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*Consultants in Acoustics, Noise & Vibration*

**13234-R01-B**

**15 July 2013**

# Brabazon House Extension

*Plant noise egress report*

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| Version | Date | Comments | Author | Reviewer |
|---|---|---|---|---|
| A | 12 July 13 | | James Atha | Mark Howarth |
| B | 15 July 13 | Updated drawings | James Atha | Mark Howarth |

# Summary

Sandy Brown Associates LLP (SBA) has been appointed to provide acoustic advice in relation to a proposed extension within the courtyard of Brabazon House, Concord Business Park, Manchester, M22 0EY. Part of the proposed extension includes a new external plant compound on the roof of the extension.

An environmental noise survey has been carried out at the site, with a view to determining the existing background noise levels in the area and the noise egress levels from the existing plant compound.

The noise survey was performed between 11:00 hrs and 12:00 hrs on 2 July 2013.

A previous noise survey was also carried out at the site between 07:00 hrs on 12 September 2011 and 09:15 hrs on 13 September 2011. The results of this survey have also been referenced in this report.

The lowest background noise levels measured in the vicinity of the nearby noise sensitive premises during the noise surveys were $L_{A90,5min}$ 45 dB during the daytime and $L_{A90,5min}$ 42 dB at night.

Based on the levels measured, appropriate plant noise limits have been set outside the nearby noise sensitive premises. Providing the recommended mitigation measures set out in this report are implemented, calculations indicate that plant noise egress levels are expected to comply with the requirements of Manchester City Council.

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# 1 Introduction

Sandy Brown Associates LLP (SBA) has been commissioned by Jones Lang LaSalle to provide acoustic advice in relation to a proposed extension in the Courtyard of Brabazon House, Concord Business Park, Manchester, M22 0EY.

An environmental noise survey has been carried out at the site with the purpose of establishing the existing background noise levels in the vicinity of nearby noise sensitive premises and the noise egress levels from the existing plant compound.

The background noise levels measured enable appropriate limits to be set regarding noise emission from proposed building services plant.

This report presents the survey method, results of the environmental noise survey, and a discussion of acceptable limits for noise emission from building services plant.

# 2 Site description

## 2.1 The site and its surroundings

The site location in relation to its surroundings is shown in Figure 1.




Figure 1 Satellite image of the site with measurement positions indicated (courtesy of Google Earth)

The site consists of an existing office building which is located on Concord Business Park. The closest main road to the site is Shadowmoss Road which is located approximately 240 m to east of the site.

There is an existing plant compound immediately to the north of the building.

### 2.2 Adjacent premises

The nearest residential premises are located on Ashmoor Road, which are approximately 35 m to the northwest of the site, and on Pendeen Close, which are approximately 35 m to the west of the site. These are indicated in Figure 1.

### 2.3 Proposals

An extension is proposed to the ground floor within the central courtyard of the existing Brabazon House building. It is proposed to include meeting rooms and a cafe within the extension, and a plant compound on the roof.

Drawings indicating the extent of the proposals are provided in Appendix C.

## 3 Method

### 3.1 Attended measurements

Attended sample measurements were performed at a three different locations around the site. These are indicated in Figure 1 as positions 1 to 3. The attended measurements were carried out on 2 July 2013, over 5 minute periods at positions 1-3. These measurements were carried out with the purpose of determining the existing noise levels from road traffic, pedestrians and other significant noise sources in the area.

In each case the microphone was mounted on a tripod approximately 1.5 m above the ground level and at least 3 m from any other reflective surface with the exception of measurement 1 which was within the Courtyard.

### 3.2 Previous noise survey

A 24 hour unattended continuous noise logging survey was undertaken at the site to determine the existing background noise levels in the vicinity of nearby noise sensitive premises.

The results and methodology of this noise survey are detailed in '*11191/DR Project Nimbus Brabazon House –Planning acoustic report (Rev02)*' dated 23 September 2011.

The unattended measurements were performed over 5 minute periods between 07:00 hrs on 12 September 2011 and 09:15 hrs on 13 September 2011.

The measurement position used during the survey is indicated in Figure 1 denoted by the letter 'L'.

This location was chosen to be reasonably representative of the noise levels experienced by the nearest noise sensitive premises.

## 3.3 Equipment

A Norsonic Nor118 sound level meter was used to undertake the attended measurements.

The calibration data for the equipment used during the survey is provided in Appendix A to this report.

The sound level meter and microphone was calibrated at the beginning and end of the measurements using a sound level calibrator. No significant deviation in calibration occurred.

## 3.4 Noise indices

The equipment was set to record a continuous series of broadband sound pressure levels. Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{Amax,T}$ The A-weighted maximum sound pressure level that occurred during a given period. Measured using the fast time weighting in accordance with the requirements of BS 8233 : 1999.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background noise level.

The $L_{A90}$ is considered most representative of the background noise level for the purposes of complying with any local authority requirements.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg $L_{A90}$) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

## 3.5 Weather Conditions

During the attended measurements carried out on 2 July 2013, the weather was clear and dry and no rain occurred. The temperature was noted to be 13$^{o}$C and a light breeze was noted.

These weather conditions are considered suitable for obtaining representative measurements.

# 4 Measurement results

## 4.1 Observations

The noise sources observed at the site during the survey consisted of the following:

- Existing plant noise
- Occasional noise from aircraft passing overhead
- Trees occasionally rustling in the breeze
- Car movements on the car parks close to the site.

## 4.2 Attended measurement results

Attended measurements were performed at three locations around the site on 2 July 2013.

The sound pressure levels recorded during these measurements are summarised in Table 1 in terms of the most notable parameters.

The measurements carried out were performed over 5 minute periods.

Table 1 Sound pressure levels from attended measurements

| Position | Start time | Sound pressure levels (dB) | | |
|---|---|---|---|---|
| | | $L_{Aeq,5min}$ | $L_{Amax,5min}$ | $L_{A90,5min}$ |
| 1 | 11:00 | 45 | 62 | 42 |
| | 11:05 | 45 | 55 | 43 |
| | 11:15 | 47 | 58 | 42 |
| 2 | 11:25 | 51 | 63 | 46 |
| | 11:30 | 50 | 63 | 45 |
| | 11:35 | 55 | 74 | 46 |
| 3 | 11:50 | 49 | 57 | 47 |
| | 11:55 | 51 | 61 | 45 |
| | 12:00 | 50 | 58 | 46 |

## 4.3 Previous survey results

A previous unattended noise survey was carried out at the site in September 2011, as detailed in '*11191/DR Project Nimbus Brabazon House –Planning acoustic report (Rev02)*' dated 23 September 2011.

The minimum measured $L_{A90,5mins}$ (dB) octave band sound pressure levels from this noise survey are provided in Table 2.

Table 2 Minimum $L_{A90}$ dB octave band sound pressure levels measured during in September 2011

| Time period | Octave band Centre Frequency (Hz) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k |
| Daytime 07:00-23:00 | 52 | 48 | 42 | 42 | 41 | 34 | 26 |
| Night time 23:00-07:00 | 51 | 46 | 41 | 39 | 37 | 32 | 28 |

The lowest background noise levels measured during the survey were $L_{A90,5min}$ 45 dB during the daytime and $L_{A90,5min}$ 42 dB at night.

A graph showing the results of the unattended measurements is provided in Appendix B of this report.

These minimum background noise levels are consistent with those measured during the survey carried out close to the residential premises on 2 July 2013.

# 5 Noise egress assessment

## 5.1 Manchester City Council

Manchester City Council (MCC) typically stipulates the following criteria in relation to plant noise egress:

"*Before the development hereby approved is occupied, the building, together with any externally mounted ancillary equipment, shall be acoustically insulated in accordance with the scheme submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site/property.*

*Externally mounted ancillary plant, equipment and servicing shall be acoustically treated in accordance with a scheme designed so as to achieve a noise level of 5dB below the existing background (LA90) in each octave band at the nearest noise sensitive location."*

## 5.2 Plant noise limits

Based on the MCC criteria and the measurement results, the cumulative noise level resulting from the operation of all new plant at 1 m from the most affected windows of the nearest noise sensitive premises, should not exceed 5 dB below the minimum external noise levels in octave bands. These limits are set out in Table 3.

Table 3 Plant noise limits at 1 m from the nearest noise sensitive premises

| Time period | Octave band Centre Frequency (Hz) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k |
| Daytime 07:00-23:00 | 47 | 43 | 37 | 37 | 36 | 29 | 21 |
| Night time 23:00-07:00 | 46 | 41 | 36 | 34 | 32 | 27 | 23 |

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), the plant should be designed to achieve a limit 5 dB below those set out above.

## 5.3 Assessment

### *5.3.1 Proposals*

The following plant items are proposed to a rooftop plant area as part of the development:

- 1 x Servery/Restaurant air handling unit
- 1 x Meeting room air handling unit
- 1 x Ground floor VRF condenser unit
- 1 x Servery/Restaurant AHU condenser unit
- 1 x Meeting room AHU condenser unit
- 1 x Meeting room VRF condenser unit

The noise data received for these units is provided in Appendix C along with the proposed rooftop plant layout and a section through the plant area.

### *5.3.2 Acoustic louvres*

Acoustic louvres are proposed to the rooftop plant compound. It is recommended that they be selected to provide the following minimum performance:

Table 4 Acoustic louvre performance

| | Octave band centre frequency (Hz) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k |
| Minimum sound level difference, *D* (dB) | 6 | 7 | 10 | 12 | 18 | 18 | 14 |

The above can typically be provided by a 300 mm thick acoustic louvre.

### *5.3.3 Noise egress calculations*

Calculations have been carried out to determine the noise egress levels from the proposed plant outside the nearest noise sensitive premises. The calculations take into account the losses from the acoustic louvres set out above, losses for the silencers within the casing to the AHUs, distance attenuation, and screening from the pitched roof that surrounds the plant area.

Calculated noise egress levels outside the nearest noise sensitive premises are provided in Table 5.

Table 5 Calculated noise egress levels ($L_{eq}$ dB) at site boundary with nearby noise sensitive premises

| Location | Octave band Centre Frequency (Hz) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k |
| Ashmoor Road, $L_{eq}$ (dB) | 28 | 25 | 18 | 14 | 5 | 6 | 8 |
| Pendeen Close, $L_{eq}$ (dB) | 25 | 22 | 15 | 11 | 3 | 3 | 6 |

### *5.3.4 Assessment*

The calculated noise egress levels shown in Table 5 are at least 13 dB below the plant noise limits shown in Table 3. They therefore comply with the requirements of MCC.

# 6 Conclusion

A noise survey has been carried out to determine the existing background noise levels in the vicinity of the site and surrounding noise sensitive premises. The minimum measured background noise levels were $L_{A90,5min}$ 45dB during the day, and $L_{A90,5min}$ 42 dB during the night.

Plant noise limits in octave bands have been set at the worst affected existing noise sensitive premises based on the measurements and the requirements of Manchester City Council.

These limits are cumulative, and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, the limits will be 5 dB more stringent than those set out above.

An assessment of the proposed plant items associated with the development has been carried out. As long as the recommended mitigation measures are incorporated within the design, the proposed plant items are expected to comply with the relevant noise limits.

# Appendix A

## Equipment calibration information

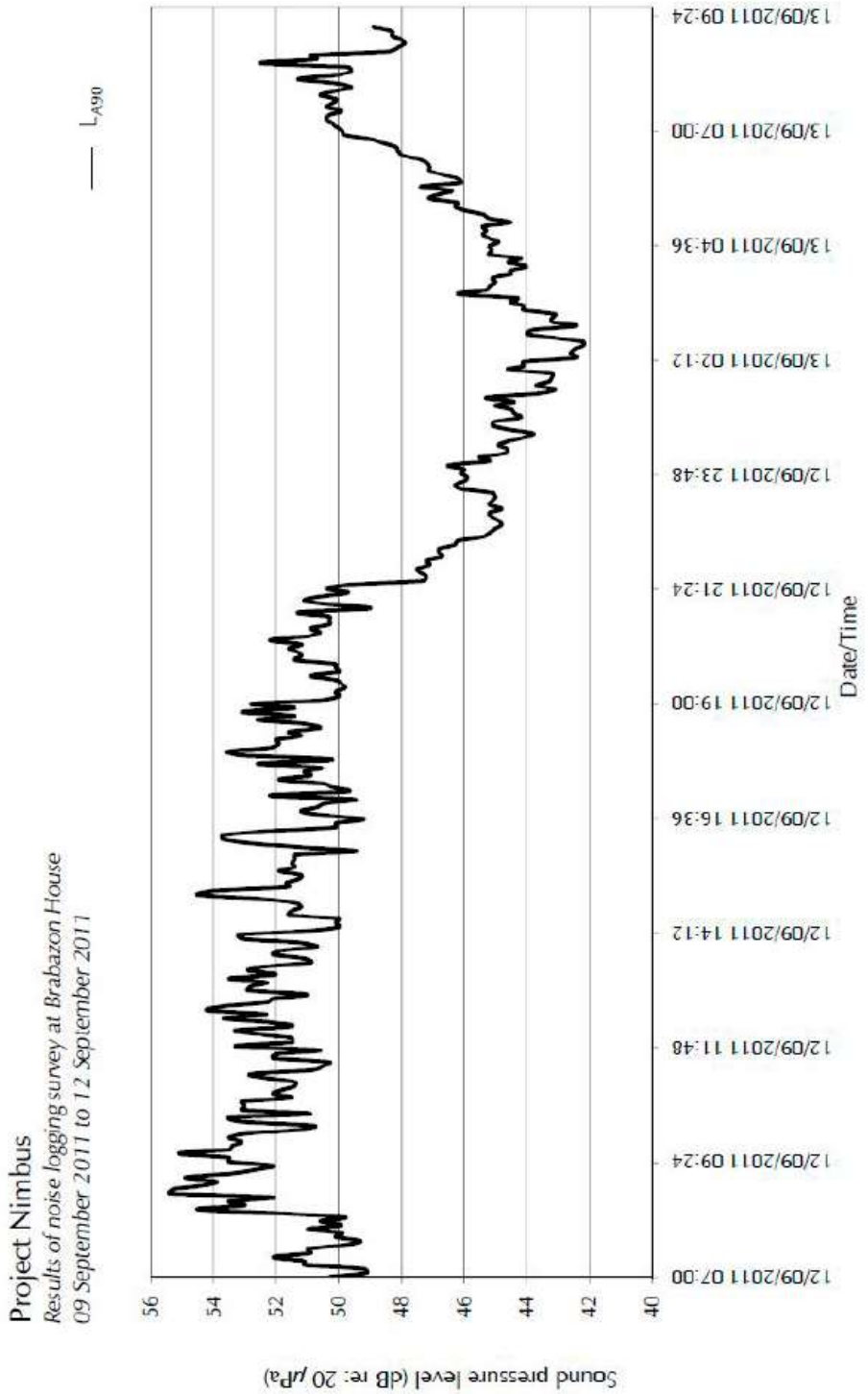
Table A1 Equipment calibration data

| Equipment description | Type/serial number | Manufacturer | Calibration expiry | Calibration certification number |
|---|---|---|---|---|
| Sound Level Meter | Nor118/31754 | Norsonic | 3 July 2014 | 1207294 |
| Calibrator | 1251/31322 | Norsonic | 3 July 2014 | 1207293 |

Calibration of the sound level meter used for the tests is traceable to national standards. The calibration certificates for the sound level meter used in this survey are available upon request.

# Appendix B

## Results of unattended measurements at Location L


Project Nimbus
Results of noise logging survey at Brabazon House
09 September 2011 to 12 September 2011
$L_{A90}$
Sound pressure level (dB re: 20 μPa)
56
54
52
50
48
46
44
42
40
12/09/2011 07:00
12/09/2011 09:24
12/09/2011 11:48
12/09/2011 14:12
12/09/2011 16:36
12/09/2011 19:00
12/09/2011 21:24
12/09/2011 23:48
13/09/2011 02:12
13/09/2011 04:36
13/09/2011 07:00
13/09/2011 09:24
Date/Time

# Appendix C

## Plant information

| MODEL | U-14ME1E8(E) |
|---|---|
| SOUND LEVEL dB(A) (Cooling/Heating) | 62.0 (Quiet mode 59.0) |
| CONDITION | 1 m in front at height of 1.5 m |

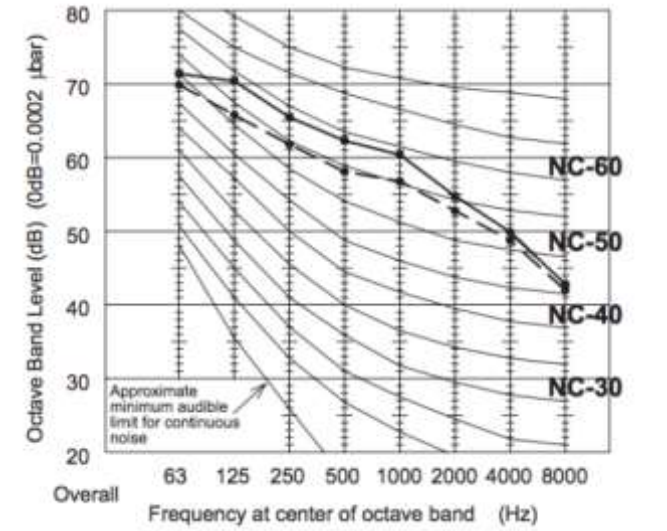



Figure 2 Servery AHU Condenser – Noise data

| | |
|---|---|
| MODEL | : U-71PE1E5 |
| SOUND LEVEL | : Heating 50 dB(A) |
| CONDITION | : 1 m in front at height of 1.5 m |
| SOURCE | : 220-230-240V, 1 phase, 50Hz |

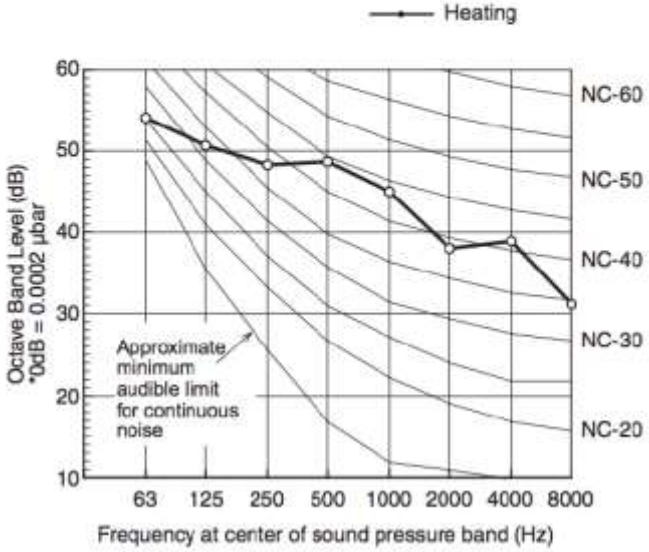



Figure 3 Meeting room AHU Condenser – Noise data

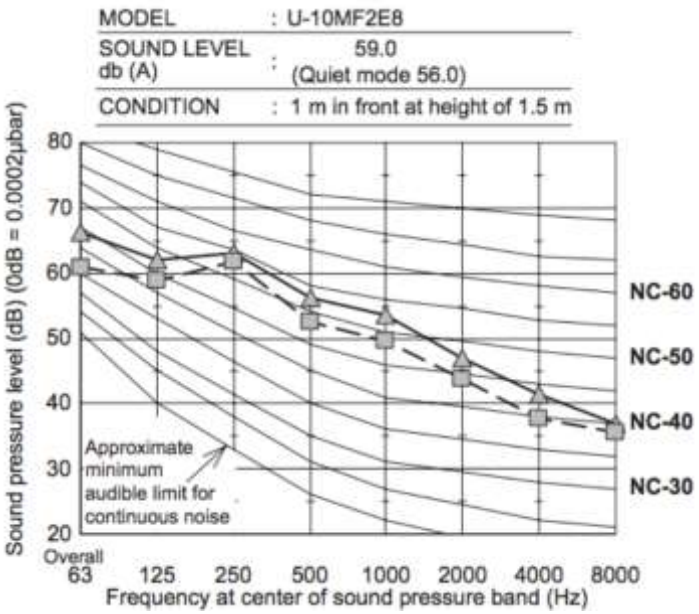



Figure 4 Open plan VRF condenser – Noise data

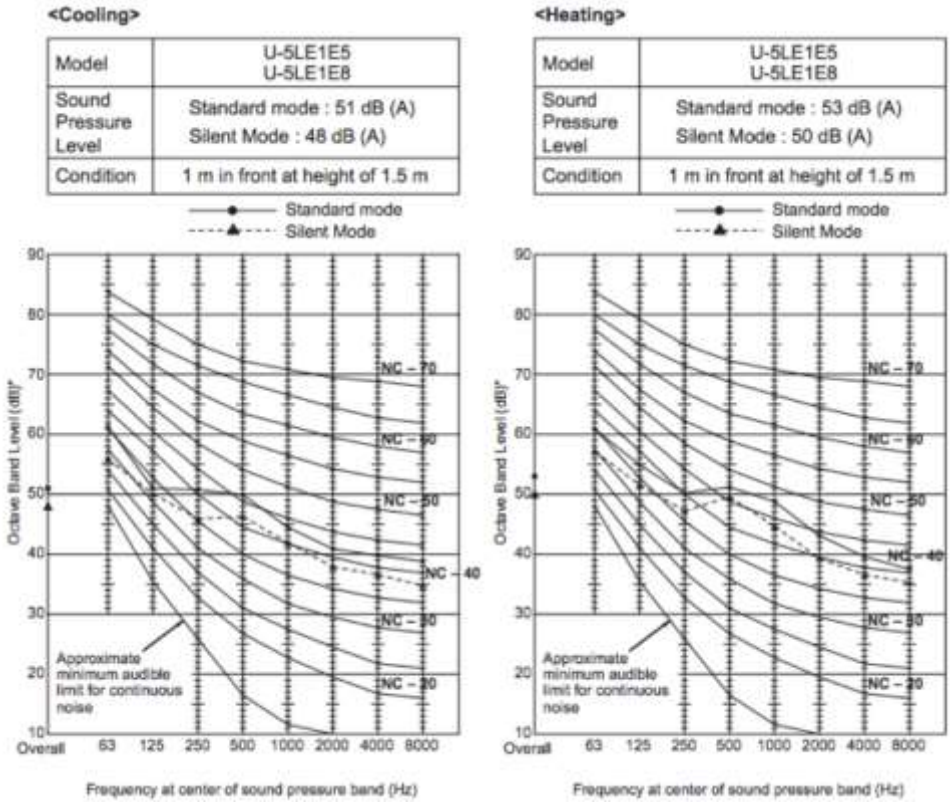



Figure 5 Meeting room VRF condenser – Noise data

Sound power level

| Frequency band | Hz | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | | All | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| To supply air duct | | 70 | 62 | 48 | 49 | 50 | 54 | 52 | 50 | dB | 59 | dB(A) |
| To outdoor air duct | | 65 | 58 | 41 | 42 | 31 | 35 | 31 | 31 | dB | 46 | dB(A) |
| To surroundings | | 64 | 57 | 45 | 47 | 36 | 34 | 29 | 29 | dB | 47 | dB(A) |
| To surroundings incl. exh. air | | 66 | 59 | 47 | 49 | 38 | 36 | 31 | 31 | dB | 49 | dB(A) |

Sound power level

| Frequency band | Hz | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | | All | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| To extract air duct | | 62 | 55 | 38 | 39 | 28 | 32 | 28 | 28 | dB | 43 | dB(A) |
| To exhaust air duct | | 68 | 60 | 47 | 49 | 50 | 54 | 52 | 50 | dB | 59 | dB(A) |
| To surroundings | | 61 | 54 | 42 | 44 | 33 | 31 | 26 | 26 | dB | 44 | dB(A) |

Figure 6 Meeting room AHU – Noise data

Sound power level

| Frequency band | Hz | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | | All | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| To supply air duct | | 70 | 63 | 56 | 57 | 54 | 58 | 56 | 56 | dB | 64 | dB(A) |
| To outdoor air duct | | 70 | 65 | 56 | 46 | 38 | 40 | 38 | 42 | dB | 53 | dB(A) |
| To surroundings | | 67 | 59 | 52 | 56 | 41 | 40 | 37 | 40 | dB | 55 | dB(A) |
| To surroundings incl. exh. air | | 70 | 62 | 55 | 59 | 44 | 43 | 40 | 43 | dB | 58 | dB(A) |

Sound power level

| Frequency band | Hz | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | | All | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| To extract air duct | | 69 | 64 | 55 | 45 | 37 | 39 | 37 | 41 | dB | 52 | dB(A) |
| To exhaust air duct | | 74 | 65 | 58 | 61 | 58 | 62 | 62 | 63 | dB | 69 | dB(A) |
| To surroundings | | 66 | 58 | 51 | 55 | 40 | 39 | 36 | 39 | dB | 54 | dB(A) |

Figure 7 Servery AHU – Noise data

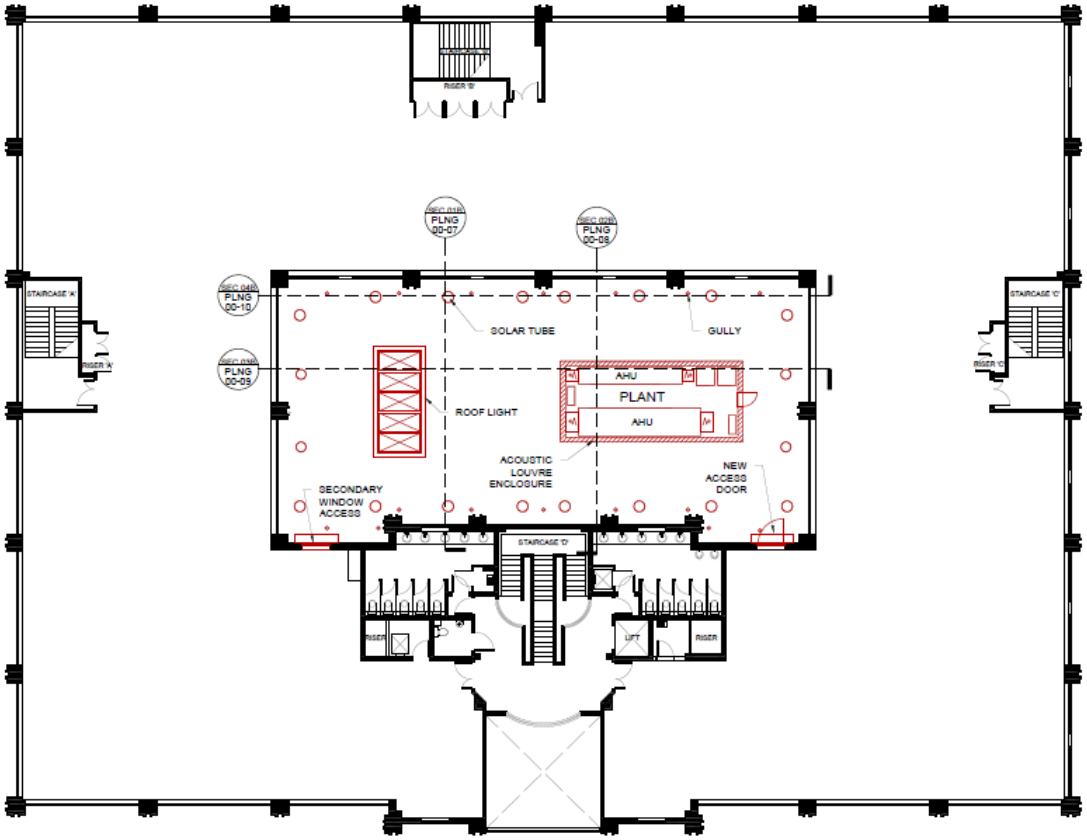



Figure 8 Proposed rooftop plant layout




Figure 9 Section through plant area