

**Beacon Centre  
127-145 Barrington Street  
Manchester**

Plant Sound Assessment Report  
0909/PSA1

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For:

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# **Plant Sound Assessment Report**

## **0909/PSA1**

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## **1.0 Introduction**

Lighthouse Acoustics has been appointed by Shepherd Architecture and Surveying to undertake an assessment of atmospheric noise emissions from the proposed 5No. condenser units at the Beacon Centre, 127-145 Barrington Street, Manchester to the nearest existing noise sensitive receptor.

The survey methodology, results and assessment are presented in this report.

## **2.0 Objectives**

To establish the Local Authority's plant sound requirements for the proposed 5No. condenser units.

To visit site to undertake environmental sound measurements during critical periods in order to establish existing environmental sound levels at the nearest noise sensitive receptor.

To undertake an assessment of atmospheric plant sound emission levels from proposed 5No. condenser units to the nearest noise sensitive receptor and to propose mitigation measures where required in order to achieve the requirements of the Local Authority.

## **3.0 Site Description**

The Beacon Centre, 127-145 Barrington Street, Manchester is bound by an alleyway to the north, residential property to the east (147 Barrington Street), Barrington Street to the south and alleyway to the west.

Residential properties are situated to the north of the site opposite the alleyway, to the south of the site opposite Barrington Street and to the west of the site opposite the alleyway.

The proposed 5No. condenser units are situated along the rear (north) facade of the Beacon Centre, 127-145 Barrington Street, Manchester.

The nearest noise sensitive receptor is the rear façade of the residential property situated to the north of the site opposite the alleyway.

The site plan overleaf indicates the extent of the site and the surrounding environment.



Site plan indicating the extent of the site and the surrounding environment

## 4.0 Local Authority Requirements

With regard to building services, Section 3.6.1.5.1 of the Planning & Noise Technical Guidance document (dated December 2015) produced by Manchester City Council states the following:

*"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."***

## 5.0 Environmental Sound Survey

### 5.1 Measurements

It is understood that the proposed 5No. condenser units are to operate between 07:30 to 21:00 hours.

Fully manned environmental sound measurements were undertaken during critical periods when daytime and evening environmental sound levels may typically be expected to be at their lowest.

The measurements were undertaken between 07:30 to 08:00 hours and 13:30 to 14:00 hours on Tuesday 30 November 2021 and 20:30 to 21:00 hours on Friday 3 December 2021.

During these periods the  $L_{Amax}$ ,  $L_{Aeq}$  and  $L_{A90}$  sound levels were measured over 15 minute periods.

### 5.2 Weather Conditions

During the morning survey period the wind conditions were calm (<1m/s) and the sky was overcast. There was no rainfall and road surfaces were dry. The temperature was approximately 9°C.

During the afternoon survey period the wind conditions were calm (<1m/s) and the sky was overcast. There was no rainfall and road surfaces were dry. The temperature was approximately 11°C.

During the evening survey period the wind conditions were calm (<1m/s) and the sky was broken cloud. There was no rainfall and road surfaces were dry. The temperature was approximately 6°C.

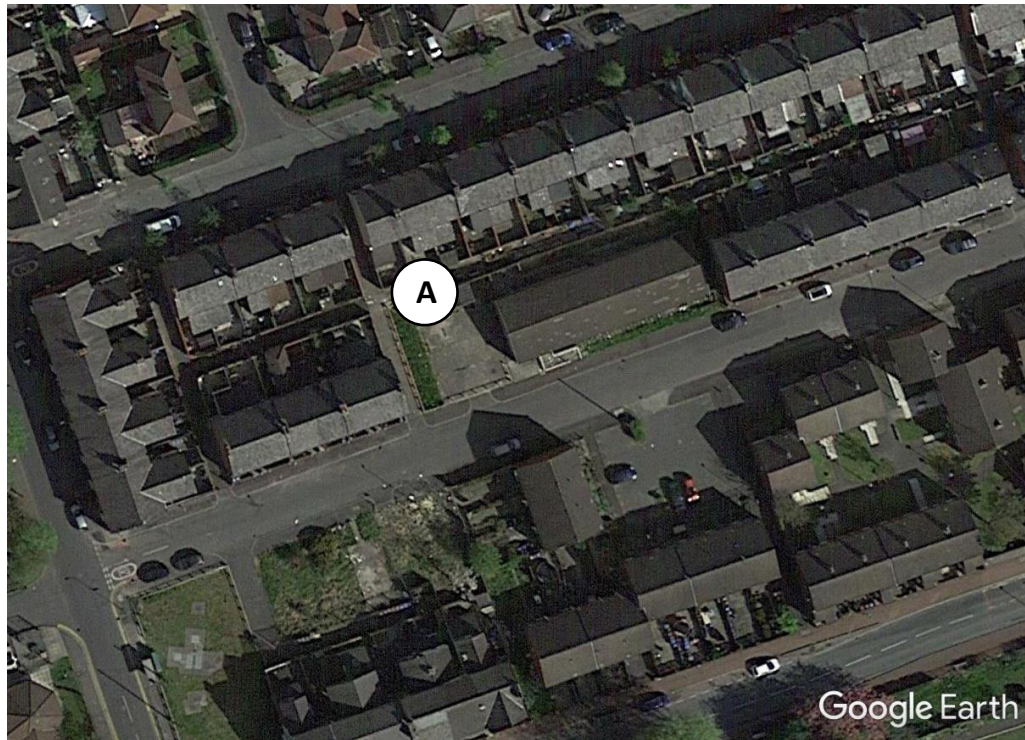
The weather conditions during the survey periods are therefore considered to be suitable for undertaking measurements of sound levels.

### 5.3 Measurement Position

Environmental sound levels were measured at a single position on-site as described in the table below.

| Position | Description                                                                                                     |
|----------|-----------------------------------------------------------------------------------------------------------------|
| A        | Microphone situated adjacent to the gate to the rear alley to the north of the site at 1.5m above ground level. |

The measurement position is shown on the site plan overleaf.



Site plan showing measurement position

The measurement position was selected in order to assess typical environmental sound levels at the nearest noise sensitive receptor.

#### 5.4 Equipment

The following equipment was used to undertake the environmental sound survey.

| Equipment                 | Manufacturer  | Model   | Serial No. | Calibration Date |
|---------------------------|---------------|---------|------------|------------------|
| Class 1 Sound Level Meter | Bruel & Kjaer | 2250    | 2626230    | 26/10/2020       |
| Preamplifier              | Bruel & Kjaer | ZC-0032 | 21309      | 26/10/2020       |
| Microphone                | Bruel & Kjaer | 4189    | 2621208    | 26/10/2020       |
| Windscreen                | Bruel & Kjaer | UA-1650 | -          | -                |
| Class 1 Sound Calibrator  | Casella       | 120/1   | 3864878    | 02/11/2021       |

Field calibration checks were performed on the sound level meter prior to and on completion of the survey and were found to be within acceptable tolerance limits.

#### 5.5 Results

The results of the environmental sound survey are presented below.

| Position | Time  | L <sub>Amax,15min</sub> (dB) | L <sub>Aeq,15min</sub> (dB) | L <sub>A90,15min</sub> (dB) |
|----------|-------|------------------------------|-----------------------------|-----------------------------|
| A        | 07:30 | 61                           | 48                          | 45                          |
|          | 07:45 | 61                           | 51                          | 46                          |
|          | 13:30 | 67                           | 51                          | 49                          |
|          | 13:45 | 63                           | 51                          | 48                          |
|          | 20:30 | 50                           | 44                          | 42                          |
|          | 20:45 | 50                           | 43                          | 41                          |

## 5.6 Discussion of Sound Climate

At Position A, the dominant sound sources during the morning, afternoon and evening survey periods were occasional road traffic along Barrington Street and distant road traffic from the surrounding road network.

## 6.0 Atmospheric Plant Sound Emission Limits

Based on the requirements of Manchester City Council detailed in Section 4.0 and the  $L_{A90}$  sound levels measured during the environmental sound survey detailed in Section 5.5, it is proposed that cumulative atmospheric plant sound emissions should be designed to achieve the following limits at the nearest noise sensitive receptor.

| Nearest Noise Sensitive Receptor | $L_{Aeq}$ Cumulative Atmospheric Plant Sound Emission Limits at Nearest Noise Sensitive Receptor (dB) |
|----------------------------------|-------------------------------------------------------------------------------------------------------|
|                                  | Daytime<br>(07:30–21:00)                                                                              |
| North                            | 36                                                                                                    |

The above limits are subject to final approval by Manchester City Council. Plant sound emissions should be assessed in accordance with BS 4142: 2014.

## 7.0 BS 4142: 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; and
- 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.

Sound of an industrial and/or commercial nature does not include sound from the passage of vehicles on public roads and railway systems.

It should be noted that the determination of noise amounting to a nuisance is beyond the scope of BS 4142.

The likely impact is indicated by subtracting the existing background sound level from the rating level of the industrial and/or commercial sound. The standard states that:

- "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.

*Note 2 Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*

The industrial and/or commercial sound is expressed as the specific sound level and given as a  $L_{Aeq,Tr}$  sound level. Should the specific sound level exhibit any acoustic features (i.e. tonality, irregularity or impulsiveness) a character correction is applied. The rating level is the specific sound level with character correction applied (if applicable) and is given as a  $L_{Ar,Tr}$  sound level.

The existing background sound level is given as a  $L_{A90, T}$  sound level. The reference time interval,  $T_r$ , is 1 hour during the daytime period (07:00 to 23:00 hours) and 15 minutes during the night-time period (23:00 to 07:00 hours).

## 8.0 Atmospheric Plant Sound Emissions Impact Assessment

### 8.1 Plant Sound Data

Atmospheric building services sound levels have been assessed based on the manufacturers sound data for the proposed 5No. condenser units which indicates octave band sound data as detailed in the table below.

**Samsung AC035RXADKG**

| Sound Pressure Level at 1m (dB) at Octave Band Centre Frequency (Hz) |     |     |     |    |    |    |    | dBA |
|----------------------------------------------------------------------|-----|-----|-----|----|----|----|----|-----|
| 63                                                                   | 125 | 250 | 500 | 1k | 2k | 4k | 8k |     |
| 57                                                                   | 55  | 49  | 46  | 41 | 37 | 36 | 38 | 48  |

Whilst it is not possible to assess plant irregularity or impulsiveness based on manufacturer's sound data, BS 4142: 2014 provides an objective method for assessing the audibility of tones in sound. The one-third octave method states that if the level of a one third octave band exceeds the level of both adjacent one third octave bands by the following amounts, then a tonal component may be identified as present:

- 15dB in the low-frequency one-third-octave bands (25Hz to 125Hz);
- 8dB in the mid-frequency one-third-octave bands (160Hz to 400Hz);
- 5dB in the high-frequency one-third-octave bands (500Hz to 10kHz).

However, one third octave band sound data is rarely available from manufacturers as is the case in this instance.

By applying the same principal to the octave band sound data in the table above, a review indicates that these items are unlikely to exhibit a tonal component. As such, no character correction has been applied to the specific sound level for these items.

Should one third octave band sound data become available a revised assessment should be undertaken.

## 8.2 Plant Location

The locations of the proposed 5No. condenser units have been taken from the following drawing.

| Author                                 | Drawing No.   | Revision | Date       |
|----------------------------------------|---------------|----------|------------|
| Shepherd Architecture<br>and Surveying | BCC01A TD 002 | -        | 06.10.2021 |

This indicates that the proposed 5No. condenser units are situated along the rear (north) facade of the Beacon Centre, 127-145 Barrington Street, Manchester.

## 8.3 Operating Hours

It is understood that the proposed 5No. condenser units have the potential to operate between 07:30 and 21:00 hours.

In order to undertake a worst case assessment, it is assumed that the proposed 5No. condenser units operate for the full 1 hour daytime assessment period.

## 8.4 Nearest Noise Sensitive Receptor

The nearest noise sensitive receptor to the proposed 5No. condenser units is the rear façade of the residential property situated to the north of the site opposite the alleyway.

The table below details the approximate distance between the proposed 5No. condenser units and the nearest noise sensitive receptor.

| Nearest Noise Sensitive Receptor | Approximate Distance (m) |
|----------------------------------|--------------------------|
| North                            | 12                       |

## 8.5 Calculation

The assessment has been undertaken in accordance with generally accepted acoustic principles for building services plant items.

## 8.6 Assessment

The results of the assessment are summarised in the following table.

| Nearest Noise Sensitive Receptor | Rating Level $L_{Ar,1hour}$ at Receptor (dB) | $L_{Aeq}$ Cumulative Atmospheric Plant Sound Emission Limit at Nearest Noise Sensitive Receptor (dB) | Difference (dB) | Local Authority's Requirements Achieved |
|----------------------------------|----------------------------------------------|------------------------------------------------------------------------------------------------------|-----------------|-----------------------------------------|
| North                            | 36                                           | 36                                                                                                   | 0               | Yes                                     |

The assessment indicates that  $L_{Ar}$  rating level is likely to achieve the proposed  $L_{Aeq}$  cumulative atmospheric plant sound emission limit at the nearest noise sensitive receptor. As such, atmospheric plant sound emissions from the proposed 5No. condenser units are likely to have a low impact at the nearest noise sensitive receptor and achieve the requirements of the Local Authority.

## 9.0 Context

BS 4142: 2014 states the following with regard to the context of the industrial/commercial sound:

*"The significance of sound of 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 the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."*

In order to place the industrial/commercial sound in context the following points have therefore been considered:

- Atmospheric plant sound emissions from the proposed 5No. condenser units are likely to have a low impact at the nearest noise sensitive receptor;
- BS 4142:2014 only uses outdoor sound levels to assess the likely effects of sound.

Based on the above, it is considered that the proposed industrial/commercial sound is likely to have a low impact at the nearest noise sensitive receptor. This conclusion is reached by professional judgement, taking context into consideration.

## 10.0 Uncertainty

Weather conditions were monitored during the survey periods and were considered to be suitable for undertaking measurements of sound levels. Measurement positions were selected that were representative of the nearest noise sensitive receptors. Measurements were undertaken during critical periods when morning, daytime and evening environmental sound levels may typically be expected to be at their lowest. Whilst environmental sound levels have the potential to be lower than those measured on some occasions, they are likely to be similar to those measured for the vast majority of the time. As such, uncertainty in the survey methodology is considered to be of marginal significance.

The survey was undertaken using Class 1 equipment which had been calibrated within the required intervals. In addition, field calibration checks were performed on the sound level meters prior to and on completion of the survey and were found to be within acceptable tolerance limits. As such, uncertainty in the survey equipment is considered to be of negligible significance.

Assessment data including sound data and operating hours has been based on manufacturers sound data, measured sound data and information received from others. A character correction has been applied as deemed appropriate. As such, uncertainty in the assessment data is considered to be of marginal significance.

Calculations have been undertaken in accordance with recognised procedures and have been performed in a spreadsheet. As such, uncertainty in the assessment is considered to be of negligible significance.

Based on the above, overall uncertainty in the assessment is considered to be of marginal significance.

## 11.0 Conclusions

The Local Authority's plant sound requirements for the proposed 5No. condenser units has been established.

Environmental sound measurements during critical periods have been undertaken in order to establish existing environmental sound levels at the nearest noise sensitive receptor.

An assessment of atmospheric plant noise emission levels from proposed 5No. condenser units to the nearest noise sensitive receptor has been undertaken.

The assessment indicates that the proposed 5No. condenser units are likely to have a low impact at the nearest noise sensitive receptor and achieve the requirements of the Local Authority.

A handwritten signature in black ink, appearing to read 'Robin Wood', with a large, sweeping horizontal stroke underneath.

**Robin Wood**  
**LIGHTHOUSE ACOUSTICS**