WOODVILLE SURE START CENTRE

PROPOSED AIR SOURCE HEAT PUMP INSTALLATION

SHIRLEY ROAD, CHEETHAM HILL, MANCHESTER, M8 0NE

NOISE IMPACT ASSESSMENT

R2329-REP01F-JW

19 March 2025

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REPORT DETAILS

Project	Proposed Air Source Heat Pump Installation Woodville Sure Star Centre		
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Signed			

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SUMMARY

Red Acoustics has been commissioned by Drees & Sommer UK Ltd to provide an assessment of noise impact from the proposed installation of 8no. Air Source Heat Pump (ASHP) units located within an acoustic enclosure and newly constructed external plant area at ground level at the Woodville Sure Start Centre, Cheetham Hill, Manchester.

The existing sound climate has been assessed at a position representative of the nearest noise sensitive dwellings and an assessment undertaken in line with the guidance in BS4142:2014+A1:2019.

This report presents the results of sound propagation modelling predictions at the proposed location based on manufacturer supplied sound power data for the proposed plant items.

Based on the current proposal, impact is expected to be low due to the selection of multiple, smaller ASHP units and a bespoke acoustic enclosure housing the ASHP installation.

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1.0 INTRODUCTION

Red Acoustics has been commissioned by Drees & Sommer UK Ltd to provide an assessment of noise impact from the proposed installation of 8no. Air Source Heat Pump (ASHP) units located within an acoustic enclosure and newly constructed external plant area at ground level at the Woodville Sure Start Centre, Cheetham Hill, Manchester.

Red Acoustics has been commissioned by Drees & Sommer UK Ltd to conduct the following assessments:

- Assess the existing background sound climate at positions representative of nearby noise sensitive receptors.
- Based on the measured existing background sound levels, determine target noise limits for the proposed externally mounted mechanical plant items.
- Prepare a 3D computer sound propagation model to predict the impact of environmental sound from the proposed ASHP units.
- Advise as necessary on the level of mitigation required to support an application for planning approval for the proposed plant installation.

This report presents the results of an environmental sound survey and details an assessment of environmental noise impact from the proposed installation.

2.0 DETAILS OF THE PROPOSED DEVELOPMENT

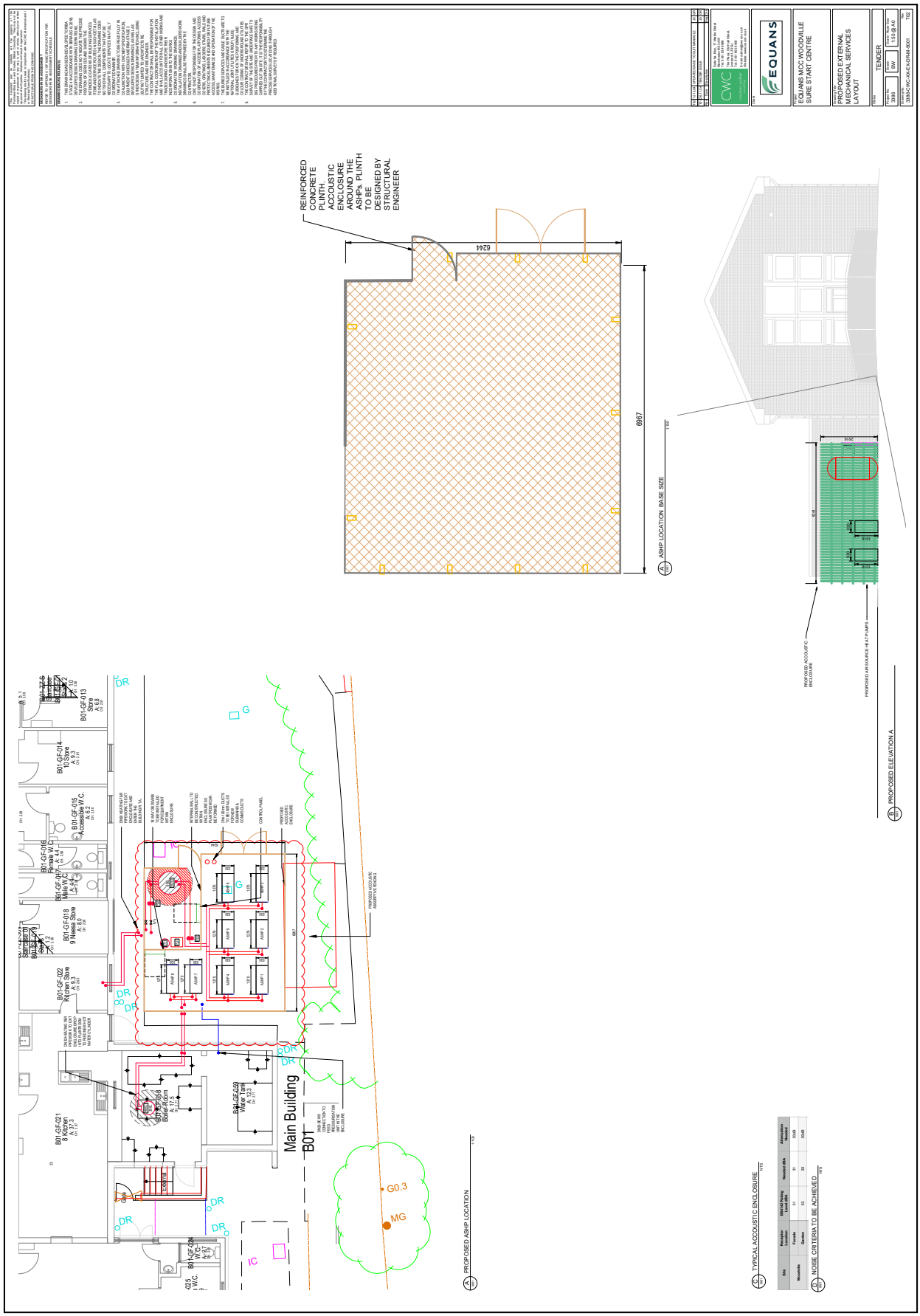
The proposed plant installation is to be located at ground level at the Woodville Sure Start Centre. The site location and proposed ASHP location is shown in Figure 2.1 below. Figure 2.1 also shows the location of the nearest noise sensitive receptors.

Figure 2.1: Site Location in Relation to Surroundings



Figure 2.2 below presents the proposed external plant layout, showing the location of the proposed ASHP units under assessment.

Figure 2.2: Proposed Plant Layout



Proposed ASHP Units

The proposal is to install 8no. Samsung AE160CXYDGG/EU air source heat pump units. It is proposed by the client that the units will operate between the hours of 6.30am and 7pm Monday to Saturday. Following several design iterations intended to reduce the impact of sound produced externally, the ASHP units have been selected on the basis of low sound generation.

From discussions with the project M&E engineer, the units selected for external use will be domestic market ASHP units with a Sound Power Level of 65dBA. It is assumed that the sound power level data provided by Samsung as detailed below is correct for operation under worst case conditions. It will be the responsibility of the client to ensure that this information is correct and will be reflected in on-site operational conditions. It is assumed for the purpose of the assessment that the proposed plant radiates sound power equally in all directions or that the sound power data represents the worst case direction of greatest directivity and that the information is accurate. The plant items are assumed to be subjectively tonal in nature for the purpose of the assessment.

It should be noted for clarity that previous revisions of this noise impact assessment have included for 11no. ASHP units with a lower sound power than the 8no. units now proposed, having previously assessed larger, commercial style ASHP units at the early design stage. This revision has incorporated the latest drawn information provided by the client in relation to the layout of 8no. units and enclosure dimensions.

Figure 2.3 below presents the datasheet provided by the project M&E engineer for the externally mounted ASHP units. Ancillary plant is not included for within the scope of this assessment.

It is proposed following discussion with the client and project M&E engineer that acoustic mitigation will be provided in the form of an acoustic enclosure formed by a purpose built louvred housing. Figure 2.4 below presents the acoustic datasheet provided by the project M&E engineer for the proposed acoustic enclosure.

Figure 2.3: Product Datasheet (ASHP)

Sound Power level

Unit: dB(A)

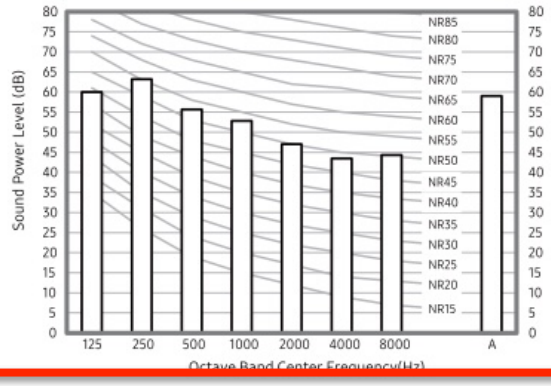
Model	Heating	Cooling
AE080CXYDGK/EU	59	59
AE120CXYDGK/EU	60	60
AE160CXYDGK/EU	65	65

NOTE

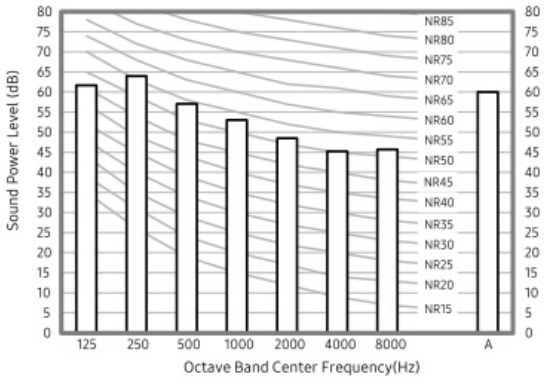
- Specifications may be subject to change without prior notice
  - Sound power level is an absolute value that a sound source generates.
  - dBA = A-weighted sound power level.
  - Reference power : 1pW.
  - Measured according to ISO 3741.

- NR Curve

5) AE080CXYDGK/EU



6) AE120CXYDGK/EU



7) AE160CXYDGK/EU

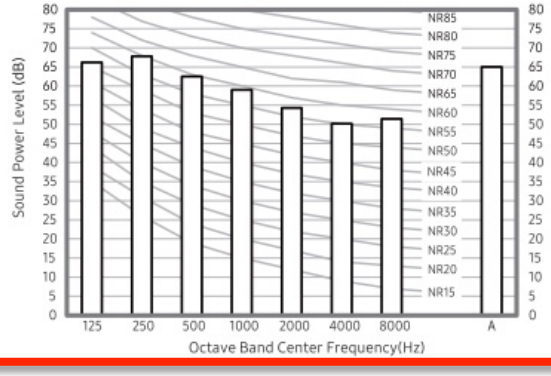
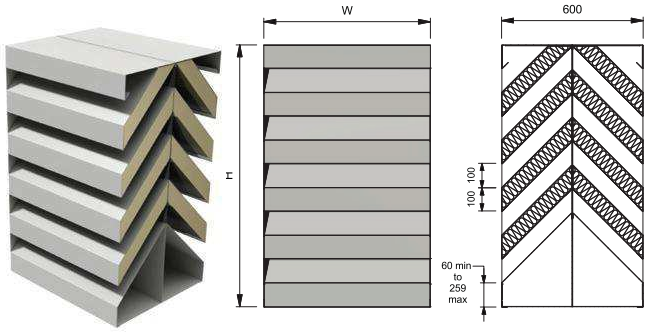


Figure 2.3: Product Datasheet (Enclosure)

CS600 Acoustic Louvre Technical Data

Chevron Acoustic Louvre, Standard Performance Profile, 600mm Deep



Typical weight 85kg/m²

Generally louvres above 50kg will be supplied in modules for assembly on site. Joining brackets and fixings will be provided for assembly.

Installation services, support steelwork, flashings, fixings to the structure and mastic will not be provided unless stated.

Refer to the Acoustic Louvre Schedule and Product Code Definitions for the size and specification of each Acoustic Louvre.

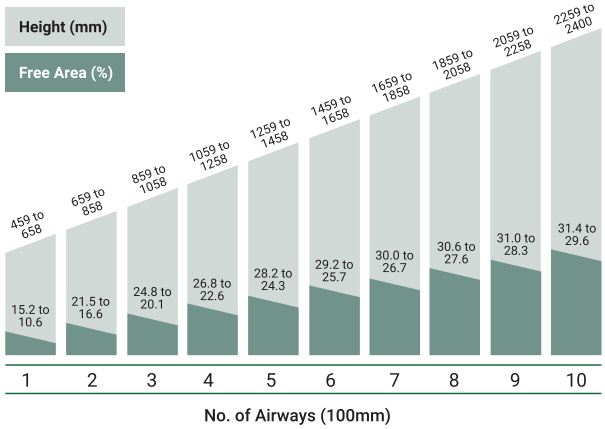
A minimum of 10mm clearance should be allowed between the structure and the Acoustic Louvre sizes shown.

Site constraints may make the installation of the Chevron style product impractical. Please contact Caice to discuss your requirements before selecting.

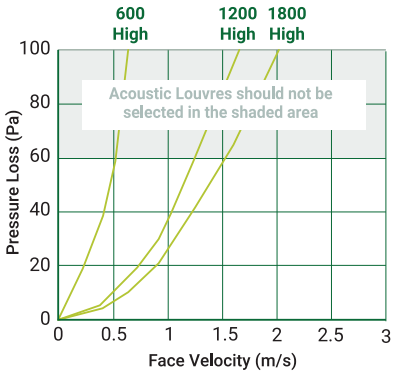
Performance

Acoustic Data	dB in each Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Sound reduction index	7	8	13	23	37	33	29	29
Weighted sound reduction index (Rw)				25				
Static insertion loss	6	8	13	23	38	32	32	32
Regenerated sound power level at 1m/s face velocity	54	46	37	32	28	24	15	12
Regenerated sound power level at 2m/s face velocity	71	66	57	50	47	46	41	30

Free Area and Height range



Free area shown is based on an 1150mm wide single piece louvre fitted with bird mesh and will vary slightly for different widths and bigger heights. Pressure losses for Class A rated louvres are available upon request.



If you require further technical data please contact Caice: 0118 918 6470 | enquiries@caice.co.uk | caice.co.uk

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3.0 PLANNING POLICY & DESIGN TARGETS

Planning Policy

National Planning Policy Framework

The National Planning Policy Framework (NPPF[1]) sets out the Government's planning policies for England and how these should be applied. Where issues of noise impact are relevant the NPPF provides guidance. In paragraph 191 it states that planning policies and decisions should contribute to and enhance the natural and local environment by:

'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution'.

Paragraph 191 also advises:

'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development - and avoid noise giving rise to significant adverse impacts on health and quality of life'.

The NPPF also refers to the 2010 DEFRA publication, the Noise Policy Statement for England (NSPE) which reinforces and supplements the NPPF guidance.

Noise Policy Statement for England

The Noise Policy Statement for England[2] (NPSE) sets out the long term vision of promoting good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development. This vision is supported by the following aims:

- Avoid Significant adverse impacts on health and quality of life.
- Mitigate and minimise adverse impacts on health and quality of life.
- Where possible, contribute to the improvement of health and quality of life.

The NPSE describes the following levels at which noise impacts may be identified:

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[1] National Planning Policy Framework. Department for Levelling Up, Housing & Communities (2023)

[2] Noise Policy Statement for England - Department for Environment, Food & Rural Affairs (2010)

- 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.

According to the explanatory notes in the statement, where a noise level falls between LOAEL and a level which represents SOAEL then:

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

Planning Practice Guidance on Noise

Planning Practice Guidance (PPG) - Noise[3] is an online www.gov.uk resource (last updated 2019) to provide additional guidance on the NPPF. It discusses:

- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur and;*
- *whether or not a good standard of amenity can be achieved.*

In line with the Explanatory Note of the NPSE, the PPG references the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, inline with the NPSE, no objective noise levels are provided although the PPG states that:

'the subjective nature of noise means that there is not a simple relationship between noise levels and impact on those effected. This will depend on how various factors combine in any particular situation'

Table 3.1 below summarises the PGG noise expose hierarchy.

[3] Planning Practice Guidance on Noise (https://www.gov.uk/guidance/noise--2). Ministry of Housing, Communities & Local Government

Table 3.1: Explanation of Noise Exposure Hierarchy - PPG

Perception	Examples of Outcomes	Increasing Effect Levels	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

British Standard 4142

BS 4142:2014+A1:2019[4] presents methods for rating and assessing the potential impact of commercial and industrial sound upon noise sensitive receptors. In order to assess impact using BS 4142, the Rating Level of the new sound source is compared with the existing contextual Background Sound Level.

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- 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.

The Rating Level is determined by assessing the Ambient Sound Level, distinguishing the Specific Sound Level from the Residual Sound Level and applying any sound specific penalties for acoustic features that would subjectively cause the sound to be perceived differently.

The Specific Sound Level of the commercial / industrial sound source is determined by either; measurement or calculation with regard to the appropriate reference time interval (for daytime or night-time periods). The standard requires separate analysis for daytime and night-time periods, evaluating the Rating Level over an appropriate reference time interval (T_r) of: 1hr for daytime (07:00 - 23:00 hrs) and 15min for night time (23:00 - 07:00 hrs). The Specific Sound Level is defined as equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, *T* (determined either by calculation or deducting the measured Residual Sound Level from the measured Ambient Sound Level).

'Ambient sound' is defined as the totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far (The ambient sound comprises the residual sound and the specific sound when present).

'Residual sound' is defined as the ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.

[4] BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

Where appropriate, a rating penalty can be applied to the specific sound level to account for the character of the sound, namely: tonality, impulsivity and intermittency. Such acoustic feature corrections can be added together linearly.

Tonality can be determined objectively (using adjacent third octave band analysis or the Joint Nordic method) or subjectively as described below:

- +2dB penalty: Just perceptible
- +4dB penalty: Clearly perceptible
- +6dB penalty: Highly perceptible

Impulsivity can be determined objectively (using Fast Fourier Transform analysis) or subjectively as described below:

- +3dB penalty: Just perceptible
- +6dB penalty: Clearly perceptible
- +9dB penalty: Highly perceptible

Where intermittency is present, a +3dB penalty can be applied. Where the acoustic feature characteristics are neither tonal nor impulsive, but are clearly distinguishable against the residual sound, a +3dB penalty can be applied.

Manchester City Council Guidance

Manchester City Council has published comprehensive guidance in relation to noise impact due to new development. The MCC Planning and Noise Technical Guidance document was updated in October 2022 and discusses the assessment of environmental noise from new development of plant items in the vicinity of nearby noise sensitive uses. The published guidance forms the basis for the decision making process when assessing planning applications within the Council's boundaries and provides design targets. With regard to fixed plant items the guidance states:

'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location'.

The guidance further states that the assessment of impact from fixed plant items should be undertaken in accordance with the guidance in BS4142:2014+A12019 and the assessment advice within the MCC guidance document.

4.0 ENVIRONMENTAL SOUND SURVEY

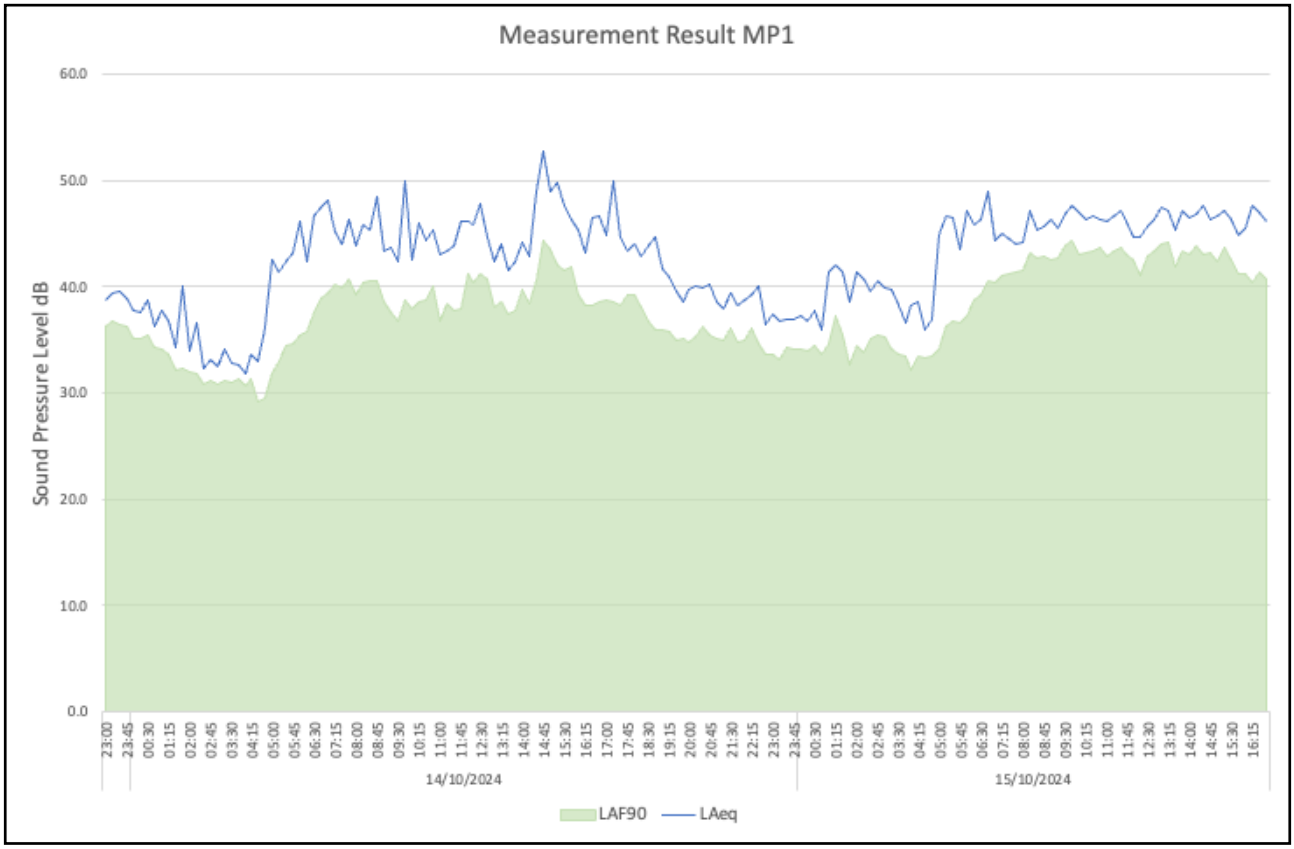
In order to determine the prevailing environmental sound levels at the site, representative unmanned measurements were taken between 1st - 4th October 2024. The measurement location used during the survey is shown in Figure 4.1 below. This position was selected to provide a measurement at a position which is representative of background sound levels for the nearest noise sensitive receptors.

Figure 4.1: Noise Survey Measurement Location



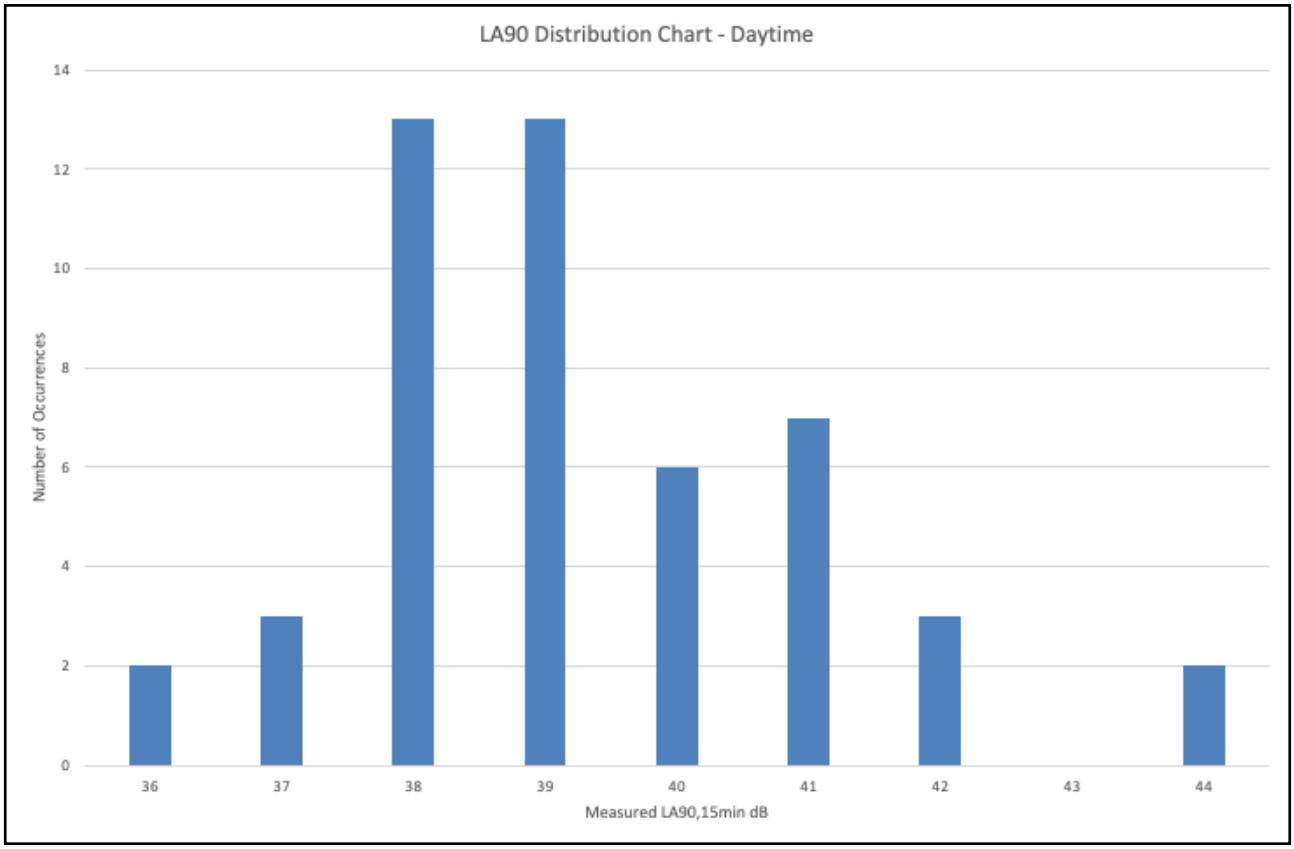
During the measurement period, the sound climate for the site was mainly driven by distant road traffic. Figure 4.2 below shows the measured broadband noise survey data taken at MP1. Measured data that was taken before and after the data presented has been excluded due to unfavourable weather conditions.

Figure 4.2: Broadband Noise Survey Data - MP1



To establish the typical daytime background sound levels, statistical analysis has been undertaken. Figure 4.3 below shows the histogram for the daytime period based on the data taken between 07:00hrs and 23:00hrs on 14 October 2024. This was the quieter of the two daytime periods measured. For the night-time period it is understood that the plant will operate between 06:30hrs and 07:00hrs only. For the typical night-time background sound level, the lowest measured 15 minute L_{A90} has been used for the periods 06:00 to 07:00 on 14th and 15th October 2024.

Figure 4.3: Histogram - MP1: Daytime LA90 Background Sound Pressure Levels (07:00 - 19:00hrs)



Based on a review of the measured survey data and subsequent statistical analysis of the daytime background sound levels and the lowest measured night-time background sound level, Table 4.1 below identifies the typical background sound levels at positions representative of the nearest noise sensitive receptors during the proposed operational hours. The levels are based on the typical measured $L_{A90,15min}$ during the relevant daytime/night-time periods.

Table 4.1: Typical Background Sound Levels (Daytime/Night-time Periods)

	Measured Sound Levels	
	Day Time (07:00 - 19:00)	Night-time (06:00 - 07:00)
Location	Typical Measured L_{A90}, dB	Typical Measured L_{A90}, dB
MP1	38	36

An assessment of predicted impact on the nearby residential receptors is presented is section 5.0 below.

5.0 CADNAA SOUND PROPAGATION MODELLING

To predict sound levels from the proposed ASHP installation to the surrounding environment and to the nearest noise sensitive receptors, the latest version of CadnaA 3D sound propagation modelling software has been used, which implements the calculation procedure specified within ISO9613-2.

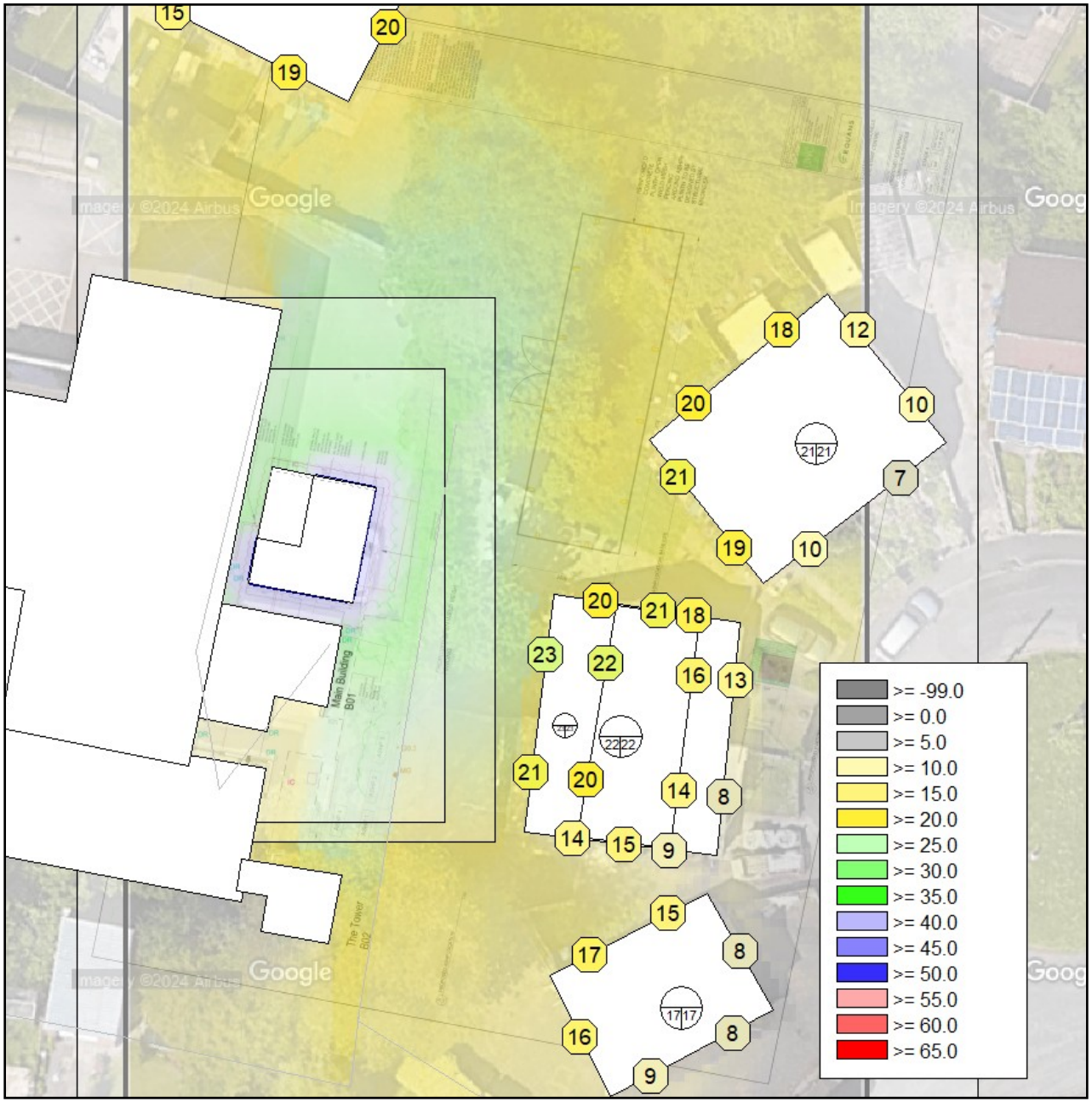
The model has been generated using the sound source data presented in Section 2.0 along with the acoustic performance of the proposed enclosure including performance losses due to regenerated sound at $1ms^{-1}$ face velocity. The modelling of the surrounding environment was undertaken by modelling the existing buildings and the surroundings using Google Earth imagery and site inspection notes with ground heights set using 1m digital terrain height data obtained from the DEFRA data services platform.

Noise propagation is predicted from the proposed location of the ASHP installation with ground set to 100% reflective and 4 orders of reflection set within the model. Noise impact is predicted to all facades of the nearby noise sensitive uses with the highest predicted facade level used for the purpose of the assessment.

The result of the sound propagation modelling is presented below. Figure 5.1 below shows the prediction grid at ground floor level and the highest predicted facade levels for the nearest noise sensitive dwellings.

The predicted level represents the Specific Sound Level in terms of BS4142:2014+A1:2019. It can be seen in Figure 5.1 below that the highest predicted Specific Sound Level at the nearest residential facade is 23dBA with all ASHP units operating simultaneously within the proposed acoustic enclosure.

Figure 5.1: Predicted Specific Sound Level (dBA)



6.0 BS4142 PLANT NOISE IMPACT ASSESSMENT

To undertake a noise impact assessment from the proposed development in accordance with BS4142:2014+A1:2019, measured data at the proposed development site has been used to determine the existing Background Sound Level. The manufacturer supplied sound power level data as discussed in Section 2.0 above has been used within the CadnaA sound propagation model to predict the impact of the Specific Sound Level to the nearest NSPs including the attenuation provided by fencing, distance and other obstacles. Tables 6.1 & 6.2 below present the BS4142 assessment for the nearest noise sensitive premises during the daytime and night-time periods respectively. The Rating Level has been rated against the typical measured $L_{A90,15min}$ Background Sound Level during both periods.

Table 6.1: BS4142 Assessment Table - NSP Typical Daytime Period

	Period (07:00 - 19:00)	Commentary
Ambient Sound Level	N/A	Prediction method to be used.
Residual Sound Level	N/A	
Specific Sound Level (predicted from measured plant data)	26 dBA	Typical predicted **garden level** at centre of nearest garden (approx 8m from enclosure). Includes all plant operating in enclosure. See above enclosure acoustic performance datasheet (25dB Rw)
Corrections	+7 dBA	No corrections for on-time as operational duty periods cannot be assumed, however it is assumed that the operation will be intermittent. An intermittent penalty of +3dB is therefore appropriate. A +4dB penalty for tonality has been applied as plant is assumed to be subjectively tonal.
Rating Level dB	33 dBA	
Typical Existing Background $L_{A90,t}$	38 dBA	Based on measured data at the proposed development site.
Difference	-5 dBA	Result meets target
Target	-5 dBA	
Conclusion	Low impact indicated	

Table 6.2: BS4142 Assessment Table - NSP Typical Night-time Period

	Period (06:00 - 07:00)	Commentary
Ambient Sound Level	N/A	Prediction method to be used.
Residual Sound Level	N/A	
Specific Sound Level (predicted from measured plant data)	23 dBA	Typical predicted **facade** level at nearest NSP approximately 12m from enclosure. Includes all plant operating in enclosure. See above enclosure acoustic performance datasheet (25dB Rw)
Corrections	+7 dBA	No corrections for on-time as operational duty periods cannot be assumed, however it is assumed that the operation will be intermittent. An intermittent penalty of +3dB is therefore appropriate. A +4dB penalty for tonality has been applied as plant is assumed to be subjectively tonal.
Rating Level dB	30 dBA	
Typical Existing Background $L_{A90,t}$	36 dBA	Based on measured data at the proposed development site.
Difference	-6 dBA	Result is 1 dBA below target
Target	-5 dBA	
Conclusion	Low impact indicated	

It can be seen from the assessment in accordance with the guidance in BS4142:2014+A1:2019 that there is a likelihood of low impact due to the proposed installation. This is due to the selection of quieter plant items and the introduction of a high performing acoustic enclosure following several design iterations.

No additional acoustic mitigation is proposed.

7.0 CONCLUSIONS

An assessment of expected impact due to commercial sound generated by the proposed ASHP units has been undertaken to the nearest noise sensitive properties in line with the guidance in BS4142:2014+A1:2019 and MCC supplementary planning guidance.

The assessment concludes that, following acoustic advice throughout the mechanical plant selection and design process there is a likelihood of low impact due to the proposed installation.

APPENDIX A:
NOISE MEASUREMENT DETAILS

Location

Woodville Sure Start Centre, Cheetham Hill

Survey Dates

11 - 15 October 2024 — Background Noise Survey

Weather dry with wind speeds below 5ms^{-1} during periods of data presented. Some data excluded due to poor weather.

Survey Conducted By

Johnathan Whittle AMIOA MCIEH

Red Acoustics Limited, Unit 8 Cable Court, Pittman Way, Preston PR2 9YW

Full Members of the Association of Noise Consultants

Accredited Test Organisation Number 180

Instrumentation

Table A1: List of Instrumentation Used

Position	Equipment Description	Type Number	Manufacturer	Serial Number	Date of Last Calibration	Calibration Certificate Number
MP1	Sound Level Meter	XL2	Nti Audio	A2A-16928-E0	29/11/2023	UK-23-140
	Sound Calibrator	Type 1251 IEC 60942-1997 Class 1	Norsonic	31040	01-May-24	47684

Methodology

Before and after the measurements the sound level meter was check calibrated to an accuracy of ±0.3dB using the sound calibrator.