

40 Spring Gardens, Manchester

Noise impact assessment

Aviva Life & Pensions UK Ltd.

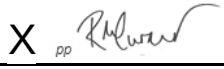
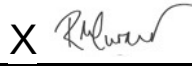
Job No: 1034566
Doc Ref: 1034566-RP-AS-001
Revision: P02
Revision Date: 24 May 2022

Project title	40 Spring Gardens, Manchester	Job Number
Report title	Noise impact assessment	1034566

Document Revision History

Revision Ref	Issue Date	Purpose of issue / description of revision
P01	03 May 2022	First issue for comment
P02	24 May 2022	Revised following Client comments

Document Validation (latest issue)

24/05/2022	24/05/2022	24/05/2022
		
X	X	X
Principal author: Jo Lacy	Checked by: Simon Everett	Verified by: Rob Turner
Signed by: Turner, Rob	Signed by: Simon Everett	Signed by: Turner, Rob

Contents

1.0	Introduction	2
2.0	Assessment criteria	4
2.1	Noise Policy Statement for England	4
2.2	National Planning Policy Framework	4
2.3	Local Authority requirements	4
2.4	BS 4142:2014+A1:2019 methods for rating and assessing industrial and commercial sound	5
3.0	Environmental noise survey	7
3.1	Site Context	7
3.2	Survey methodology	7
3.3	Results summary	8
4.0	External plant noise limits	10
5.0	Plant noise assessment	12
5.1	Manufacturers' noise level data	12
5.2	Assessment procedure	12
5.3	Mitigation measures	13
5.4	Assessment with mitigation measures	13
5.5	Discussion	14
6.0	Conclusions	16
Appendix I	Rooftop plant layout	18

1.0

Introduction

1.0 Introduction

It is proposed to replace rooftop plant on the commercial office building at 40 Spring Gardens, Manchester, M2 1EN as part of a refurbishment of the site. Installation of a new VRF system will require placement of a number of new condensing units on the roof of the building.

Cundall have been appointed to carry out the necessary survey and assessment works required to support a planning application, full details of which are contained herein. This report lays out relevant local and national planning policy and guidance, details of an undertaken noise survey and subsequent assessment.

2.0

Assessment criteria

2.0 Assessment criteria

This section of the report outlines the key legislation and guidance relevant to the assessment of noise for a development of this type.

2.1 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published by Defra in March 2010. This NPSE sets out the long-term vision of Government noise policy:

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 long term vision is supported by the following aims:

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

- *Avoid significant adverse impacts 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 National Planning Policy Framework (NPPF) was originally published in March 2012 and amended in July 2021. The NPPF is part of government reform to make the planning system less complex and more accessible, and to promote sustainable growth. It replaced existing national planning policies such as Planning Policy Guidance PPG24: Planning and Noise.

The NPPF states:

174 - Planning policies and decisions should contribute to and enhance the natural and local environment by;

*e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or **noise pollution** or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;”*

and

“185 - 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:

- a) 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 the quality of life;*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;*

2.3 Local Authority requirements

Section 3.6.1.5.1 of the Manchester City Council (MCC) ‘Planning & Noise - Technical Guidance’ document (December 2015) relates to noise limits for building services plant and states:

Many of the noise complaints Environmental Health receive about noise from plant, equipment and machinery specifically concern the character of the noise emitted. Any noise assessment needs to consider not only the overall level of noise emitted but also its particular characteristics. 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 5 dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.

2.4 BS 4142:2014+A1:2019 methods for rating and assessing industrial and commercial sound

BS 4142:2014+A1:2019 (BS 4142) provides a method of rating the significance of impact when sources of industrial noise are located near residential properties. It involves comparing the rating level (the 'specific' sound level plus a range of potential feature corrections) of the sound source to the measured background sound level in order to estimate its initial impact. A formal BS 4142 assessment has not been carried out in this instance, however, the methods described have been used to inform this assessment.

The document states:

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

The 2014 version of the standard suggests that the noise source of interest will have a 'low impact' when the 'rating level' of a noise source is below than the existing background sound level. It is also important to note that the standard requires that any quantitative assessment results are considered in light of the context in which the sound occurs.

With regards to background sound levels, BS 4142 states:

In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.

BS 4142 suggests that penalties may also be applied to sounds based on a subjective assessment of their acoustic characteristics which may include tonality and impulsivity etc.

3.0

Environmental noise survey

3.0 Environmental noise survey

3.1 Site Context

The site is located on Spring Gardens and is bounded by Spring Gardens to the east, Marriots Court to the north, Brown Street to the west and existing buildings off King Street directly to the south. The site location with an approximate red line boundary is given in the figure below:



Figure 1 - Site context and approximate red line boundary

3.2 Survey methodology

In order to assess prevailing background noise levels, an unattended continuous noise survey was undertaken on the roof of the building. The noise monitoring was carried out between approximately 13:00 on Friday 18 February to 18:45 on Saturday 19 February 2022.

The approximate measurement position (MP1) is shown in Figure 2 below:



Figure 2 - Measurement position

The measurement position was selected to minimise the influence of existing roof-mounted mechanical services plant items and in a position most representative of the nearest and most noise-sensitive receptor positions. The microphone was approximately 1.3m above the roof level of the building, in a free-field position.

Measurements were undertaken using a NtI XL2 precision sound level meter (serial number: A2A-16315-E0), generally in accordance with BS 7445-1:2003. The meter was field calibrated before and after the survey to ensure a consistent and acceptable level of accuracy was maintained throughout. No significant drift was observed. Calibration certificates for all items of noise survey equipment are available on request.

All noise measurements were undertaken by competently trained Cundall acoustics staff. Subjective impressions were that the noise climate was dominated by road traffic noise from local roads, with some contributions from the existing mechanical services plant noise.

Weather conditions when setting up and collecting the survey equipment were clear and cold, with very light intermittent winds and no rain.

3.3 Results summary

A summary of the measured noise survey results is presented in Table 1, below:

Period	Average $L_{Aeq,T}$ (dB)	Representative $L_{A90,15min}$ (dB)
Daytime	55	54
Night-time	52	48

Table 1 - Attended environmental noise survey results summary

Full survey results are presented as a time history graph in Appendix I.

4.0

External plant noise limits

4.0 External plant noise limits

Manchester City Council stipulate the following criteria with respect to noise emissions from new building services plant installations:

“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 5 dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.”

The nearest existing noise-sensitive building is understood to be offices at the Zenith Building to the north of the development site.

Table 2 below summarises the existing background noise levels measured at the site along with limiting noise levels for all new items of services plant, when measured at 1 m from the nearest noise sensitive receptors.

Time period	Representative background noise level* dB L_{A90}	Plant noise rating level not to be exceeded at 1 m from nearest noise-sensitive receptor dB $L_{A,r,Tr}$
Daytime (07:00 – 23:00 hrs)	54	49
Night-time (23:00 – 07:00 hrs)	48	43
* Existing background noise value based on modal measured $L_{A90,15min}$ value during noise survey		

Table 2 – Limiting rating noise levels for building services plant

The above limit is applicable to the cumulative noise level from all new items of plant when running under normal operation. Where applicable, acoustic feature corrections should be applied to the specific plant noise level to account for any distinguishable acoustic characteristics (e.g. tonality, impulsivity, intermittency or other acoustic characteristics).

5.0

Plant noise assessment

5.0 Plant noise assessment

5.1 Manufacturers' noise level data

Manufacturer's data, along with a proposed roof layout for plant items has been provided to Cundall by David Webb Associates Ltd (mechanical services engineers). It is understood that a total of 32 condenser units are proposed to be introduced and mounted on the roof as follows:

- Daikin REYQ12 condenser – 16 units
- Daikin REYQ14 condenser – 8 units
- Daikin REYQ18 condenser – 8 units

The layout of the proposed items of plant has been based on the DWA drawing 20009-L(55)-06 Roof FLOOR HVAC LAYOUT Rev 00 Date 24.03.22. This drawing has been reproduced in Appendix II. It is possible that the specific plant units will change following procurement and detailed design. Final details of any alternative proposals should be sent to Cundall for review.

5.2 Assessment procedure

On the basis of the plant noise limits set out in Section 4.0 of this report and the plant selection detailed in section 5.1 above, a model has been produced to assess potential mechanical services noise impact using SoundPLAN 8.2 acoustic modelling software. The software is capable of accurately determining sound propagation, by taking into account variations in topography, barrier attenuation provided by existing landscaping and buildings, and distance attenuation.

A calculation was undertaken to determine the worst-case façade location and noise levels, for which a screenshot of the grid noise map at that level (45 m above ground level) is reproduced below in Figure 3:

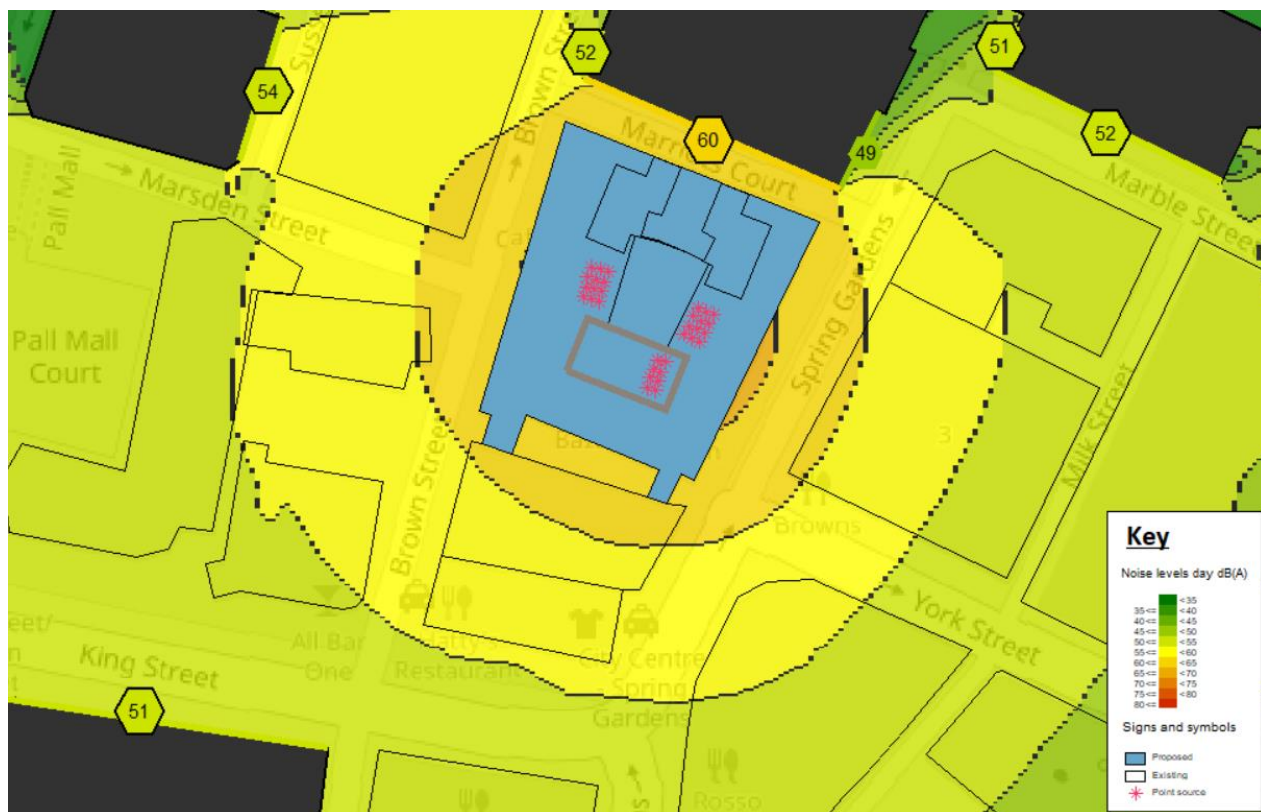


Figure 3 - Unmitigated plant noise emissions

Table 3 below shows the highest noise level at the nearest noise sensitive receptor to the site, which in this case is around the 17th floor of the Zenith Building to the north of the site, compared against the daytime plant noise limits for the site:

Location	Worst Case Cumulative Sound Pressure Level, L_{Aeq} dB	Cumulative limiting noise level for all items of building services plant, L_{Aeq} dB	Assessment outcome
Zenith Building	60	48	+ 12 dB exceedance

Table 3 - Worst case predicted façade noise level

It can be seen from the table above that without mitigation, current plant selections and layouts are expected to exceed the noise limiting criteria at nearby noise sensitive receptors by 12 dB.

5.3 Mitigation measures

In order to meet the noise limits at these nearby noise sensitive receptors, mitigation measures are required. In order to meet the noise limits, it will be necessary to install acoustic enclosures / louvres on the condenser units. The specification of the proposed louvres are reproduced in Table 4 below:

Unit	Accredited Insertion Loss (dB)							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
BAS Louvre 150 mm	6	6	8	10	14	18	15	15

Table 4 – Environ enclosure insertion loss

No other mitigation measures are necessary in order to meet the proposed plant noise limits for the site.

5.4 Assessment with mitigation measures

The mitigation measures detailed in Section 5.3 above were implemented into the noise model. A screenshot of the resulting grid noise map at the same height as previously, but with the mitigation measures installed is presented in Figure 4:



Figure 4 - Mitigated plant noise emissions

Table 5 below shows the highest noise level calculated at the Zenith Building against the criteria set out in Section 4.1.

Location	Worst case cumulative sound pressure level, L_{Aeq} dB	Cumulative limiting noise level for all items of building services plant, L_{Aeq} dB	Assessment outcome
Zenith Building	48	48	Equal to limit

Table 5 - Worst case predicted facade noise levels

5.5 Discussion

As can be seen from the results detailed in Table 5, the worst-case level of sound impact due to new building services plant associated with the new mechanical services installations is predicted to be equal to the plant noise limits and therefore compliant with them, provided the mitigation measures detailed in Section 4.4 are implemented.

6.0

Conclusions

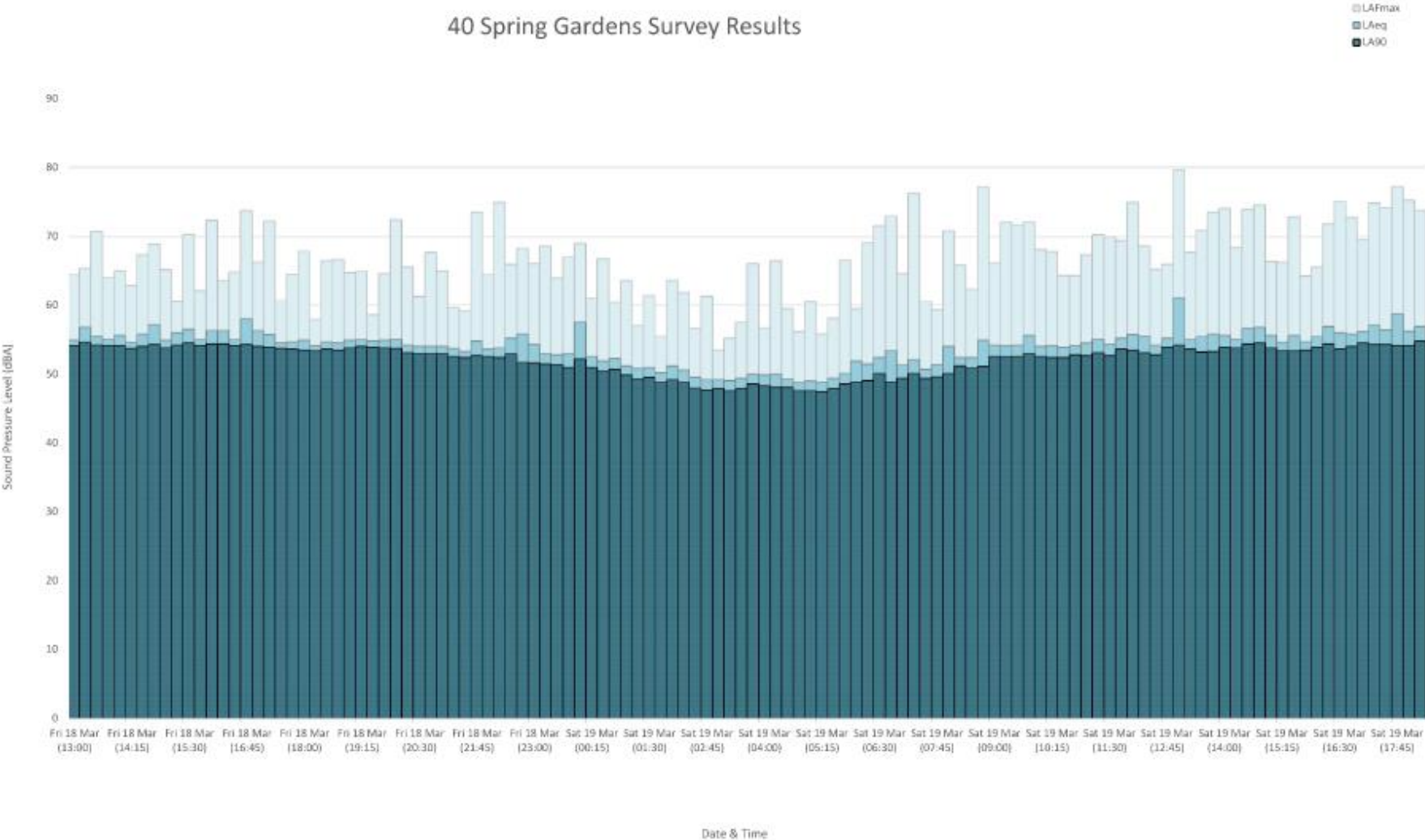
6.0 Conclusions

It is proposed to replace rooftop plant on the commercial office building at 40 Spring Gardens, Manchester, M2 1EN as part of a refurbishment of the site. Installation of a new VRF system will require placement of a number of new condensing units at the site.

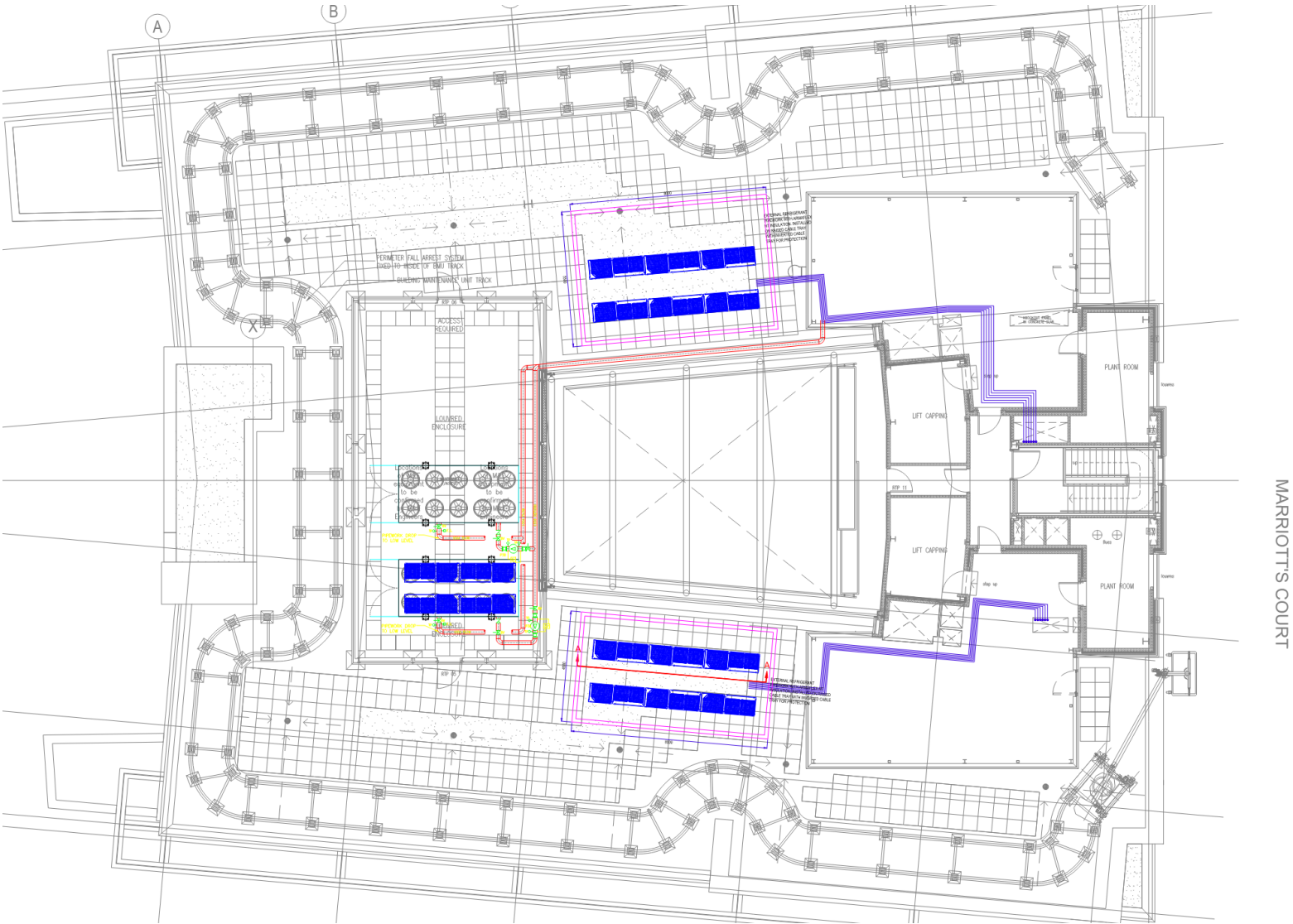
This report has provided details of an undertaken environmental noise survey, set plant noise limits in accordance with the requirements of the Local Planning Authority, and the undertaken noise assessment as well as providing details of appropriate mitigation measures to ensure that the plant noise limits are met with all mechanical services plant in operation.

Appendices

Appendix I Full survey time history graph



Appendix I Rooftop plant layout



Cundall Johnston & Partners LLP

Fourways House 57 Hilton St Manchester M1 2EJ
Tel: +44 (0)161 244 5660

Asia Australia Europe MENA UK and Ireland
www.cundall.com

