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Environmental Noise Impact Assessment
Hopwood Hall College

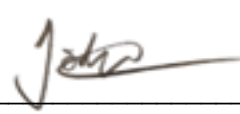
P2436-REP01-BDH
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PROJECT: Environmental Noise Impact Assessment
Hopwood Hall College

CLIENT: The HI Group
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DOCUMENT
REFERENCE: P2436-REP01-BDH

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DATE: 12 July 2024

SUMMARY

Sol Acoustics Ltd has been commissioned by The HI Group limited on behalf of Hopwood Hall College and University Centre to conduct an environmental noise impact assessment of the four proposed fixed Air Source Heat Pump plant to be located at Hopwood Hall College, Rochdale Rd, Middleton, Manchester M24 6XH.

An unattended environmental noise survey was conducted at a single measurement position from Tuesday 11th June to Wednesday 12th June 2024. The purpose of the survey was to determine the prevailing daytime "Residual Sound Level" and to ascertain the existing "Background Sound Level" at the nearest noise sensitive receptors through direct, environmental noise measurement.

Based on the results of the noise survey an acoustic assessment has been carried out in line with British Standard 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'. The purpose of the assessment is to determine the impact of the proposed fixed plant on the worst-affected noise sensitive receptors.

The environmental noise emissions that shall be arising from the operation of the plant have been quantified, modelled, and assessed using proprietary "CadnaA" 3D acoustic software.

The acoustic assessment is based on plant specifications provided by The HI Group.

It is the conclusion of this environmental noise impact assessment that the total, aggregate environmental noise impact arising from the proposed operation of the plant in its entirety, in full compliance with the plant noise specification as presented herein, will likely have a low impact on existing noise sensitive receptors, providing the proposed plant units are further attenuated to the levels specified in Table 5 of this report. Noise from the ASHP is also not expected to have an adverse impact on the college or the external 5-a-side football pitch.

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1 INTRODUCTION

Sol Acoustics Ltd has been commissioned by The HI Group limited on behalf of Hopwood Hall College and University Centre to conduct an environmental noise impact assessment of the proposed fixed Air Source Heat Pump (“ASHP”) plant to be located at Hopwood Hall College, Rochdale Rd, Middleton, Manchester M24 6XH.

The purpose of this acoustic assessment is as follows:

- Identify the nearest pre-existing noise sensitive receptors (“NSRs”) which are most likely to be affected by environmental noise arising from the fixed plant.
- Determine the prevailing daytime and night-time “Background Sound Levels” at the nearest NSR through direct, environmental noise measurement.
- Calculate the resultant environmental noise level contribution and impact at the nearest NSR to the site, as occurring during the daytime and night-time periods.
- Carry out an environmental noise assessment of the proposed plant in accordance with the methodology prescribed in relevant standards and guidance (i.e. British Standard 4142:2014+A1:2019 ‘*Methods for rating and assessing industrial and commercial sound*’) in order to determine the significance of the potential noise impact specifically generated.

2 DESCRIPTION OF SITE

2.1 General Overview and Noise Sensitive Receptors

The site is located on Rochdale Road, Middleton, Manchester. The college is situated on the historic estate of Hopwood Hall. The area surrounding the college consists largely of grassland and wooded areas. The nearest residential housing is as follows:

- A. Two storey housing on Woodside Farm, which is located c.65 metres to the south of the proposed plant.

There is an existing 5-a-side football pitch located adjacent to the east of the plant area.

Additionally, there are teaching classrooms within the Hopwood Hall located approximately 22 metres to the north of the proposed plant location.

2.2 Proposals

It is proposed that four Clade Aspen 280-211 ASHP shall be positioned next to the existing 5-a-side football pitch at Hopton Hall College. The plant area will be completely enclosed by a solid barrier with a height of c.3 metres to the west along the boundary line and c.2 metres to the north, east and south. It is understood that the plant will be available for operation 24/7.

The hemispherical free-field acoustic performance of the plant was provided to Sol by The HI Group and is as follows:

- CLADE Aspen 280-211 – Sound Pressure Level – 55dB $L_{Aeq,T}$ at ten metres distance

Figure 1 indicates the location of the site in relation to its general surroundings as well as denoting the NSRs, the noise monitoring position used during the noise survey, and the location of the proposed plant.

Figure 2 shows the proposed location of the new ASHPs.

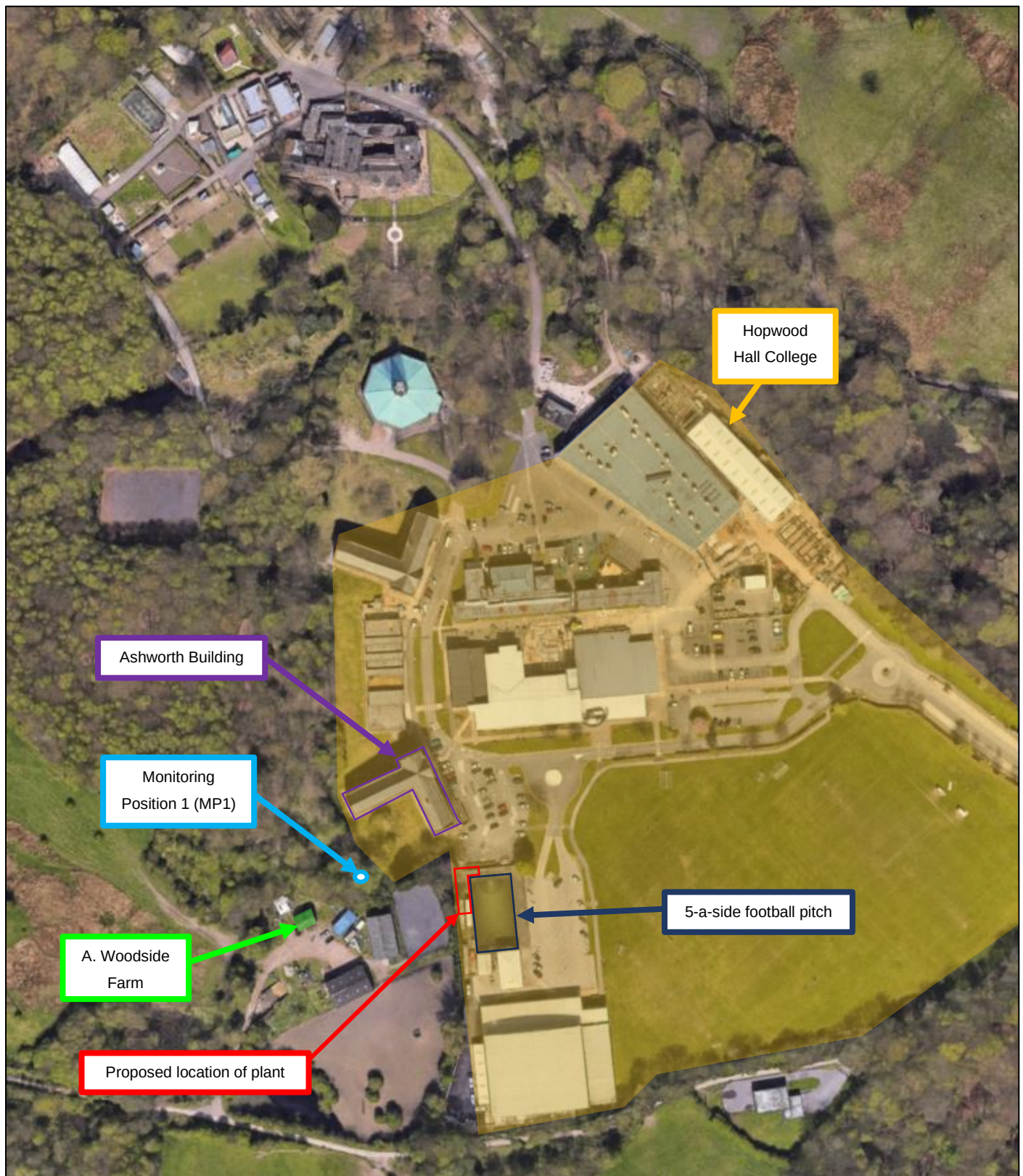


Figure 1: Proposed scheme in relation to its surroundings and key noise sensitive receptors (Google Earth 2024)

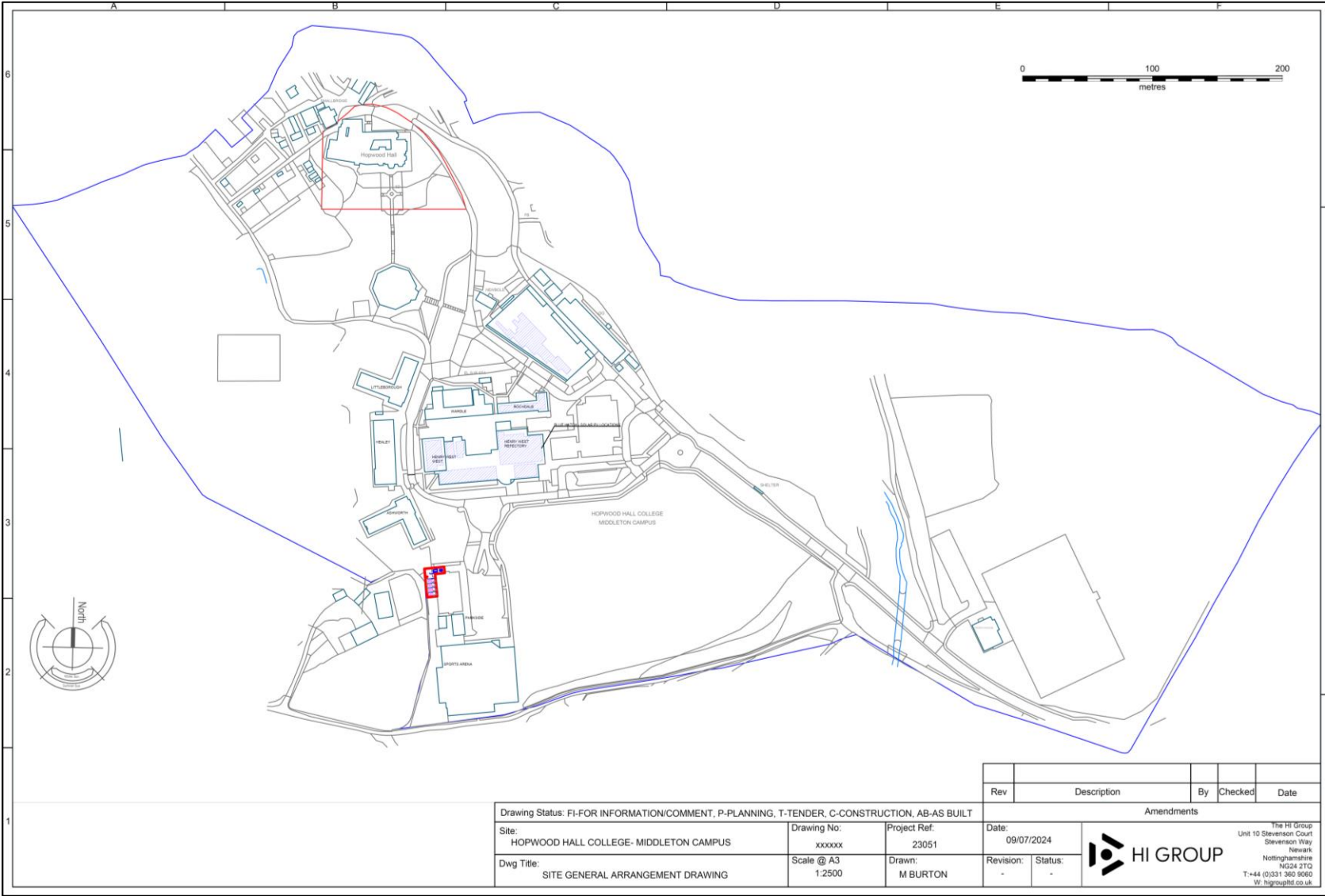


Figure 2: Proposed location of the new ASHPs

3 SITE SURVEY

3.1 Pre-existing Environmental Noise Climate

To inform the acoustic assessment, an environmental noise survey has been conducted by Sol in order to determine the prevailing, pre-existing Background Sound Levels at the NSRs close to the site.

An unattended environmental noise measurement was carried out, at a single measurement location, as between c.11:00 hours on Tuesday 11th June and c.09:45 hours on Wednesday 12th June 2024.

As shown in Figure 1, Monitoring Position 1 (MP1) was situated in a position considered to be acoustically representative of the NSR. The sound level meter was tripod mounted at a height of c.1.5 metres above local ground level and in free-field conditions. Distant road traffic noise and noise from foliage were the predominant underlying noise sources at MP1.

The noise survey was carried out using Type 1 Precision Grade noise monitoring equipment, and the complete measuring system was field calibrated immediately before and after the noise survey. (Full details of the noise monitoring systems are retained on file by Sol, including traceable calibration records; these are available for review if needed).

Meteorological data was recorded for the duration of the noise survey, as using a Professional Grade Vaisala "WXT530" weather station. The average wind speed throughout the survey remained below 5ms⁻¹. No rain was observed during the survey.

Notwithstanding the weather conditions recorded, the microphone system was entirely weatherproofed and fitted with all-weather environmental windshields, with bird spike. The weather conditions are not expected to affect the measurements.

3.2 Noise Survey Results Summary

Appendix B provides full detailed time history for the environmental noise levels as recorded at Measurement Position 1 for the duration of the environmental noise survey.

Table 1 provides a basic summary of the typical overall, A-weighted noise levels measured at the various noise monitoring locations, in $L_{Aeq,T}$ and $L_{A90,15min}$ terms. The specific, measured noise levels pertinent to the required BS4142 environmental noise assessment are highlighted in ***bold, italic*** text:

Date	Daytime (07:00 – 23:00 Hours)		Night Time (23:00 – 07:00 Hours)	
	dB $L_{Aeq,T}$	dB $L_{A90,15min}$ (Typical)	dB $L_{Aeq,T}$	dB $L_{A90,15min}$ (Typical)
Tuesday 11 June 2024	48*	<i>34</i>	54	<i>30</i>
Wednesday 12 June 2024	49*	38	-	-
* Measurement not conducted for the full daytime or night time assessment period				

Table 1: Summary of the typical overall, A-weighted noise levels as measured at Measurement Position 1

4 ACOUSTIC GUIDANCE AND CRITERIA

4.1 BS 4142:2014+A1:2019: '*Method for Rating and Assessing Industrial and Commercial Sound*'

BS 4142:2014+A1:2019 '*Method for rating and assessing industrial and commercial sound*' ("BS 4142") is intended to be used to assess noise of an industrial and commercial nature, which includes sound from fixed installations comprising mechanical and electrical plant and equipment.

The procedure contained in BS 4142: 2014+A1: 2019 for assessing environmental noise impact is to compare the measured or predicted noise level from the source in question, the "Specific Sound Level" immediately outside the noise sensitive premises, with the corresponding "Background Sound Level". Where the noise contains attention attracting characteristics such as tonal, impulsive, and/or intermittent elements, it may be appropriate to apply a correction to the Specific Sound Level to obtain the "Rating Level".

BS 4142: 2014+A1: 2019 states that the significance of sound arising from an industrial and/or commercial nature depends upon both the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, and also the context in which the sound occurs:

- a) Typically, the greater this difference, the greater the magnitude of the 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.

For the daytime, the assessment is carried out over a one-hour period, and over a 15-minute period at night. The daytime and night-time periods are defined as occurring between 07:00 hours to 23:00 hours, and 23:00 hours to 07:00 hours, respectively.

4.2 Local Authority Criteria

The site sits within the Planning Authority of Rochdale Borough Council. Email contact was initiated with the environmental health department on 13/06/2024 in order to ascertain any council specific plant noise level limits at noise sensitive receptors.

In absence of any response from the council at the time of publishing, it is assumed the plant will be required to not exceed the typical pre-existing background level, resulting in an “indication of the specific sound source having a low impact, depending on the context” in BS 4142:2014+A1:2019 terms.

Table 2 presents the maximum design Rating Level in order to comply with the Local Authority Criteria:

Residential Dwellings (NSRs)	Representative Noise Measurement Position	Maximum Rating Level, dB $L_{Ar,T}$	
		Daytime (07:00 – 23:00 Hours)	Night Time (23:00 – 07:00 Hours)
A. Woodside Farm	1	34	30

Table 2: Summary of maximum permissible Rating Level applicable at the noise sensitive residential receptor

4.3 BS8233: 2014

British Standard 8233:2014: ‘*Guidance on sound insulation and noise reduction for buildings*’ provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.

The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings for steady external noise sources. It is stated that it is desirable that the internal ambient noise level does not exceed the criteria set out in Table 3:

BS8233: 2014 – Indoor ambient noise levels for dwellings			
Activity	Location	07:00 to 23:00 hours	23:00 to 07:00 hours
Resting	Living room	35dB $L_{Aeq,16hours}$	-
Dining	Dining room / area	40dB $L_{Aeq,16hours}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hours}$	30dB $L_{Aeq,8hours}$

Table 3: Indoor ambient noise levels for dwellings

With respect to external amenity space such as gardens and patios, it is stated that it is desirable that the noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments.

4.4 Building Bulletin 93

In order to assess the potential noise impact on the university, appropriate noise guidance as presented in Acoustics of Schools: a design guide, as published jointly by the Institute of Acoustics (IoA) and the Association of Noise Consultants (ANC) in November 2015, has been adopted. Building Bulletin 93 is to be read in conjunction with the aforementioned document.

Part E4 of the Building Regulations and the School Premises Regulations do not cover colleges, however it is considered good practise to design colleges in line with the guidance offered.

The Ashworth Building has been identified to consist mainly of classrooms. The applicable criteria is a 35dB Upper limit for the indoor ambient noise level $L_{Aeq,30mins}$ (new build)

The guidance document entitled 'Acoustics of Schools: a design guide', as published jointly by the IoA and the ANC, provides the following guidance in relation to the sound reduction provided by an open window:

'... The laboratory measured airborne sound insulation of partially open single-glazed windows, or double-glazed windows with opposite opening panes, is approximately 10-15dB ...'

4.5 Acoustics of Schools: A Design Guide 2015

'Acoustics of Schools: a design guide' ("AOS") as published jointly by the Institute of Acoustics and the Association of Noise Consultants in November 2015, provides guidance and recommendations for the acoustic design of new and refurbished schools.

Whilst the main aim of this document is to provide generic acoustic design recommendations in order to be capable of achieving compliance with the acoustic performance standards set out in BB93, the AOS does specify appropriate acoustic design standards for areas of a school premises which are not enforced under Requirement E4 of the Building Regulations, and as such are not specified in BB93. In particular, the AOS sets out appropriate guidance for suitable ambient noise levels to be achieved within outdoor teaching and recreational areas.

AOS states that noise levels prevailing in unoccupied playgrounds, playing fields and other outdoor areas should not exceed 55dB $L_{Aeq,30mins}$ and that there should be at least one area suitable for outdoor teaching activities where noise levels are below 50dB $L_{Aeq,30mins}$. Where this is not possible (e.g., due to the lack of suitably quiet sites), acoustic screening should be employed to reduce noise levels in these areas as far as is practicable.

5 NOISE IMPACT ASSESSMENT

5.1 Residential Noise Sensitive Receptors (BS 4142: 2014+A1: 2019 Assessment)

Appendix C provides a CadnaA noise map of the site and the surrounding environment, presenting the Specific Sound Levels expected at each of the surrounding noise sensitive receptor locations.

Table 4 presents the predicted overall A-weighted, BS4142-defined Rating Level at the identified NSRs:

Noise Sensitive Receptor	Assessment Period	Predicted Specific Level, dB $L_{Aeq,T}$	Acoustic Character Correction (see note below), dB	Predicted Rating Level, dB $L_{Ar,Tr}$	Typical Background Sound Level, dB $L_{A90,15min}$	Rating Level sub. Background $\pm$ dB
A. Woodside Farm	Daytime (07:00hrs – 23:00hrs) T = 1 hour	30	+0	30	34	-4
	Night Time (23:00hrs – 07:00hrs) T = 15 minutes	30	+0	30	30	+0

Table 4: BS4142 summary assessment

5.1.1 Rating Penalty

In accordance with BS 4142, a Rating Penalty can be applied for sounds with features that are readily distinctive against the residual acoustic environment, such as tonal, impulsive, and/or intermittent elements.

The BS4142 defined acoustic character correction is determined at the location of the noise sensitive premises. In this case, this is the Complainant's property. Note 1 of Section 9.1 of BS4142 states the following (emphasis added in **bold**):

*'... NOTE 1 The prominence of tonal or impulsive sound from a source **can be masked by residual sound**. In many cases the amount of masking varies as the residual sound changes in level and possibly character. The source's tonal and/ or impulsive characteristics could also vary with time ...'*

Table 4 shows that the predicted Cumulative Specific Sound Level is expected to be significantly below the Residual Sound Level at all times. It is therefore to suggest that any acoustic character associated with the ASHPs is likely to be masked by the residual sound.

The proposed ASHP plant is inverter controlled providing 'soft-start' fan speeds to meet continual demand and is therefore unlikely to feature significant tonal or impulsive acoustic character at the closest NSR.

5.1.2 Plant Noise Assessment Outcome

The total, aggregate environmental noise impact as arising from the proposed ASHP operation of the Facility is not expected to exceed the typical Background Sound Level by at any time. This is an indication of a '*... low impact, depending on the context...*' in BS4142 terms.

The predicted magnitude of the impact is subject to the consideration of context. BS4142 states the following with regards to context:

'... Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

- 1) *The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.*

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night ...'

The predicted Specific Sound Level at the housing at Woodside Farm is predicted to be just 30dB $L_{Aeq,T}$ as during the night time period (23:00 hours to 07:00), which is considered to be low in absolute noise level terms.

It is reasonable to assume that occupants of the worst affected NSRs would be within their dwellings during night time periods. As a likely worst case, a given occupant may be resting or sleeping with windows open. The level of sound reduction afforded by an open window can vary depending on the open area and can range from c.4dB for a fully open window (assuming the window open area is equivalent to 13% of the floor area) up to c.15dB for a partially open window (in line with guidance as presented in BS8233: 2014). Higher levels of sound insulation would be expected to be achieved with windows closed.

The predicted noise level within the worst affected dwelling with windows open could therefore be within the range from c.15dB to 26dB $L_{Aeq,15min}$, depending on extent of the window opening, during night time periods. This is below the BS8233:2014 defined *desirable* night time indoor ambient noise level limit of 30dB $L_{Aeq,8hour}$ for resting and sleeping within dwellings (see Table 3 of Section 4.3).

5.2 Non-Residential Noise Sensitive Receptors (BB93)

5.2.1 Internal Classrooms

The classrooms as located on the southern façade of the Ashworth Building have been identified as the worst affected non-residential receptor.

With the worst-case façade noise level on Block A of 40dB $L_{Aeq,1hr}$, partially opened windows would therefore result in an indoor ambient noise level inside the classrooms of c.25-30dB $L_{Aeq,1hr}$ which is below the 35dB $L_{Aeq,30min1hr}$ requirement.

5.2.2 Outdoor Playing Fields

The proposed plant is located next to an existing outdoor playing field. The noise model predicts a noise level of 50dB $L_{Aeq,30mins}$ which meets the AOS suitable limit of exceed 50dB $L_{Aeq,30mins}$.

5.3 Plant Noise Limits

The above assessment has been carried out with attenuation applied to the plant items. Therefore, daytime and night time noise level limits have been put on the plant that is to be installed. Table 5 provides a summary of the advised noise level data for the proposed plant:

Plant Unit		Attenuation Required, dB	Maximum Permissible Sound Pressure Level at 10 metres distance, dB $L_{Aeq,T}$
Ref	Model		
1	CLADE Aspen 280-211	5	50
2	CLADE Aspen 280-211	5	50
3	CLADE Aspen 280-211	5	50
4	CLADE Aspen 280-211	5	50

Table 5: Advised noise data for the proposed heat pumps

In addition to the above, the plant area shall be completely enclosed by a solid barrier with a height of c.3 metres to the west along the boundary line and c.2 metres to the north, east and south. The location of the required acoustic fence, as used to inform this assessment is shown in Figure 3.

The acoustic fences must be to be solid, imperforate (with no gaps), sealed to the base and provide a surface mass per unit area of at least 12.5 kg/m². Any amendments to the actual location, layout or construction of the acoustic fence must be approved by the Acoustic Consultant.

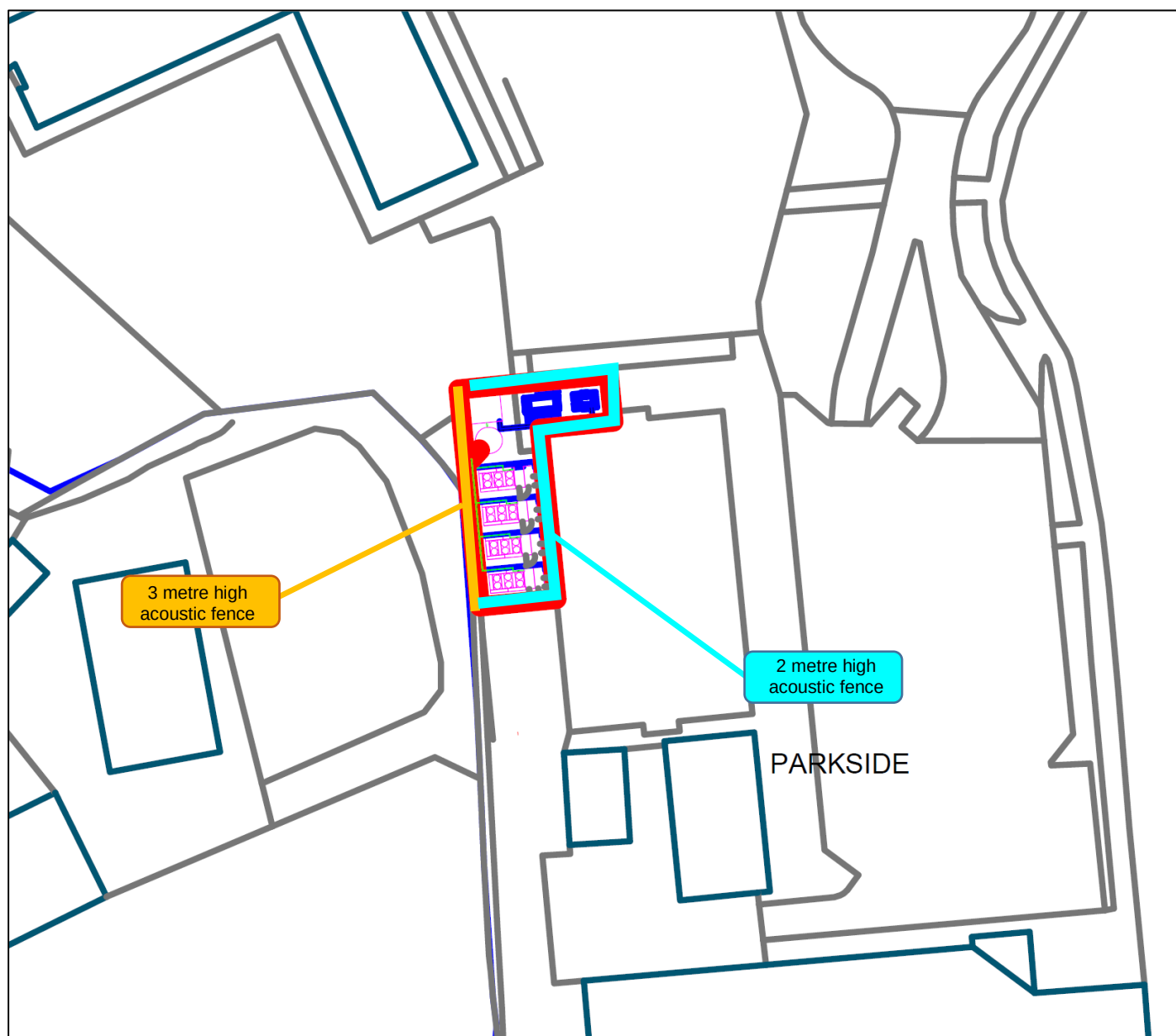


Figure 3: Location of acoustic fencing surrounding plant area

5.4 Uncertainty

Section 10 of BS4142: 2014 states the following with regards to uncertainty:

‘... Consider the level of uncertainty in the data and associated calculations. Where the level of uncertainty could affect the conclusion, take reasonably practicable steps to reduce the level of uncertainty. Report the level and potential effects of uncertainty...’

In accordance with the requirements of BS 4142: 2014+A1: 2019, Sol have undertaken the following steps to limit the level of uncertainty in the acoustic assessment:

1. All noise measurements have been carried out using Type 1 Precision Grade noise mounting equipment. All noise measuring instruments have traceable laboratory calibration certification.
2. All environmental noise level measurements were accompanied by continuous meteorological measurements as conducted at, or close to, the measurement position in order to ensure that the measurement data was not adversely affected by unfavourable weather conditions. Periods of adverse weather conditions have been excluded from the assessment.
3. Calculations have been conducted in line with appropriate and nationally recognised acoustic standards (ISO 9613-2), and using proprietary 3D noise modelling software, CadnaA.
4. The assessment assumes downwind propagation in all cases as this represents the worst case.

6 CONCLUSION

Sol Acoustics Ltd has been commissioned by The HI Group limited on behalf of Hopwood Hall College and University Centre to conduct an environmental noise impact assessment of the proposed fixed Air Source Heat Pump plant to be located at Hopwood Hall College, Rochdale Rd, Middleton, Manchester M24 6XH.

The environmental noise emissions arising from the proposed operation of all plant and associated processes, has been assessed and reported, as modelled using proprietary “CadnaA” 3D software.

An environmental noise survey was undertaken and the results of the BS 4142:2014+A1:2019 assessment concludes that the Rating Level, as arising from the proposed plant will likely have a low impact on existing noise sensitive receptors, providing the proposed plant units are further attenuated to the levels specified in Table 5 of this report. Noise from the ASHP is also not expected to have an adverse impact on the college or external 5-a-side football pitch.

APPENDIX A

GLOSSARY OF ACOUSTIC TERMS

Term	Abbreviation	Description
Decibel	dB	A scale for comparing the ratios of two quantities, including sound pressure and sound power.
A-weighting	dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the change in sensitivity of the human ear at varying frequencies.
Sound Pressure Level	L_{pA}	A measure of the sound pressure at a particular location. Typically expressed in dB(A) referenced to 2×10^{-5} Pascals.
Equivalent Continuous Sound Level	$L_{Aeq,T}$	The steady level of sound over a prescribed period of time which would contain the same total sound energy as the actual fluctuating noise under consideration in the same period of time.
Statistical Sound Levels	L_{A10} and L_{A90}	The level of noise exceeded for a percentage of the time period being sampled, namely 10% or 90% respectively.
Background Sound Level	$L_{A90,T}$	The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of the time period being sampled.
Maximum Sound Level	L_{Amax}	The maximum sound or noise level determined with instrumentation set to either a fast time weighting, L_{AFmax} , or a slow time weighting, L_{ASmax} , as occurring during the time period being sampled.
Sound Power Level	L_{WA}	A measure of the total sound energy radiated from a source. Like sound pressure levels, this is also expressed in dB(A) terms, but it is referenced to 1×10^{-12} W.
Broadband		Sound sampled over a wide range of frequencies.
Narrow band		Sound sampled over a specific, restricted frequency range. Used to ascertain the amplitude and significant of individual, audible tones, and to assist in identifying particular sources of noise within a complex, multi-source soundscape environment.
Ambient Sound	$L_{eq,T}$	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, both near and far.
Specific Sound Level	$L_{eq,T}$	The Equivalent Continuous A-Weighted Sound Level at an assessment position produced by a specific sound over a given reference time interval, T_r
Rating Level	L_{Ar,T_r}	The Specific Sound Level plus any adjustment for the acoustic characteristic features of the noise (e.g. intermittency, tones etc.).
Residual Noise	$L_{Aeq,T}$	The ambient sound remaining at given position in a given situation, when the specific sound source is suppressed to such an extent that it no longer contributes to the ambient sound.
Sound Reduction Index	SRI	The reduction in sound energy when transmitted through a panel or similar planar element, typically used in relation to single octave or one-third octave frequency band values.
Weighted Sound Reduction Index	R_w	The Sound Reduction Index expressed as a single figure, as expressed against a reference curve.
Dynamic Insertion Loss	DIL	Reduction in acoustic energy resulting from the insertion of a noise control element (e.g. an attenuator, acoustic enclosure etc.).
Free Field		Noise measuring location that is free from the presence of sound reflecting objects (except the ground), usually taken to mean being at least 3.5 metres distance from reflective surface(s) or greater.

APPENDIX B

NOISE SURVEY DETAILS AND SUMMARY RESULTS

LOCATION

Hopwood Hall College, Middleton

DATES, TIMES, AND WEATHER CONDITIONS

Date	Daytime (07:00 hours – 23:00 Hours)				Night Time (23:00 hours – 07:00 hours)			
	Temp, °C	Rain, mm/h	Wind Direction	Average Wind Speed, m/s	Temp, °C	Rain, mm	Wind Direction	Average Wind Speed, m/s
11/06/2024	12	0	E	0.6	9	0	W	0.3
12/06/2024	11	0	NE	0.4	-	-	-	-

PERSONNEL

Chris Downing MMath – Sol Acoustics

INSTRUMENTATION

Measurement Position 1

01dB Cube Sound level meter (serial no. 12070)

01dB Pre22 Microphone preamplifier (serial no. 1915040)

GRAS 40CD Microphone capsule (serial no. 288057)

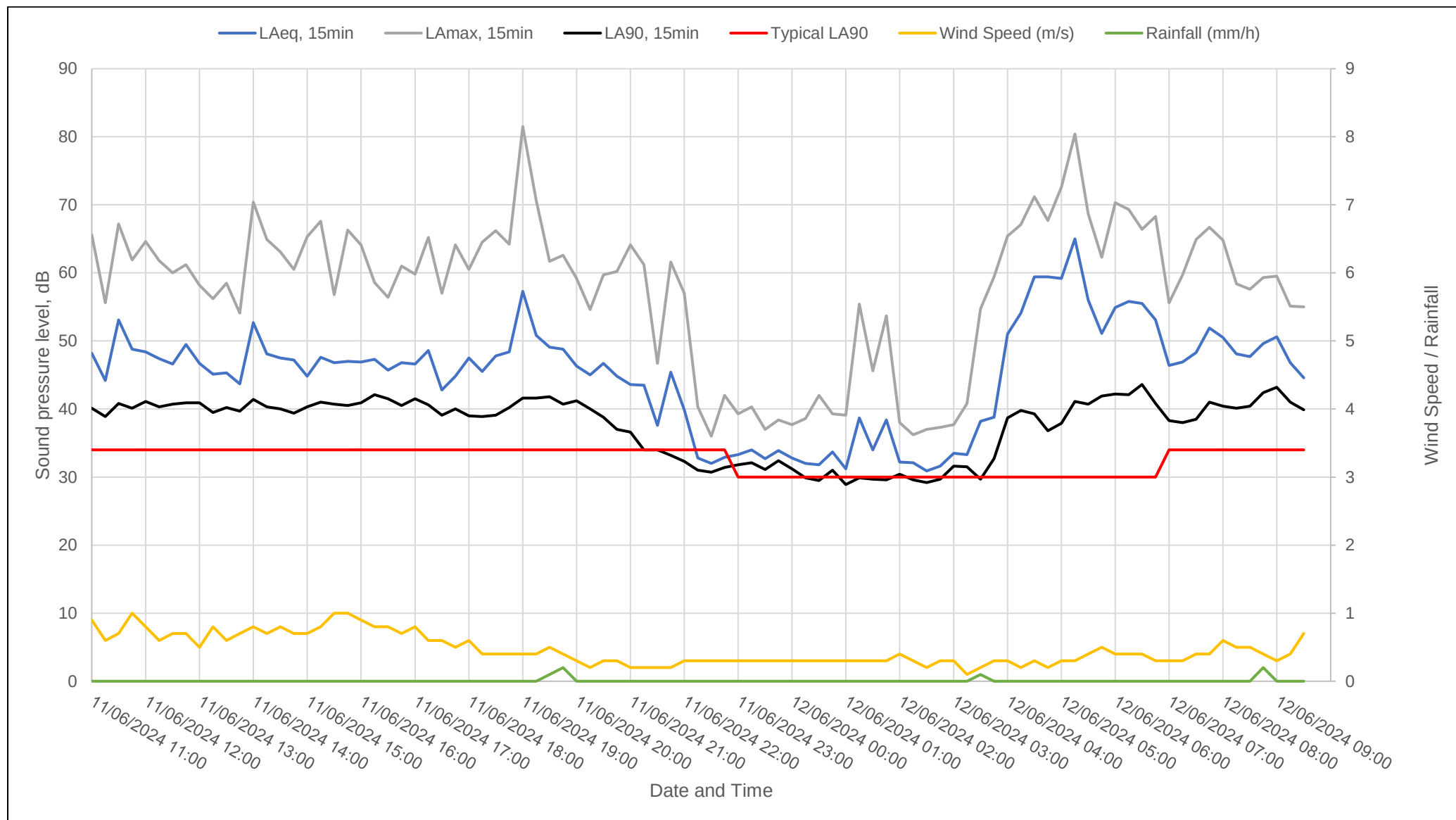
01dB Cal21 acoustic calibrator (serial no. 34375244)

METHODOLOGY

Before and after the measurements the noise monitoring equipment was calibrated to an accuracy of $\pm 0.4\text{dB}$ using the Cal 21 Calibrator. The calibrator produces a sound pressure level of $94\text{dB re } 2 \times 10^{-5} \text{ Pa @ } 1\text{kHz}$.

MEASUREMENT RESULTS

Graph B1 summarises the broadband A-weighted results obtained at unattended measurement position 1.



Graph B1: Environmental noise time history, Measurement Position 1

APPENDIX C
ENVIRONMENTAL NOISE MODELLING RESULTS

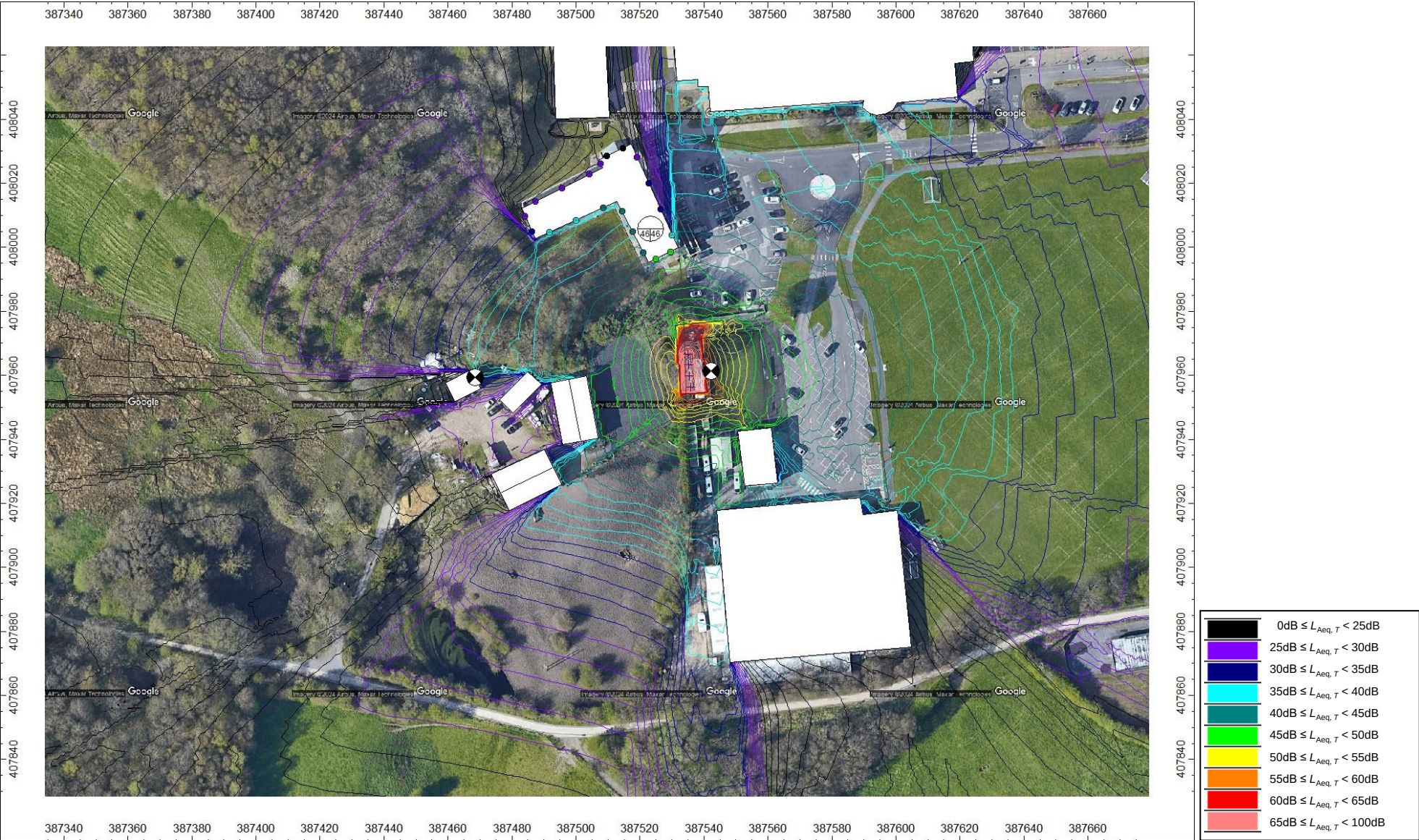


Figure C1: Predicted daytime (07:00 hours to 23:00 hours) $L_{Aeq,1hour}$ and night time (23:00 hours to 07:00 hours) dB $L_{Aeq,15min}$. Specific Sound Level from the Facility at 1.5m grid height