# The Place
## Manchester

**Noise Survey &**
**Plant Noise Impact Assessment Report**

22977/PNIA1

03 March 2017

For:
Capital & Centric
Sun House
2-4 Little Peter St
Manchester
M15 4PS



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Hann Tucker Associates

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## Document Control

| Rev | Date | Comment | Prepared by | Authorised by |
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This report has been prepared by Hann Tucker Associates Limited (HTA) with all reasonable skill, care and diligence in accordance with generally accepted acoustic consultancy principles and the purposes and terms agreed between HTA and our Client. Any information provided by third parties and referred to herein may not have been checked or verified by HTA unless expressly stated otherwise. This document contains confidential and commercially sensitive information and shall not be disclosed to third parties. Any third party relies upon this document at their own risk.

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# Noise Survey & Plant Noise Impact Assessment Report 22977/PNIA1

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## Attachments


Appendix A – Acoustic Terminology

Time History Graph 22977/TH1

Time History Graph 22977/TH2



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# 1.0 Introduction

It is proposed to install new items of building services plant at street and first floor level at The Place in Manchester. The new plant will have the potential to introduce noise externally and give rise to an increase in sound pressure levels at nearby noise sensitive windows.

Hann Tucker associates have therefore been commissioned to conduct an environmental noise survey and plant noise impact assessment.

This report presents our findings.

# 2.0 Objectives

To establish the existing environmental noise levels at the site by means of fully automated noise monitoring over a period of approximately 24 hours.

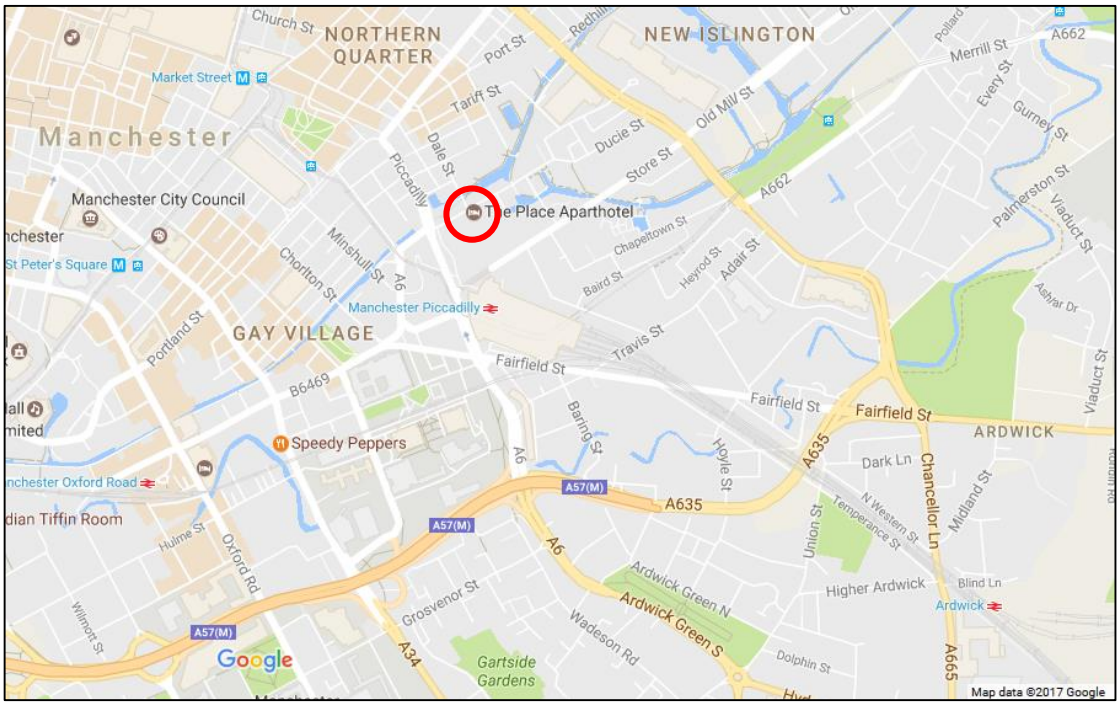
To establish plant noise emission limits in conjunction with Local Authority guidance and the appropriate industry standards (BS 4142:2014).

To assess the atmospheric noise emissions from the proposed building services plant, based upon data with which we are provided, and comment upon the acceptability.

# 3.0 Site Description

## 3.1 Location

The site is located on Ducie Street in Manchester city centre, just east of the A6, and directly north of Piccadilly Railway Station. The location is shown in the Location Map below.



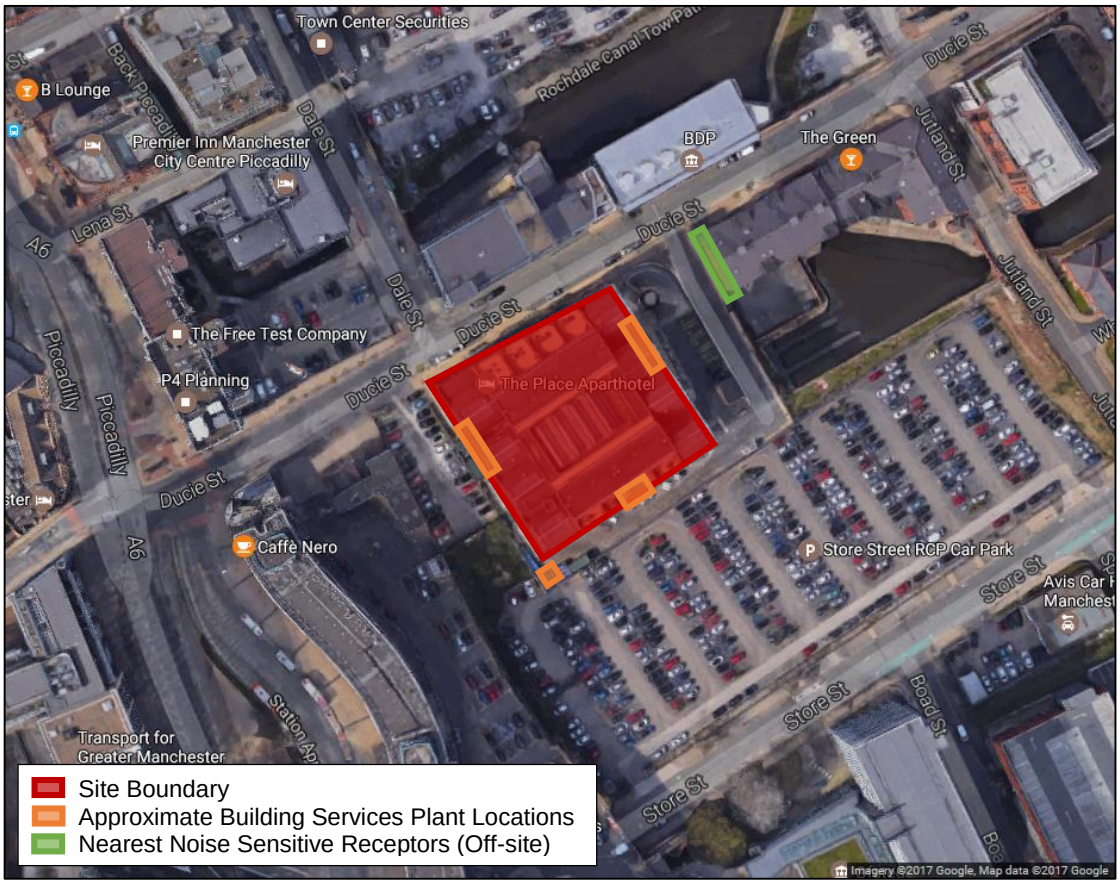

Location Map (maps.google.com)

The site falls within the jurisdiction of Manchester City Council.

## 3.2 Description

The site is a ground plus 6No. storey building (with basement levels) situated on Ducie Street amidst a number or residential and commercial properties. The site it bound by Ducie Street to the north, and by facility access roads to the east and west. To the south, the site backs onto a large single level car parking facility at sub-street level. The nearest off-site noise sensitive receptors are understood to be the residential windows located to the northeast of the site, at an approximate distance of 19 metres from the nearest louvre. Overall, the nearest noise sensitive receptors are understood to be the windows of The Place itself and as such form the basis of our assessment.

The site is shown in the Site Plan below.




Site Plan (maps.google.com)

# 4.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

# 5.0 Planning Policy/Guidance

## 5.1 Noise Policy Statement for England

The Government's Noise Policy Statement for England (NPSE, March 2010) sets out the long term vision for Government noise policy, which is to "*Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*".

The NPSE includes three primary aims to be achieved through effective management of environmental, neighbour and neighbourhood noise; (1) avoid "significant adverse" impacts on health and quality of life, (2) mitigate and minimise "adverse" impacts on health and quality of life, and (3) where possible, contribute to the improvement of health and quality of life.

## 5.2 National Planning Policy Framework

The National Planning Policy Framework (NPPF, March 2012) sets out the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

The planning system should prevent both new and existing development from contributing to, or being put at, unacceptable risk from environmental factors including noise.

Planning policies and decisions should aim to avoid noise giving rise to significant adverse impacts on health and quality of life as a result of new development. Conditions may be used to mitigate and reduce noise to a minimum so that adverse impacts on health and quality of life are minimised.

Reference is made to the Government's Noise Policy Statement for England (NPSE, March 2010) which sets out the long term vision for Government noise policy, which is to "*Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*".

## 5.3 Local Planning Requirements

Manchester City Council requirements are outlined in Section 3.0 of Manchester City Council's Planning & Noise Technical Guidance document (December 2015).

Section 3.6.1.5.1 outlines that the noise assessment for fixed plant should be based on BS 4142:2014 and the assessment must demonstrate that:

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

## 5.4 BS 4142:2014 – Method for rating and assessing industrial and commercial sound

BS 4142:2014 'Method for Rating industrial noise affecting mixed residential and industrial areas' describes methods for rating and assessing the effects of outdoor sound levels, of an industrial and/or a commercial nature, *"on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident".*

The impact of a specific sound is indicated by subtracting the existing background noise level from the rating level (i.e. noise level from the proposed items of plant/machinery/etc. plus any acoustic feature corrections).

The noise from the new development is expressed in terms of a rating level and given as a $L_{Aeq,T}$ noise level. The existing background noise level is expressed in terms of a $L_{A90,T}$ noise level.

T is the assessment time interval, which is 1-hour for operations during daytime hours (07:00 to 23:00 hours) and 15-minutes for operations during night-time hours (23:00 to 07:00 hours).

A penalty should apply to plant emitting noise of a tonal, irregular or impulsive nature.

The standard states that:

*"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 estimation of the impact of the specific noise can be obtained by the difference of the rating noise level and the background noise level and considering the following:*

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

# 6.0 Survey Methodology

## 6.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 11:00 hours on Tuesday 14 February 2017 to 12:00 hours on Wednesday 15 February 2017.

During the periods we were on site the wind conditions were calm, the sky was generally overcast and road surfaces were dry. We understand that generally throughout the survey period the weather conditions were mostly dry with some short periods of light precipitation. Nevertheless, these conditions were considered suitable for obtaining representative measurement results.

Measurements were taken continuously of the A-weighted (dBA) $L_{90}$, $L_{eq}$ and $L_{max}$ sound pressure levels over 15 minute periods.

Supplementary manned measurements were made a street level at a small number of positions around the building perimeter.

## 6.2 Measurement Positions

Automated monitoring was undertaken at 2No. free-field positions overlooking the southwest and northeast corners of the site respectively. The microphones were attached to a pole and secured approximately 1.2 metres from the building façade, approximately 1.5 metres above roof level.

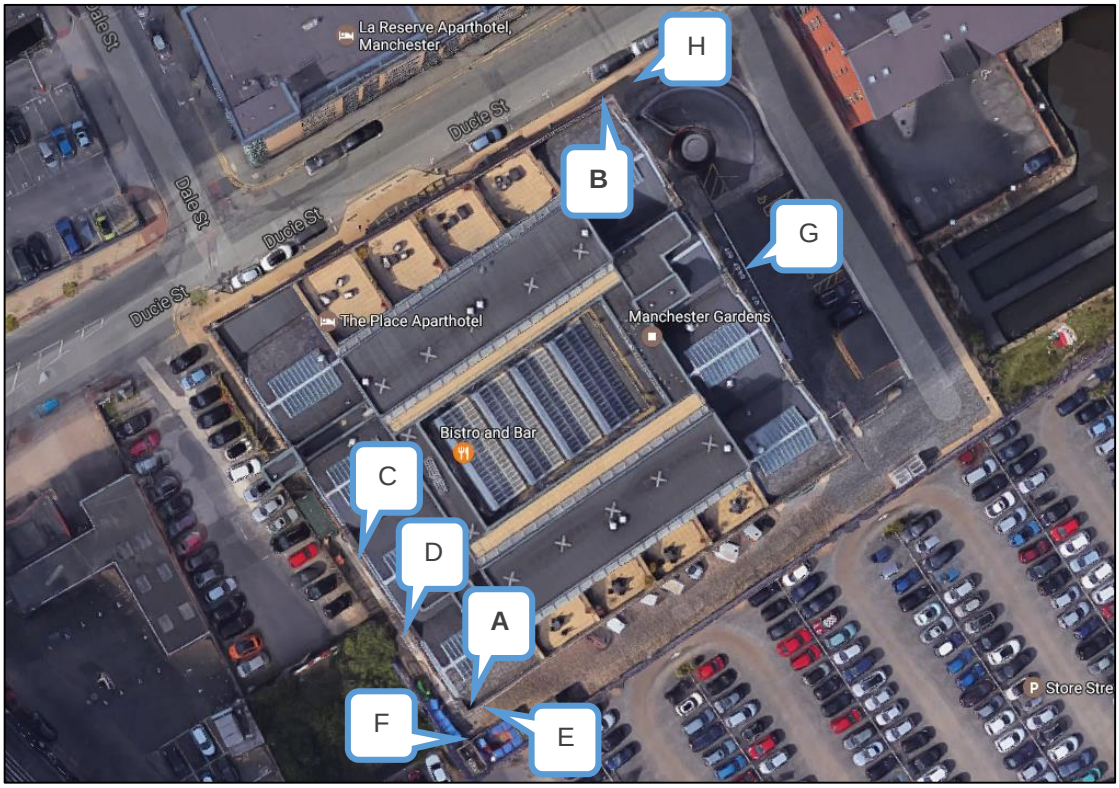
Manned measurements were recorded at 6No. further free-field positions with the sound level meter mounted on a tripod at 1.3 metres from the ground.

These supplementary manned measurements were conducted firstly to serve as ‘calibration’ levels, in order to assess the background noise levels at the lower noise sensitive windows based upon the 24 hour data measured at roof level. And secondly to measure the noise emissions of the existing building services plant units that are proposed to be replaced.

The measurement positions are described in the table below.

| Position | Type | Description |
|---|---|---|
| A | Automated | Overlooking southwest corner of the site |
| B | | Overlooking the northeast corner of the site. |
| C | Manned | To the west of the site, approximately 3 metres from the street level louvres on the western façade. |
| D | | To the west of the site, approximately 3 metres from the building façade. |
| E | | At the southwest corner of the site, approximately 3 metres from the building envelope. |
| F | | To the southwest of the site, approximately 1 metre from the existing building services plant items located behind the bin store. |
| G | | To the east of the site, approximately 3 metres from the eastern façade and existing louvres at upper ground level. |
| H | | At the northeast corner of the site, approximately 3 metres from the building envelope. |

These measurement positions are illustrated in the plan below.




Plan Showing Measurement Positions (maps.google.com)

## 6.3 Instrumentation

The instrumentation used during the survey is presented in the Table below:

| Description | Manufacturer | Type | Serial Number | Calibration |
|---|---|---|---|---|
| Type 1 Data Logging Sound Level Meter | Larson Davis | 824 | 3533 | Calibration on 08/12/2016 |
| Type 1 Data Logging Sound Level Meter | Larson Davis | 824 | 3053 | Calibration on 18/10/2016 |
| Type 1 Hand Held Sound Level Meter | Larson Davis | LXT | 4568 | Calibration on 09/11/2015 |
| Type 1 Calibrator | Larson Davis | CAL200 | 3083 | Calibration on 18/04/2016 |

The automated sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. The microphones was fitted with a Larson Davis windshield.

All equipment was calibrated prior to and on completion of the survey. No significant deviations occurred (no more than 0.1 dB).

# 7.0 Results

## 7.1 Automated Survey (Positions A & B)

The results have been plotted on Time History Graphs 22977/TH1 and 22977/TH2 enclosed, presenting the 15 minute A-weighted (dBA) $L_{90}$, $L_{eq}$, and $L_{max}$ noise levels at each measurement position throughout the duration of the survey.

The lowest $L_{A90\ (15\ min)}$ measurements recorded during the survey are presented in the table below:

| Position | Location | Typical Lowest Background Sound Pressure Level, $L_{A90,15min}$ (dB) | | |
|---|---|---|---|---|
| | | Daytime (07:00 – 19:00 hours) | Evening (19:00 – 23:00) | Night (23:00 – 07:00) |
| A | SW | 59 | 60 | 59 |
| B | NE | 54 | 52 | 46 |

### 7.2 Manned Survey (Positions C-H)

| Position | Location | Type | Time Period | Measured Sound Pressure Level (dB) | |
|---|---|---|---|---|---|
| | | | | $L_{A90}$ | $L_{Aeq}$ |
| C | W | Source | 11:50 – 11:51 | 67 | 68 |
| D | SW | Calibration | 11:52 – 11:57 | 58 | 62 |
| E | | Calibration | 12:00 – 12:05 | 56 | 58 |
| F | | Source | 12:06 – 12:07 | 56 | 57 |
| G | E | Calibration | 12:10 – 12:15 | 56 | 60 |
| H | NE | Calibration | 12:16 – 12:21 | 57 | 64 |

## 8.0 Discussion Of Noise Climate

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period, the dominant noise sources were noted to be traffic noise from the surrounding road network, and noise from nearby construction sites.

At the southwest of the site there was also noted to be a significant contribution to the background noise levels from the existing building services plant items located behind the bin store. The prevalence of these contributions is evidenced by the relatively static $L_{A90}$ and $L_{Aeq}$ noise levels presented in Time History Graph 22977/TH2.

## 9.0 Plant Noise Emissions

### 9.1 Proposed Limits

Due to the presence of the existing building services plant items at the southwest of the site, and the subsequently elevated background noise levels monitored at position A, the proposed noise emission limits have been based on the background noise levels measured at position B.

As the 24 hour noise levels presented in TH Graph 22977/TH2 appear to be unaffected by nearby building services plant, the data recorded at position B has been assumed to be representative of the true background noise level around the site.

On the basis of the Manchester City Council's guidance and the results of the environmental noise survey, we propose that the following cumulative plant noise emission limits be achieved at 1 metre from the nearest noise sensitive residential windows.

| Period | Plant Noise Emission Limit |
|---|---|
| Daytime (07:00-19:00) | 49 dB $L_{Aeq,1hr}$ |
| Evening (19:00-23:00) | 47 dB $L_{Aeq,1hr}$ |
| Night-time (23:00-07:00) | 41 dB $L_{Aeq,15min}$ |

Noise shall be assessed in accordance with BS 4142: 2014 with corrections applied for any plant emitting noise of a tonal or irregular quality. Emergency plant items (e.g. standby generators, smoke extract equipment) should be subject to more relaxed criteria.

## 9.2 Project Proposals

Our assessment is based upon the following drawings provided by The Anslow Partnership.

| Reference | Description | Revision | Date of Issue |
|---|---|---|---|
| 216037//M/3101 | Mechanical Services Ground Floor (Low Level) | T1 | AUG 2016 |
| 216037//M/3200-2 | Mechanical Services Ground Floor High Level | T1 | AUG 2016 |
| 216037//M/3201-2 | Mechanical Services Ground Floor Mezzanine | T1 | AUG 2016 |

From the above we understand the acoustically pertinent proposals to be as follows:-

- 2No. new outdoor VRF units to replace the existing units located adjacent to the bin store to the southwest of the site.
- 4No. new or existing louvres on the west façade of the building to service new AHUs.
- 2No. new or existing louvres on the east façade of the building to service new AHUs.
- 2No. new or existing louvres within the service access area at the south of the site to service new AHUs.

It is also understood that further building services plant items will likely be installed to service a ground floor class A3 unit in the northwest corner of the building. This unit is to be fitted out at a later date, and as such, currently no information is available regarding possible plant items associated with its operation. Subsequently in our calculations we have allowed for a slight ‘headroom’ such that future building services plant items can be designed such that they do not give rise to an exceedance of the measured background noise levels.

At this stage in the project plant selections have not yet been made; however primary indicative selections have been made with an allowance for attenuation as required based upon the proposed plant noise emission limits.

We have approached this assessment with the following key assumptions:-

- Any louvres or grilles on the building façade should not exceed an $L_{Aeq}$ of 55 dB day and 50 dB night when measured at 1 metre. In our experience this is an appropriate noise level for plant items at street level within public access or back of house areas.
- The new outdoor VHF units should not exceed an $L_{Aeq}$ greater than the measured $L_{Aeq}$ noise level of the existing bin store plant units when measured at 1 metre (just above 55 dB $L_{Aeq}$).

The following tables show a summary of our calculations to assess the atmospheric plant noise emissions from these proposed items to the nearest hotel windows in accordance with BS 4142. Our calculations consider standard distance and screening losses as well as reflections from buildings and directionality of plant in relation to the receptor.

**R1: Window at Southwest Corner**

| Source (dB) | Outdoor VRF 2 | Outdoor VRF 3 |
|---|---|---|
| Proposed $L_{Aeq}$ @ 1m (Day/Night) | 55 | 55 |
| Divergence Loss (12 / 12)m | -17 | -17 |
| Screening Loss | 0 | 0 |
| Reflections | 0 | 0 |
| BS 4142 Feature Correction | 0 | 0 |
| BS 4142 Rating Level | 38 | 38 |
| Cumulative Rating Level | 41 | |
| Plant Noise Limit | 47 / 41 | |
| Compliance? | ✓ | |

### R2: Window on West Façade

| Source (dB) | Outdoor VRF 2 | Outdoor VRF 3 | AHU01 Exhaust | AHU01 Intake | AHU02 Intake | AHU02 Exhaust |
|---|---|---|---|---|---|---|
| Proposed $L_{Aeq}$ @ 1m (Day/Night) | 55 | 55 | 55 / 50 | 55 / 50 | 55 / 50 | 55 / 50 |
| Divergence Loss (25 / 25 / 4 / 7 / 5 / 6)m | -23 | -23 | -16 | -22 | -18 | -20 |
| Screening Loss | 0 | 0 | -5 | -5 | -5 | -5 |
| Reflections | 0 | 0 | 0 | 0 | 0 | 0 |
| BS 4142 Feature Correction | 0 | 0 | 0 | 0 | 0 | 0 |
| BS 4142 Rating Level | 32 | 32 | 34 / 29 | 28 / 23 | 32 / 27 | 30 / 25 |
| Cumulative Rating Level | 40 / 37 | | | | | |
| Plant Noise Limit | 47 / 41 | | | | | |
| Compliance? | ✓ | | | | | |

### R3: Window on South Façade

| Source (dB) | Outdoor VRF 2 | Outdoor VRF 3 | AHU04 Intake | AHU04 Exhaust |
|---|---|---|---|---|
| Proposed $L_{Aeq}$ @ 1m (Day/Night) | 55 | 55 | 55 / 50 | 55 / 50 |
| Divergence Loss (34 / 34 / 4 / 4)m | -26 | -26 | -16 | -16 |
| Screening Loss | 0 | 0 | -10 | -10 |
| Reflections | 0 | 0 | +6 | +6 |
| BS 4142 Feature Correction | 0 | 0 | 0 | 0 |
| BS 4142 Rating Level | 29 | 29 | 35 / 30 | 35 / 30 |
| Cumulative Rating Level | 39 / 36 | | | |
| Plant Noise Limit | 47 / 41 | | | |
| Compliance? | ✓ | | | |

**R4: Window on East Façade**

| Source (dB) | AHU03 Intake | AHU03 Exhaust |
|---|---|---|
| Proposed $L_{Aeq}$ @ 1m (Day/Night) | 55 / 50 | 55 / 50 |
| Divergence Loss (4 / 7)m | -18 | -24 |
| Screening Loss | 0 | 0 |
| Reflections | 0 | 0 |
| BS 4142 Feature Correction | 0 | 0 |
| BS 4142 Rating Level | 37 / 32 | 31 / 26 |
| Cumulative Rating Level | 38 / 33 | |
| Plant Noise Limit | 47 / 41 | |
| Compliance? | ✓ | |

The above demonstrates compliance with the requirements of the Local Authority, including a sufficient overhead such that additional building services plant items associated with the proposed class A3 unit can be suitably designed to achieve a total cumulative plant noise emission level in line with the proposed limits, as summarised below.

**Specific Plant Noise Limits**

| Item | Plant Noise Limit, $L_{Aeq}$ @ 1m (dB) | |
|---|---|---|
| | Day (07:00 – 23:00) | Night (23:00 – 07:00) |
| Louvre / Grille | 50 | 55 |
| Outdoor VRF Unit | 55 | |

# 10.0 Conclusions

An environmental noise survey has been undertaken in order to establish the currently prevailing noise levels at the site.

Plant noise emission criteria have been recommended based on the results of the environmental noise survey and with reference to the Local Authority's requirements.

An assessment has been carried out to determine the plant noise emissions limits at 1 metre from each proposed building services plant item such that the total cumulative emissions do not exceed the Local Authority's requirements.

Additional consideration has been given to the need for additional building services plant items to be designed and installed at a later date to service the proposed class A3 unit in the northwest corner of the building.

# Appendix A

The acoustic terms used in this report are defined as follows:

dB — Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).

dBA — The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The $_A$ subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted

It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

$L_{90,T}$ — $L_{90}$ is the noise level exceeded for 90% of the period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.

$L_{eq,T}$ — $L_{eq,T}$ is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.

$L_{max}$ — $L_{max}$ is the maximum sound pressure level recorded over the period stated. $L_{max}$ is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the $L_{eq}$ noise level.

Sound Pressure Level ($L_p$) is the sound pressure relative to a standard reference pressure of $2 \times 10^{-5}$ Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).

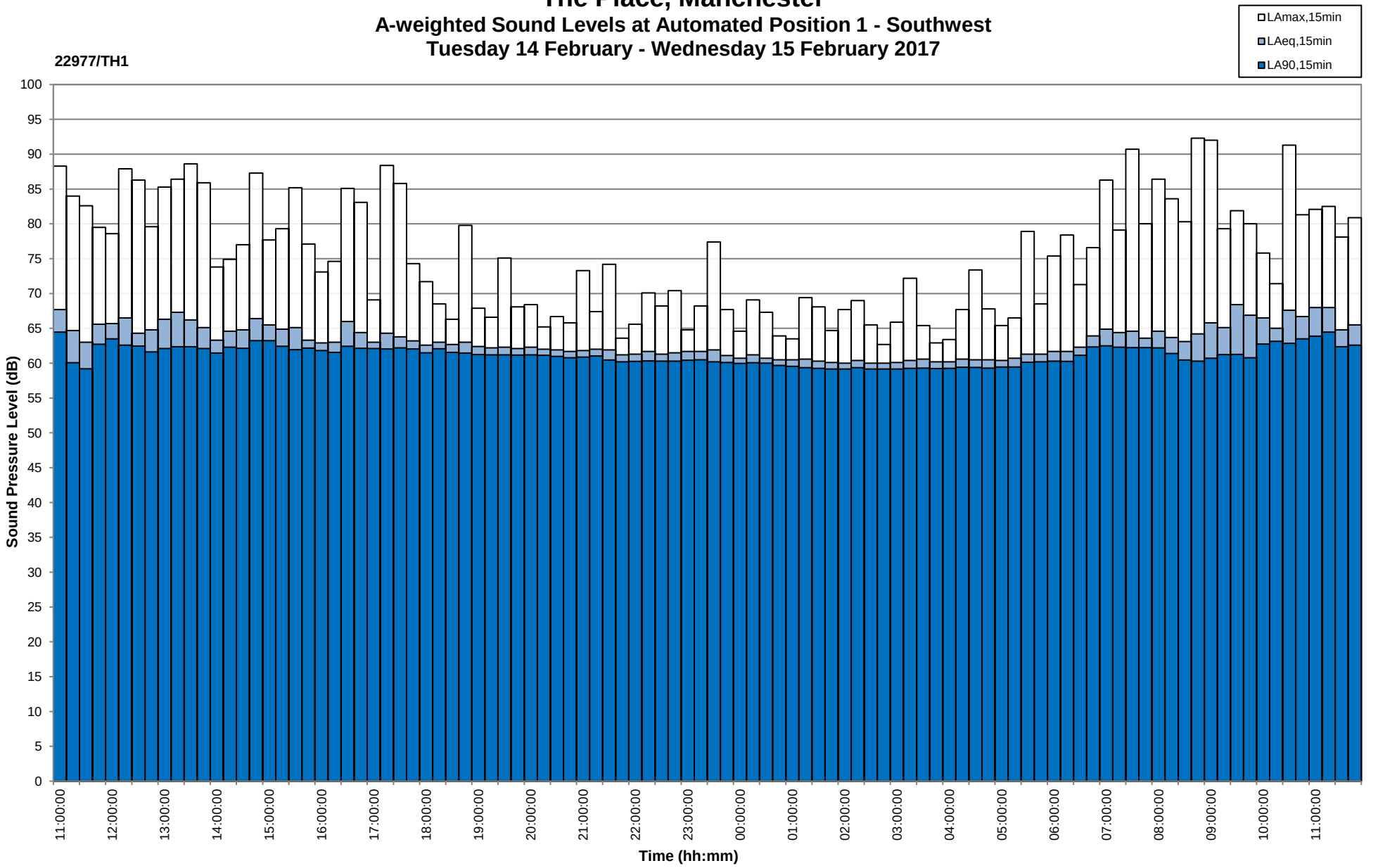
Sound Power Level (SWL or $L_w$) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually $10^{-12}$ W).

# The Place, Manchester

## A-weighted Sound Levels at Automated Position 1 - Southwest

## Tuesday 14 February - Wednesday 15 February 2017

**22977/TH1**



# The Place, Manchester

## A-weighted Sound Levels at Automated Position 2 - Northeast

## Tuesday 14 February - Wednesday 15 February 2017

**22977/TH2**

