

East Manchester Leisure Centre, Beswick

Plant Noise Assessment Report

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1 Introduction

BDP Acoustics has been commissioned by Ameresco to assess proposed noise levels emanating from new mechanical plant equipment (2no. Air Source Heat Pump (ASHP) units) being installed at East Manchester Leisure Centre, Beswick (referred to as “the site” throughout this report) to accompany the Planning submission for the project.

The following information has been provided to BDP Acoustics for this assessment by Ameresco on 08/11/2021:

- Manufacturer acoustic data for the proposed ASHP units;
- ASHP units location details;
- Proposed noise mitigation measures (namely barrier fencing and noise reduction shroud details) for the proposed plant equipment on-site.

Based on the above information provided to BDP Acoustics, we understand that it is proposed for the new plant equipment to be located at ground floor level, at the south of the existing East Manchester Leisure Centre building, adjacent to the bin store.

We also understand that the following noise mitigation measures are proposed:

- Each ASHP unit to be mounted with a noise reduction shroud on both the air inlet and discharge;
- ASHP units to be surrounded by a barrier fence to provide effective acoustic screening.

Location details for the proposed plant equipment, including the ASHP barrier, are shown in Figure 1 and Figure 2.

This report details the acoustic assessment undertaken, and in summary includes the following:

- Review of the Local Planning Authority requirements alongside other relevant guidance and acoustic standards;
- A summary of the environmental noise survey undertaken;
- Proposed acoustic design criteria for noise relating to the proposed new equipment;
- Determination of the noise levels generated, compared to the proposed criteria;
- Where necessary, comments have been provided relating to proposed noise mitigation measures, in order to achieve the proposed acoustic design criteria;
- Confirmation of compliance with relevant criteria when adopting the proposed mitigation measures.

A glossary of acoustic terms is presented in Appendix I – Glossary of Acoustic Terms.

Figure 1: Image of approximate proposed plant equipment location, provided to BDP Acoustics by Ameresco on 08/11/2021 (BDP additional label in red).

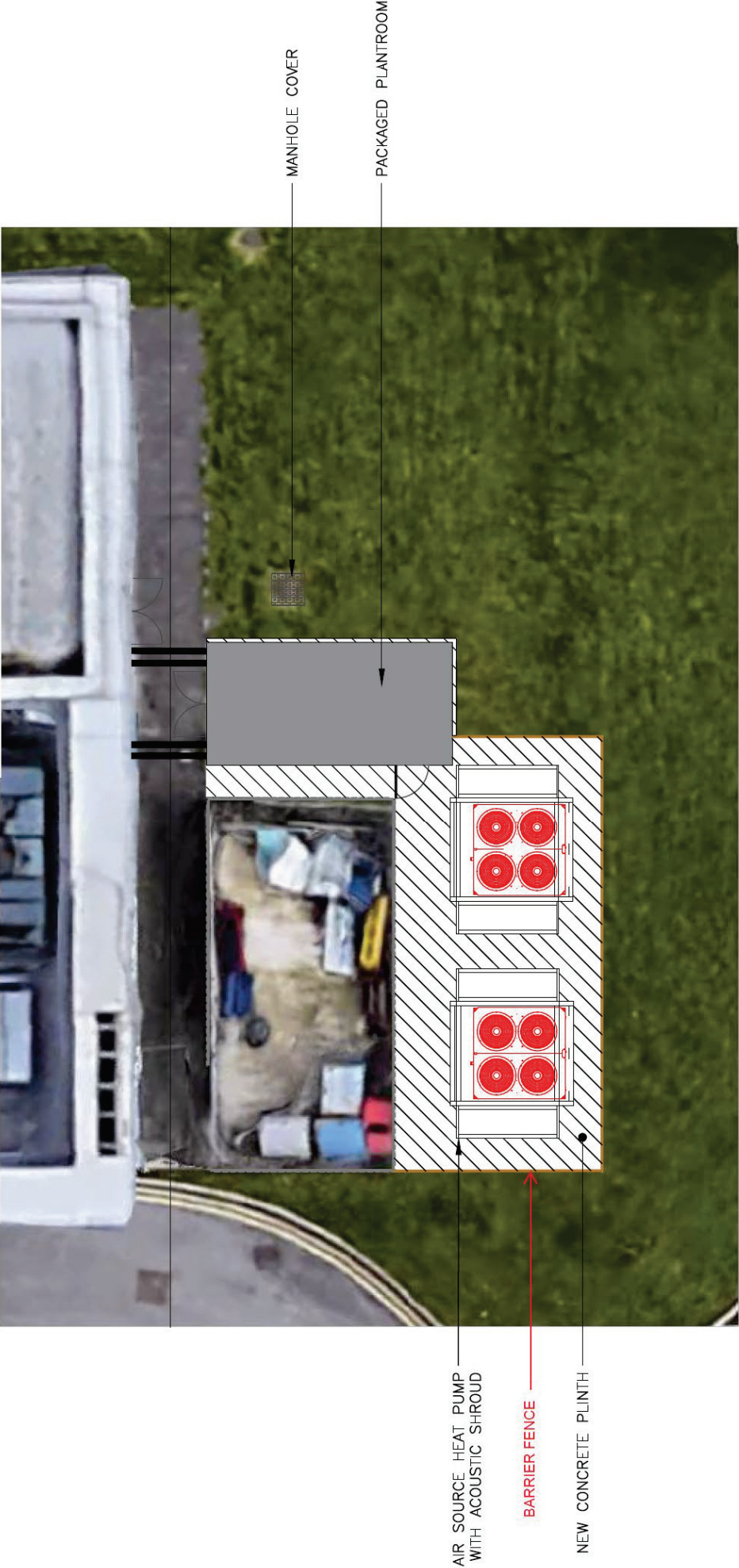


Figure 2: BDP Acoustics markup interpretation showing approximate proposed plant equipment location in context of wider surroundings (plant equipment indicated by red squares surrounded by red line barrier; packaged plant room indicated in turquoise).



2 Relevant Guidance and Standards

2.1 Noise Policy Statement for England

The NPSE provides guidance on the management of noise from sustainable development. The statement sets out three key aims in paragraph 1.7:

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

- *Avoid significant adverse impact 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.”*

2.2 National Planning Policy Framework

The NPPF sets out the Government's planning policies for England and how these are expected to be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced.

It advises that planning decisions should prevent new and existing developments from being put at unacceptable risks from, amongst other things, noise pollution. It goes on to advise that new development should be appropriate to its location and should mitigate and reduce to a minimum potential adverse impacts resulting from noise new development and avoid noise giving rise to significant adverse effects on health and quality of life.

2.3 BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

BS 4142:2014+A1:2019 (BS 4142) provides a method for rating industrial and commercial sound and a method for assessing resulting impacts upon people. The impact assessment procedure described in BS 4142 is based on the comparison of rating sound level with the background sound level prevailing at the assessment locations.

2.4 Local Planning Authority (LPA)

Advice has been sought from Manchester City Council in regards to suitable noise level criteria and assessment methodology for noise egress from the proposed new plant equipment on the site. The following requirements are provided within Manchester City Council's Planning & Noise Technical Guidance:

- *“The noise assessment should be based on BS 4142: 2014 and any application for fixed plant, equipment or machinery must demonstrate that: ‘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’.”*

3 Environmental Noise Survey

3.1 Introduction

An environmental noise survey has been undertaken on 24/06/2021 at the nearest / most exposed noise sensitive receptor (NSR) properties to the proposed plant equipment location on the site.

The data obtained has been used in order to assist in the following :

- Establishing the existing background noise climate at NSR properties;
- Establishing external noise limit criteria.

3.2 Survey Methodology

A series of manned short-term measurements were undertaken by BDP Acoustics at locations considered to be representative of the nearest / most exposed NSR properties to the proposed plant equipment location at the site.

The approximate measurement position at the site is presented in Figure 3 and was selected in order to encompass worst-case, i.e. quietest, night-time (0200 – 0400 hours) background noise levels at the nearest / most exposed NSR properties for the purposes of determination of plant noise emission limits, in line with LPA requirements.

Weather conditions during the survey were dry with no wind, temperatures varying around 14°C and 100% cloud cover.

The instrumentation used for measurements consisted of 1no. Bruel & Kjaer 2260 sound level meter, which was calibrated before and after the survey, with no significant drift in sensitivity observed. The sound level meter and calibrator used on site had been calibrated to traceable standards and calibration certificates can be provided upon request.

At the position octave band and A-weighted fast response levels were recorded for a comprehensive suite of noise level metrics.

All readings were taken at a height of 1.5m above local ground level in free-field conditions.

Measurements were carried out by Gavin Stevenson MIOA.

3.3 Results

The background noise climate at the NSR properties was dominated by noise from existing Leisure Centre mechanical plant equipment. The ambient noise climate was dominated by the same mechanical plant equipment and local road traffic noise, when present.

A summary of the measured results from the survey are presented in Table 1 below. Full measured results are available upon request.

Table 1: Summary of noise measurement results

Measurement Position	Start Time (hh:mm)	Duration (mm:ss)	L _{A90,5mins} Range (dB)	L _{Aeq,5mins} Range (dB)	L _{AFmax,5mins} Range (dB)
1	02:04	15:00	38 - 40	54 - 59	69 - 78

Figure 3: Approximate survey measurement position



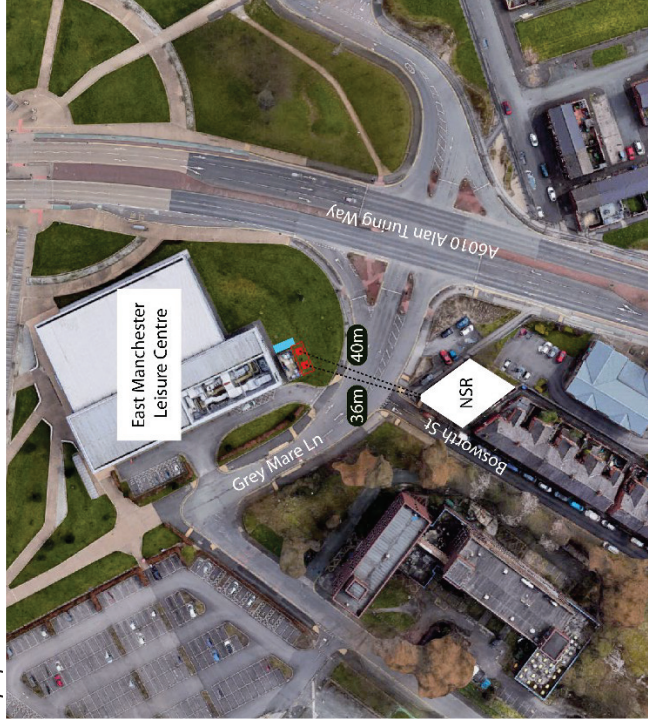
4 Assessment

The following section provides an assessment of noise levels from the proposed plant equipment at the nearest / most exposed NSR properties against proposed noise level criteria, based on LPA requirements.

4.1 Noise Sensitive Receptor Properties

The nearest / most exposed NSR properties to the proposed plant equipment location at the site are identified to be residential properties on the corner of Bosworth Street and Grey Mare Lane, approximately 36 meters and 40 meters to the south-west of the 2no. ASHP units' location, as shown in Figure 4.

Figure 4: Identified nearest / most exposed NSR properties to the proposed new plant equipment location on the site



4.2 Proposed Assessment Criteria

LPA criteria relating to the proposed plant equipment states that the following requirements must be achieved:

- *“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_{Aeq}) level at the nearest noise sensitive location”.*

Based on the above requirements and guidance documents referenced in Section 2, proposed external noise limit criteria for noise from the proposed plant equipment at the NSR properties identified in Section 4.1 are presented within Table 2.

4.3 Noise Level Assessment at NSR Properties

Manufacturer acoustic data, plant equipment location details and proposed noise mitigation measures for the proposed ASHP units at the site have been provided to BDP Acoustics, as detailed in Section 1.

Manufacturer acoustic data for the ASHP units identifies that a sound power level of 84 dBA is expected to be achieved from each proposed ASHP unit at the site.

Proposed mitigation measures provided by Ameresco identify that the following noise mitigation measures are proposed for the plant equipment at the site:

- Each ASHP unit to be mounted with a noise reduction shroud on both the air inlet and discharge;
- ASHP units to be surrounded by an acoustic barrier on all sides.

It is important to note that this acoustic assessment has been based on the following understanding regarding these noise mitigation measures:

- The ASHP barrier fence will have no gaps (for example a close-boarded timber fence) and have a minimum surface mass of 20 kg/m²;
- The ASHP barrier fence will block line of sight between both ASHP units and the upper storey windows at the identified NSR properties;
- The ASHP noise reduction shrouds will achieve a noise reduction of at least 8 dB for each ASHP unit.

Based on the information provided and the understanding previously stated, cumulative BS4142 Rating Noise Levels due to the proposed plant equipment, in the proposed arrangement, at the identified NSR properties, have been calculated. These noise levels have been presented and compared against the proposed external noise limit criteria at the NSR properties within Table 2.

Table 2: Comparison of the calculated cumulative BS4142 Rating Noise Level at the nearest / most exposed NSR properties due to the proposed plant equipment against the proposed external noise limit criteria based on LPA requirements

Identified NSR properties	Lowest worst-case measured existing background noise level at NSR (dB L _{A90,5min})	Proposed external noise limit criteria at the NSR façade location for the proposed new plant equipment (dB L _{Ak,Ti})	Calculated Rating Noise Level at the NSR façade location due to the proposed new plant equipment (dB L _{Ak,Ti})	Difference between Rating Level and proposed external noise limit criteria at NSR
Residential properties on the corner of Bosworth St and Grey Mare Ln	38	33	32	-1

As can be seen from Table 2 above, the calculated cumulative Rating Noise Level at the nearest / most exposed noise sensitive receptor properties due to the proposed plant equipment, in the proposed arrangement, does not exceed the proposed noise level criteria. This assessment therefore indicates that the proposals relating to the new plant equipment at the site will comply with LPA requirements, when installed as per the proposed arrangement and adhering to the understanding stated within Section 4.3 of this report. Calculations indicated that the relevant criteria would not be achieved without the proposed noise mitigation measures in place.

5 Summary

- BDP Acoustics has been commissioned by Ameresco to assess proposed noise levels emanating from new mechanical plant equipment (2no. Air Source Heat Pump (ASHP) units) being installed at East Manchester Leisure Centre, Beswick.
- Environmental noise measurements have been completed at the nearest / most exposed noise sensitive receptor properties to the proposed plant equipment location on the site during the night in order to encompass worst-case, i.e. quietest, night-time background noise levels for the purposes of determination of plant noise emission criteria, in line with LPA requirements.
- Manufacturer acoustic data, plant equipment location details and proposed noise mitigation measures for the proposed ASHP units at the site have been provided to BDP Acoustics, and are presented in Section 4.3.
- Based on information provided to BDP Acoustics, calculated noise levels at the nearest / most exposed noise sensitive receptor properties due to the operation of the proposed plant equipment have been found to not exceed the proposed external noise limit criteria for the project. This assessment therefore indicates that the proposals relating to the new ASHP units at the site will comply with Local Planning Authority (LPA) requirements, when installed as per the proposed arrangement and adhering to the understanding stated within Section 4.3 of this report.

Appendix I – Glossary of Acoustic Terms

A-Weighting

Normal hearing covers the frequency range from approximately 20Hz to 20kHz but sensitivity is greatest between about 500Hz and 8kHz. The "A-Weighting" is an electronic filters network incorporated in sound level meters which approximately corresponds to the frequency response of the ear. The unit of measurement of A-weighted sound level is dBA or dB(A).

Break-in

Noise transmission into a structure from the outside.

Break-out

Noise transmission from inside a structure to the outside.

Decibel, dB

This is a relative unit of measurement which in acoustics is the unit to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). The dB is a logarithmic unit used to describe a ratio between the measured level and a reference or threshold level of 0dB (re. 20 micro-Pascals). We therefore use a logarithmic scale to describe sound pressure level, intensities and sound power levels. Subjectively, an increase of 10dB corresponds to a doubling in the perceived loudness of sound.

Equivalent Continuous Sound Level, L_{eq} or L_{Aeq}

The equivalent continuous sound level, L_{eq} is a notional sound level. It is the sound level, which, if maintained for a given length of time, would produce the same acoustic energy as a fluctuating noise over the same time period. (The formula for the above is implemented electronically in all good sound level meters and it is customary to measure rather than calculate the equivalent continuous sound level.) L_{Aeq} (A-weighted L_{eq}) is widely used to measure any environmental noise which varies considerably with time.

Free Field

A sound field region with no adjacent reflecting surfaces.

Octave and Third Octave Bands

The human ear is sensitive to sound over a range of approximately 20Hz to 20kHz, and is generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum is divided into frequency bands (continuous range of frequencies between two limiting frequencies), and the sound pressure level is measured in each band. The most commonly used frequency bands are octave bands, in which the mid-frequency of each band is twice that of the band below it. (For instance the octave bands above and below the 500Hz octave band are 1kHz and 250Hz respectively). For finer analysis, each octave band may be split into three one-third octave bands or in some cases, fine frequency bands.

Rating Level, $L_{Ar, T}$

The specific sound level plus any adjustment for the characteristic features of the sound, as described in BS 4142:2014+A1:2019.

Sound Insulation

Airborne sound insulation refers to the process of separating, by a physical barrier, a space to be protected from a noise source or space containing a noise source.

Statistical Level: L_{90} or L_{A90}

Sound pressure level that is exceeded for 90% of the measurement time. Consequently it is indicative of the general background noise level in the absence of any higher level short duration events that occur during the period.

Statistical Level: $L_{\max,T}$ or $L_{A\max}$

A noise level index defined as the maximum RMS sound pressure level measured during the measurement period, T . $L_{\max}$ is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.

Time Weighting

One of the standard averaging times (Fast (F), Slow (S)) used for the measurement of RMS sound pressure level in sound level meters, specified in BS 5969.

Z-Weighting

Z-weighting or "zero weighting" is where no frequency weighting has been applied to the measured values.