sound exposure levels assessed for the worst case position on site, Location 1, the minimum recommended R_w dB rating for the glazing systems for the site should be as follows.

Period	Noise Exposure Level	Internal Living Space / Bedroom Target Level	Minimum R _w Values Required
Daytime (0700 – 2300 Hrs)	LA _{eq} , 16 Hours – 55 dB	LA _{eq} , 16 Hours – 35 dB	R_w 20 dB
Night-time (2300 – 0700 Hrs)	LA _{eq} , 8 Hours – 47 dB LA _{max} - 60 dB	LA _{eq} , 8 Hours – 30 dB LA _{max} - 45 dB	R_w 17 dB R_w 15 dB

Based upon Standard Float Glass data for glazing systems, it is possible to provide the necessary sound insulation using an a 4mm Float Glass – 20mm wide Argon Filled Airspace – 4mm Float Glass. This system has certified acoustic values of R_w 31 dB, with an R_{w+C} 30 dB and R_{w+Ctr} 25 dB.

Therefore, this is the recommendation for all elevations of the development and the acoustic properties of this type of glazing is provided below for reference.

Glazing type	Frequency in Hz	63	125	250	500	1000	2000	4000
4/20/4	R _w of Facade	18	24	20	25	34	37	43

12.2.3 Ventilation Considerations – AE-O Overheating Mitigation

If we consider opening a window within a dwelling room such as living space or bedroom to provide additional room ventilation, the accepted attenuation value of the partially open window is -15 dB, we can determine if the noise ingress would be within acceptable levels, when compared against the Building Regulations AD-O and BS8233 limits.

Below is a table indicating the noise ingress for an open window scenario at the 2 No site locations used within the noise monitoring regime.

Location	Period	Open Window Adjusted Noise Exposure Level	AD-O Internal Limit Values	BS8233 Internal Limit Values	Targets Achieved Y/N
1	Daytime (0700 – 2300 Hrs)	LAeq, 16 Hours – 40 dB	45 dB	40 dB	Y
	Night-time (2300 – 0700 Hrs)	LAeq, 8 Hours – 32 dB LAmax - 45 dB	40 dB 55 dB	35 dB 45 dB	Y Y

As can be seen from the above results, noise ingress with a window open scenario does not result in excessive internal values above the limits set within the latest version of the Building Regulation Approved Document O, therefore, no additional mitigation measures will be required for the introduced premises bedrooms.

12.3 External Recreational Areas

The development is noted as having an external recreational area to the south of the building. This will be within an enclosed 2m high stone walled and fenced area and as such will achieve a value less than 55 LAeq dB for daytime periods.

The fence will need to be completed using close boarded wooden panels sealed to the base and overlapped joints to form a solid barrier against noise transmission. The effective panel will need to be at least 15 Kg/m² superficial density.

12.4 BS8233:2014 Noise Ingress Assessment

To provide further evidence that the above recommended mitigation measures will be adequate to achieve a comfortable internal environment within the dwellings once occupied, a BS8233:2014 assessment will be completed.

This assessment will account for the daytime, nighttime and maximum nighttime values recorded for the worst-case facades of the development and compare the results against the limiting criteria necessary to demonstrate an acceptable internal environment without giving rise to any undue loss of amenity to the incumbent residents.

Below is an overview of the results of the calculations completed.

Location	Daytime	Nighttime	Nighttime Maximum	Comments
Limiting Values	35 dBA (NR 30)	30 dBA (NR 25)	45 dBA (NR 40)	
Location 1	34 dBA (NR 30)	26 dBA (NR 23)	40 dBA (NR 36)	Design Target Met

As can be seen from the above overview the mitigation recommendations will allow the internal noise criterion to be fully achieved.

Refer to Appendix D for details of the full calculation data sheets.

13.0 Report Summary

An acoustic assessment of the existing noise levels on land between No 12 and 14 Knowl Road, Mirfield has been completed to inform the Planning Application No 2021/62/91246 Condition No 4 for the site with respect to noise.

The noise survey established the pre-existing noise climate and sources for the area, which are primarily due to traffic movements locally and at a distance. Children at play are also audible.

To achieve an acceptable and comfortable internal noise climate for the potential residents the WHO guidance on community noise has been utilised for the acoustic target levels for the internal criteria of the dwelling areas of the development. The National Planning Policy Framework has been considered, with NR 30 daytime and NR 25 nighttime internal limits being utilised since the NPPF is not prescriptive in its noise limits.

Mandatory mitigating recommendations are necessary to provide adequate protection against intrusion from external noise sources and achieve the WHO guidelines for the internal noise climate of the residences.

Recommendations have been proposed for the glazing systems to be employed on this development, to achieve the internal dwelling room design target exposure levels as determined within WHO recommendations.

To provide background ventilation, opening windows is acceptable and not likely to result in adverse comment from the incumbent residents or result in disturbed sleep due to the external noise sources identified.

The development is noted as having external recreational areas and as such it is recommended that the solid walls and wooden boundary fence would be adequate, with the wooden fence formed using solid fencing panels.

Provided that the recommended mitigation measures have been incorporated into the development of the site, the amenity of the incumbent residents will be achieved and Condition No 4 will have been satisfied and would allow discharge accordingly.

Appendix A Locational Outline and Monitoring Location



Appendix B Proposal Outline Drawing



Appendix C Survey Results Frequency Analysis

Location	Period	LAMax dB	11th Highest LAMax dB	LAeq dB	LA10 dB	LA90 dB	LAeq dB in Frequency Band Hz							
							63 Hz	125 Hz	250 Hz	500 Hz	1000Hz	2000 Hz	4000 Hz	8000 Hz
1	Daytime (07.00 - 23.00)	84	N/A	55	57	47	30.7	37.7	42.5	47.1	51.2	50.0	44.3	33.2
	Nighttime (23.00 - 07.00)	75	60	47	49	41	22.4	31.3	36.5	40.0	43.5	40.2	33.6	26.0

Appendix D BS8233 Noise Ingress Assessment Calculations

BS8233:2014 NOISE INGRESS CALCULATION - LOCATION 1

Position Assessment - Living Space	Leq Octave band noise levels (dB)							dBA
	63	125	250	500	1K	2K	4K	
	Hz	Hz	Hz	Hz	Hz	Hz	Hz	
Façade - Daytime								
Average façade noise levels	57	54	52	50	51	49	43	55
Noise reduction through façade elements								
SRI External solid wall	-40	-41	-45	-45	-54	-58	-65	
absorption area	-3	-3	-3	-3	-3	-3	-3	
noise level through wall	14	10	4	2	0	0	0	7
SRI windows - glazing (4 - 6-20 - 4)	-18	-24	-20	-25	-34	-37	-43	
absorption area - Window 1.2m x 1.8m	-7	-7	-7	-7	-7	-7	-7	
noise through windows	32	23	25	18	10	5	0	20
Open Window Scenario	-15	-15	-15	-15	-15	-15	-15	
absorption area - 0.18sq.m	-6	-6	-6	-6	-6	-6	-6	
noise level through vent	36	33	31	29	30	28	22	34
Total noise internally								
through wall	14	10	4	2	0	0	0	7
through glazing	32	23	25	18	10	5	0	20
through vent	36	33	31	29	30	28	22	34
Combined total	37	33	32	29	30	28	22	34
Criteria - Living Room - Daytime								35
NR 30 Criteria	59	48	40	34	30	27	25	
Variance and Actual NR Value Achieved	-22	-15	-8	-5	0	1	-3	NR 30

Position Assessment - Bedroom	Leq Octave band noise levels (dB)							dBA
	63	125	250	500	1K	2K	4K	
	Hz	Hz	Hz	Hz	Hz	Hz	Hz	
Façade - Nighttime								
Nighttime façade noise levels	48	47	45	43	44	39	33	47
Noise reduction through façade elements								
SRI External solid wall	-40	-41	-45	-45	-54	-58	-65	
absorption area	-3	-3	-3	-3	-3	-3	-3	
noise level through wall	5	3	0	0	0	0	0	0
SRI windows - glazing (4 - 6-20 - 4)	-18	-24	-20	-25	-34	-37	-43	
absorption area - Window 1.2m x 1.8m	-7	-7	-7	-7	-7	-7	-7	
noise through windows	24	17	19	11	3	0	0	14
Open Window Scenario	-15	-15	-15	-15	-15	-15	-15	
absorption area - 0.18sq.m	-6	-6	-6	-6	-6	-6	-6	
noise level through vent	27	26	24	22	23	18	12	26
Total noise internally								
through wall	5	3	0	0	0	0	0	6
through glazing	24	17	19	11	3	0	0	14
through open window	27	26	24	22	23	18	12	26
Combined total	29	27	26	22	23	19	12	26
Criteria - Bedroom - Nighttime								30
NR 25 Criteria	55	44	35	29	25	22	20	
Variance and Actual NR Value Achieved	-26	-17	-9	-7	-2	-3	-8	NR 23

BS8233:2014 NOISE INGRESS CALCULATION - LOCATION 1

Position	Leq Octave band noise levels (dB)							dBA
	63	125	250	500	1K	2K	4K	
Assessment - Bedroom	Hz	Hz	Hz	Hz	Hz	Hz	Hz	
Façade - Nighttime								
11th Highest MAX façade noise levels	66	60	56	55	57	54	44	60
Noise reduction through façade elements								
SRI External solid wall	-40	-41	-45	-45	-54	-58	-65	
absorption area	-3	-3	-3	-3	-3	-3	-3	
noise level through wall	23	16	8	7	0	0	0	9
SRI windows - glazing (4 - 6-20 - 4)	-18	-24	-20	-25	-34	-37	-43	
absorption area - Window 1.2m x 1.8m	-7	-7	-7	-7	-7	-7	-7	
noise through windows	41	29	29	23	16	10	0	25
Open Window Scenario	-15	-15	-15	-15	-15	-15	-15	
absorption area - 0.18sq.m	-6	-6	-6	-6	-6	-6	-6	
noise level through vent	45	39	35	34	36	33	23	39
Total noise internally								
through wall	23	16	8	7	0	0	0	9
through glazing	41	29	29	23	16	10	0	25
through vent	45	39	35	34	36	33	23	39
Combined total	46	39	36	34	36	33	23	40
Criteria - Bedroom - Nighttime								45
NR 40 Criteria	67	57	49	44	40	37	35	
Variance and Actual NR Value Achieved	-21	-18	-13	-10	-4	-4	-12	NR 36