



PRESCOT GYM & SOCCER CENTRE

Plant Noise Assessment

Reference: 14684.RP01.PNA.0

Prepared: 14 October 2025

Revision Number: 0

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Plant Noise Assessment



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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	14 October 2025	James Gill	Helen Sheldon

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The recommendations within this report relate to acoustics performance only and will need to be integrated within the overall design by the lead designer to incorporate all other design disciplines such as fire, structural integrity, setting-out, etc. Similarly, any sketches appended to this report illustrate acoustic principles only and will need to be developed into full working drawings by the lead designer to incorporate all other design disciplines.



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1. INTRODUCTION

It is proposed to locate new items of plant at Prescott Gym & Soccer Centre in Prescott, Merseyside. As part of the planning application, Knowsley Metropolitan Borough Council requires consideration be given to atmospheric noise emissions from the proposed equipment to the nearest noise-sensitive receptors.

RBA Acoustics has been commissioned to undertake measurements of the prevailing noise conditions at the site and to determine the atmospheric noise emission limits in accordance with Knowsley Metropolitan Borough Council's requirements. This report presents the results of the noise measurements, associated criteria and provides the required assessment.

2. SITE DESCRIPTION

The site is shown in relation to its surroundings in the site plan in Figure 1 (Appendix E).

Prescot Gym & Soccer Centre is active all day with its busiest period in the evenings, primarily between the hours of 18:00 and 20:00. The site houses an internal gym and café with external football pitches and is located in Prescott, Merseyside. It is proposed to locate two Mitsubishi air source heat pump on the single storey flat roof of Prescott Gym & Soccer Centre. The ambient noise across site predominantly consists of intermittent football activity noise and people talking / shouting. There is also intermittent vehicle noise to the main car park (front) and the overflow car park to the east.

The nearest noise sensitive receptors off site are residential dwellings off Warrington Road, Pool Avenue and Atherton Drive.

3. ENVIRONMENTAL NOISE SURVEY

3.1 Survey Methodology

Monitoring of the prevailing background noise was undertaken over the following 3 consecutive hourly periods:

- 18:04 to 21:02 on Tuesday 30th September 2025.

Measurements of the quietest part of the evening (daytime) period obtained because the plant is only proposed to operate during operational daytime hours of Prescot Gym & Soccer Centre.

As the survey was attended in full, weather conditions were considered suitable for obtaining representative noise measurements, being predominantly dry with little wind.

Measurements were made of the L_{A90} and L_{Aeq} noise levels over 5-minute, 20-minute and 1 hour: 45-minute sample periods. A summary of acoustic terminology is included in Appendix A.

3.2 Measurement Positions

To determine the existing noise climate around the site measurements were undertaken at the following locations:

- ***Measurement Position 1 – at the rear of the residential dwelling off Warrington Road***
The sound level meter was mounted on a tripod, approximately 1.4m from the ground and was in a free field condition. It was located to the rear of the residential dwelling off Warrington Road, which is being assessed as NSR 1. The dominant noise source at this location is foot related active, these being ball strike impacts and people shouting, to also include vehicle movements on the access road.
- ***Measurement Position 2 – at the rear of the residential dwellings off Atherton Drive***
The sound level meter was mounted on a tripod, approximately 1.4m from the ground and was in a free field condition. It was located to the rear of the residential dwellings off Atherton Drive, which is being assessed as NSR 3. The dominant noise source at this location is foot related active, these being ball strike impacts and people shouting, to also include vehicle movements in the car park.

The measurement positions are also illustrated on the site plan attached in Figure 1 and photos in Figure 2 (Appendix E).

3.3 Instrumentation

For information regarding the equipment used for the measurements please refer to Appendix B.

The sound level meter was calibrated both prior to and on completion of the survey with no significant calibration drift observed.

3.4 Survey Noise Levels

The representative lowest background L_{A90} and the period averaged L_{Aeq} noise levels measured are summarised in Table 1

Table 1 - Measured Baseline Noise Levels

Measurement Period	Measurement Position 1 (MP1) – Residential Dwelling of Warrington Road		Measurement Position 2 (MP2) – Residential Dwellings off Atherton Drive	
	Representative Lowest Background Noise Level $L_{A90,15min}$ [dB]	Period-Averaged Noise Level $L_{Aeq,T}$ [dB]	Representative Lowest Background Noise Level $L_{A90,15min}$ [dB]	Period-Averaged Noise Level $L_{Aeq,T}$ [dB]
Daytime (07:00 – 23:00)	45	57	43	57

4. PLANT NOISE CRITERIA

In the absence of specific noise guidance for permanent and/or temporary plant installations regarding assessment of noise impact upon the nearest noise sensitive receptors, we will follow the guidance of British Standards 4142: 2014 'Methods for rating and assessing industrial and commercial sound'.

4.1 BS 4142: 2014 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS4142: 2014)

BS 4142:2014 *Methods for rating and assessing industrial and commercial sound* describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

- sound from industrial and manufacturing processes
- sound from fixed installations which comprise mechanical and electrical plant and equipment
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises
- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

The methods described within BS 4142:2014 use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

The standard is also applicable to determine rating levels for sound of an industrial or commercial nature at proposed new dwellings or premises used for residential premises. The standard is only appropriate for the assessment of external sound levels.

The assessment method described in BS 4142:2014 is based on the continuous sound pressure level produced by a specific source ($L_{Aeq,Tr}$) at the assessment location. Appropriate corrections allowing for any tonality, impulsivity, other characteristics or intermittency of the specific sound source are then applied to derive the rating level ($L_{Af,Tr}$). The rating level is then compared to the background sound level ($L_{A90,T}$) to produce the relative difference, or excess of rating level over background sound level. BS 4142:2014 quantifies the estimated impact from the excess as:

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

It would be our recommendation to improve upon meeting background and therefore, we would propose items of mechanical services be designed 5dB below the typical background ($L_{A90, 5min}$), when assessed at the nearest noise sensitive location. The noise limits to achieve are as follows:

Table 2 – Plant Noise Limits at NSR

Assessment Period	NSR	Plant Noise Criteria to be achieved at 1m outside the window of the nearest Noise-Sensitive Receptor* (NSR), $L_{A_{Tr}}$ (dB)
Daytime (07:00 – 23:00)	1 – Residential Dwelling off Warrington Road	40
	2 – Residential Dwellings on Pool Avenue	38
	3 – Residential Dwellings on Atherton Drive	38

Given the consistent nature of the noise across Prescott Gym & Soccer Centre, measured levels at the rear of the residential dwellings on Atherton Drive (MP2) are also considered representative at the rear of the residential dwellings on Pool Avenue.

5. PLANT NOISE ASSESSMENT

This assessment has been based on the information provided to RBA by Vital Energi, described in the following sections.

5.1 Proposed Plant Items

The following plant is proposed for the scheme:

Table 3 – Proposed Plant Items

Ref.	Manufacturer/Model/Duty	Plant Type
ASHP	Mitsubishi / CAHV-R450YA-HPB	Air Source Heat Pump

5.2 Plant Locations

The Mitsubishi heat pumps (x2) are proposed to be located on the roof of Prescott Gym & Soccer Centre. The equipment positions are indicated on the site plan in Figure 1 and in Figure 3 in Appendix E.

5.3 Plant Noise Levels and Operating Times

Information regarding the noise levels of the proposed plant has been provided by the manufacturer of the unit. Furthermore, it is our understanding that the plant is proposed to operate during daytime hours only. The associated plant noise levels are detailed as follows:

Table 4 – Plant Noise Levels

Unit	Parameter	Sound Level [dB] at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
ASHP COP Priority Mode	L_p at 1m	64	66	67	60	54	52	52	47	64
ASHP Capacity Priority Mode	L_p at 1m	66	73	69	67	62	59	61	52	72

Review of the octave band data provides no indication of any tonal characteristics associated with the proposed plant.

5.4 Noise-Sensitive Receptors (NSRs)

Based on observations made on site and discussions with the design team we understand the nearest noise-sensitive receptors to the proposed plant to be as follows:

- **NSR1 – Residential Dwelling off Warrington Road**
A bungalow located approximately 30m from the proposed plant location. The bungalow does not have direct line of sight to the proposed plant location.
- **NSR2 – Residential Dwellings on Pool Avenue**
Residential dwellings located approximately 90m from the proposed plant location. The dwellings have the potential for direct line of sight to the proposed plant location. We have included residential dwellings on Pool Avenue in our assessment as it falls within the distance between NSR1 and NSR3

and has the potential for direct line of sight. However, we don't foresee an issue of noise from plant at this location regardless due to the rail line located very close to the residential dwellings.

- **NSR3 – Residential Dwellings on Atherton Drive**

Residential dwellings located approximately 130m from the proposed plant location. The dwellings have the potential for direct line of sight to the proposed plant location.

The receptors are shown in the site plan in Figure 1 in Appendix E.

5.5 Predicted Noise Levels at NSRs

Our calculation method for predicting noise levels from the proposed external plant at the nearest noise-sensitive receptors, based on the information above, is summarised below.

- Source Term SPL / SWL
- Distance Attenuation
- Directivity
- Reflections
- Screening

Calculation sheets are attached for further information in Appendix C.

The results of the calculations indicate the following noise levels at the nearest affected residential windows:

Table 5 – Predicted Plant Noise Levels (COP Priority Mode)

Operating Period	NSR	Noise Level (dB) at NSR	
		Prediction	Criterion
Daytime (07:00 – 23:00)	1 – Residential Dwelling off Warrington Road	30	40
	2 – Residential Dwellings on Pool Avenue	26	38
	3 – Residential Dwellings on Atherton Drive	23	38

Table 6 – Predicted Plant Noise Levels (Capacity Priority Mode)

Operating Period	NSR	Noise Level (dB) at NSR	
		Prediction	Criterion
Daytime (07:00 – 23:00)	1 – Residential Dwelling off Warrington Road	38	40
	2 – Residential Dwellings on Pool Avenue	35	38
	3 – Residential Dwellings on Atherton Drive	32	38

Noise from the proposed plant installations meets the plant noise limits and is therefore considered acceptable in terms of noise.

6. VIBRATION CONTROL

In addition to the control of airborne noise transfer, it is also important to consider the transfer of noise as vibration to adjacent properties (as well as to any sensitive areas of the same building).

We would typically advise that heat pumps be isolated from the supporting structure by means of either steel spring isolators or rubber footings. For particularly sensitive locations, or when on lightweight structures the mounts should ideally be caged and be of the restrained type.

For high vibration-generating plant, e.g. heat pumps located on roofs or in close proximity to noise-sensitive receptors, critical consideration must be given to vibration isolation as the natural frequency of typical isolators can coincide with the frequency of a typical roof. This can lead to significant vibrational noise transfer to below, unless the isolators are appropriately selected. We would typically expect the isolators to be caged and restrained steel spring isolators. Where the roof is lightweight, it is likely that a plant deck will need to be installed and connected to the structural columns to take the plant off the lightweight elements of the roof.

It is important the isolation is not “short-circuited” by associated pipework or conduits. To this end, any conduits should be looped and flexible connectors should be introduced between the condenser and any associated pipework. Pipework should be supported by brackets containing neoprene inserts.

A detailed assessment of the specific measures will be required once full understanding of the precise plant selections are known.

7. CONCLUSION

RBA Acoustics have undertaken noise monitoring at Prescott Gym & Soccer Centre. The measured noise levels are presented within this report. The resultant noise levels have been used to determine the required criteria for atmospheric noise emissions from the proposed plant installations.

The results of the assessment indicate atmospheric noise emissions from the proposed plant are within the criteria required by Knowsley Metropolitan Borough Council. As such, the proposed plant installations should be considered acceptable in terms of noise.

Appendix A - Acoustic Terminology

A-weighting (e.g. dB(A))	A correction applied across the frequency bands to take into account the response of the human ear, and therefore considered to be more representative of the sound levels people hear.
DeciBel (dB)	Unit used for many different acoustic parameters. It is the logarithmic ratio of the level being assessed to a standard reference level.
L_{eq}	The level of a notional steady sound which, over a stated period of time, T , would have the same acoustic energy as the fluctuating noise measured over that period. Typically used to represent the average or ambient noise level.
$L_{Aeq,T}$	The A-weighted level of a notional steady sound which, over a stated period of time, T , would have the same acoustic energy as the fluctuating noise measured over that period. Typically used to represent the average or ambient noise level.
L_{An} (e.g. L_{A10} , L_{A90})	The sound level exceeded for n% of the time. E.g. L_{A10} is the A-weighted level exceeded for 10% of the time and as such can be used to represent a typical maximum level. Similarly, L_{A90} is the level exceeded for 90% of the measurement period, and is often used to describe the underlying background noise.
NR	Noise Rating – A single figure term to describe a measured noise level which considers the frequency content of the noise, generally used for internal noise level measurements (particularly mechanical services plant).

Appendix B - Instrumentation

The following equipment was used for the acoustic measurements.

Table B1 - Equipment Calibration Details (Red Kit)

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Valid Until
Norsonic Type 1 Sound Level Meter	Nor140	1405945	U44502	15 June 2025
Norsonic Pre Amplifier	1209	15314		
Norsonic ½" Microphone	1225	208218	44501	15 June 2025
Norsonic Sound Calibrator	1251	34057	U44500	15 June 2025

Appendix C - Plant Calculations

Table C1 - Example Calculation – ASHP (Capacity Priority Mode) to NSR 1 Residential Dwelling off Warrington Road

Parameter	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
Mitsubishi CAHV-R450YA-HPB	69	76	72	70	65	62	64	55	72
Quantity Correction [2 no.]	+3	+3	+3	+3	+3	+3	+3	+3	
	72	79	75	73	68	65	67	58	75
Distance Loss (Point Source) (30m)	-30	-30	-30	-30	-30	-30	-30	-30	
	42	49	45	43	38	35	37	28	46
Screening Loss	-5	-5	-5	-5	-5	-5	-5	-5	
Daytime Plant Noise Limit									41
Achieved (Yes / No)									Yes

Appendix D - CDM Considerations

The Likelihood (**L**) the harm will occur can be assessed by applying an indicative score (from 1 to 5) as follows:

- 1 – Remote (almost never)
- 2 – Unlikely (occurs rarely)
- 3 – Possible (could occur, but uncommon)
- 4 – Likely (recurrent but not frequent)
- 5 – Very likely (occurs frequently)

The Severity of harm (**S**) can be assessed by applying an indicative score (from 1 to 5) as follows:

- 1 – Trivial (e.g. discomfort, slight bruising, self-help recovery)
- 2 – Minor (e.g. small cut, abrasion, basic first aid need)
- 3 – Moderate (e.g. strain, sprain, incapacitation for more than 3 days)
- 4 – Serious (e.g. fracture, hospitalisation for more than 24 hours, incapacitation for more than 4 weeks)
- 5 – Fatal (single or multiple)

The rating value is obtained by multiplying the two scores and is then used to determine the course of action.

Table D1- Risk Ratings

Rating Bands (Likelihood x Severity)		
Low Risk (1 – 8)	Medium Risk (9 -12)	High Risk (15 – 25)
May be ignored but ensure controls remain effective	Continue, but implement additional reasonable practicable controls where possible	Avoidance action is required; therefore alternative design solutions must be examined. Activity must not proceed until risks are reduced to a low or medium level

The following hazards pertinent to our design input have been identified and control measures suggested:

Table D2 – Risk Assessment

Hazard	Risk Of	At Risk	Rating			Control Measures	Controlled		
			L	S	R		L	S	R
Plant room noise levels may be above lower exposure action level	Hearing damage.	Contractors/ Operators	3	4	12	Employer should undertake noise at work assessment.	1	4	4
Vibration Isolators	Injury to hands	Contractors	3	3	9	Care needs to be taken during adjustment. Follow manufacturers guidance	1	3	3
Attenuators/ Acoustic Lagging	Strain of neck, limbs or back.	Contractors	3	4	12	Provide sufficient manpower/ lifting gear	1	4	4
Attenuators/ Acoustic Lagging	Skin & respiratory irritation	Contractors	4	3	12	Wear gloves and mask	1	3	3

L: Likelihood S: Severity R: Rating

Appendix E - Graphs and Site Plans



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Figure 1 – Proposed plant location, measurement positions and nearest noise sensitive receptors

Prescot Gym & Soccer Centre

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14 October 2025

Not to Scale



Figure 2 – NSR 1 and measurement position 2 at the rear of the dwellings on Atherton Drive

Prescot Gym & Soccer Centre

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14 October 2025

Not to Scale

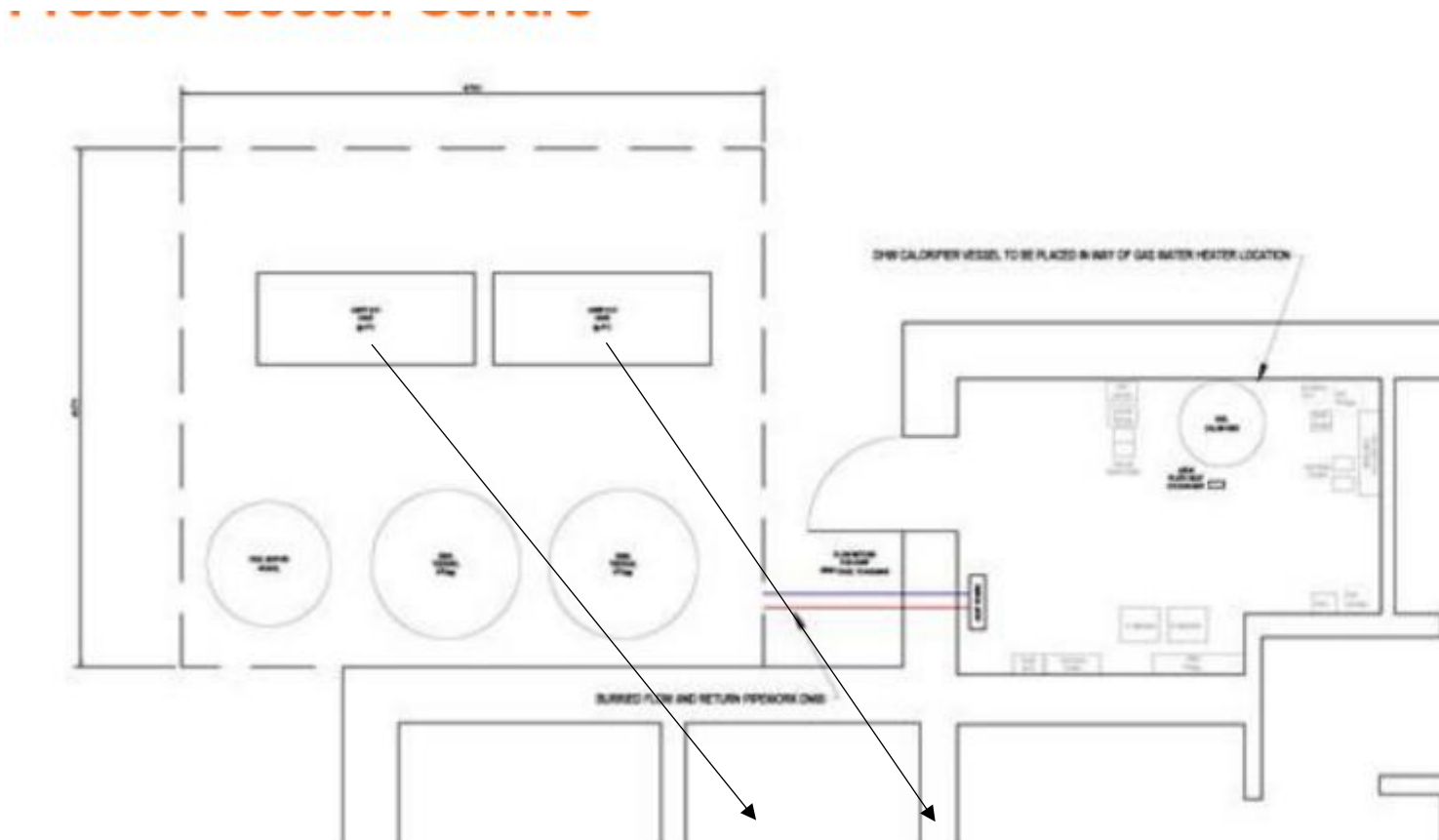


Figure 3 – Proposed Plant Location (moved from ground level to upon the rooftop)

Prescot Gym & Soccer Centre

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Not to Scale

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