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ROYAL ACADEMY OF DRAMATIC ART, 16-18 CHENIES STREET, CAMDEN, LONDON

PLANT NOISE IMPACT ASSESSMENT

Technical Report: R6861-1 Rev 1

Date: 30th October 2018

For: Royal Academy of Dramatic Art
16-18 Chenies Street
London
WC1E 7EX

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Project Title: Royal Academy of Dramatic Art, 16-18 Chenies Street, Camden, London
Plant Noise Impact Assessment

Report Ref: R6861-1 Rev 1

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0	Approved for Issue	John Edhouse	Steve Gosling
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EXECUTIVE SUMMARY

24 Acoustics Ltd has been instructed by the Royal Academy of Dramatic Art to undertake an assessment of the noise impact associated with proposed plant at 16-18 Chenies Street, London.

A survey of background noise measurements was undertaken between 2nd and 8th September 2015.

Noise limit criteria have been established following guidance provided by the local planning authority, Camden Council.

Based on the outline mechanical services plan, the assessment has indicated that noise from the proposed plant will meet the defined noise level criteria for day, evening and night time periods. Further review and calculations should be undertaken during detailed design to specify any additional mitigation measures necessary to meet the defined noise limit criteria.

CONTENTS

1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been instructed by the Royal Academy of Dramatic Art to undertake a noise impact assessment at 16-18 Chenies Street, Camden, London in relation to plant associated with proposed extension and refurbishment works at the site.

1.2 This report has addressed an updated scheme of plant and mechanical services following changes to the originally submitted scheme of works (Planning Reference: 2015/5759/P). Planning permission is sought for the installation of proposed plant related to the revised scheme. Proposals include removal of several existing plant units at the site and replacement with new systems to provide ventilation, comfort heating/cooling and air extraction (e.g. to kitchen areas).

1.3 Background noise measurements have been undertaken at the site between 2nd and 8th September 2015. This report has assessed the impact of noise from proposed plant at the nearest sensitive properties.

1.4 All noise levels in this report are quoted in dB relative to 20 μPa.

2.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 The Royal Academy of Dramatic Art, 16-18 Chenies Street is located in a mixed residential and commercial area of Camden, London. Chenies Street bounds the site to the north west. The existing building comprises five storeys including a basement level. The building contains a mixture of uses including; office areas, teaching areas, theatre spaces, rehearsal rooms.

2.2 It is proposed to demolish and rebuild at the rear of 18 Chenies Street and demolish and extend at the rear of 16 Chenies Street. Air handling and air conditioning plant at the existing site has been reviewed and a scheme replacing and upgrading services plant to the site has been specified.

2.3 Planning consent was sought from Camden Borough Council for the original scheme of works in November 2015 (Planning Reference: 2015/5759/P). The original scheme has been updated to include detailed design of plant and mechanical services. This noise impact assessment has therefore been prepared to consider noise impact associated with the operation of proposed plant.

2.4 It is understood that the new plant units will be located externally at basement level at the rear of 18 Chenies Street and at first floor roof level to the rear of 16 Chenies Street. In addition, plant will be located externally at third floor level to the rear of 16 Chenies Street within a new plant enclosure area. Air handling plant will be located internally at basement level at the rear of 18 Chenies Street.

2.5 The nearest residential properties adjacent to the proposed plant are located north east at 25 Ridgmount Street (Receptor 1) and to the south at the top floor level of Rossetti Court (Receptor 2). The majority of surrounding properties to the site comprise offices. The nearest offices to the proposed plant are located west in Whittington House, 19-30 Alfred Place (Receptor 3) and south at 23 Ridgemount Place (Receptor 4). Noise from road traffic is the dominant source of background noise at the nearest sensitive properties, however, noise from plant associated with properties at Chenies Street and adjacent properties also contribute to the surrounding noise environment.

2.6 Figure 1 shows the site location and receptor locations. Figure 2 shows the proposed basement plan. Figure 3 shows the proposed first floor plan. Figure 4 shows the proposed third floor plan.

3.0 DEVELOPMENT SITE PLANNING CONSENT AND CONDITIONS

NPPF

3.1 The National Planning Policy Framework (NPPF) [Reference 1] states that planning policies and decisions should ensure that new development is appropriate for its location taking into account the likely 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:

- 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 quality of life;
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

3.2 The NPPF refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision 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' which is supported by the following aims.

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life.

Local Planning Authority – Camden Council

3.3 The Local Planning Authority, Camden Council, advises that noise arising from plant and machinery should be assessed in line with DP28 of Camden's Development Policies [Reference 3].

3.4 Table E of DP28 details noise limits for plant which should not be exceeded at the nearest sensitive properties. Table E states that for plant which does not have a distinctive tonal or impulsive noise character, noise from the plant should be 5 dB below the background noise level (L_{A90}) 1 metre from the nearest sensitive facade. For noise which does have a distinctive tonal or impulsive nature the plant noise level must be set 10 dB below the background noise level (L_{A90}) 1 metre from the nearest sensitive façade. The daytime

period is assessed between 0700-1900 hours, evening period between 1900-2300 hours and night time period between 2300-0700 hours.

British Standard 4142:2014

3.5 BS 4142:2014 [Reference 4] provides a method for rating the effects of industrial and commercial sound on residential areas. The standard advocates a comparison between the typical measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact again depending on the context. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact (depending upon the context).

4.0 ASSESSMENT METHODOLOGY

4.1 The following assessment methodology has been used:

i. A background noise survey has been undertaken to determine existing levels of background noise at the nearest sensitive properties during proposed plant operating hours;
ii. Calculations of the noise level from plant at the nearest noise sensitive properties;
iii. An assessment of the likely noise impact has been undertaken in accordance with Local Planning Authority criteria and the guidance of BS 4142.

5.0 AMBIENT NOISE MEASUREMENTS

Background Survey

5.1 Noise measurements were undertaken to determine the existing background noise level at the nearest sensitive properties. Noise monitoring equipment was located at roof level of 18 Chenies Street immediately adjacent to residential properties to the east. This location is considered representative of the background noise levels at the nearest noise sensitive properties in the surrounding area. Measurements were undertaken in samples of 5 minutes in terms of the overall free-field A-weighted L_{eq}, L_{90} and $L_{max,f}$ noise levels. Noise measurements were undertaken between 2nd and 8th September 2015.

5.2 The survey location is shown in Figure 1. The survey was undertaken with the following instrumentation:

- Rion NL32 Class 1 accuracy sound level meter;
- Bruel and Kjaer Type 4231 Class 1 accuracy acoustic calibrator.

5.3 The instrumentation was calibrated before and after the survey in accordance with the manufacturer's instructions. No significant drift in calibration was recorded. All instrumentation was fitted with environmental weather shields during the survey.

5.4 Weather conditions during the survey were mostly fine and dry. Short periods of rain occurred on the 3rd September. Measurements relating to these short periods of rain have been removed from the data prior to analysis. Wind speeds were typically lower than 5 m/s during the measurements.

5.5 The results of the background noise survey are summarised below in Table 1 and shown graphically in Appendix B.

Date	Daytime Level (07:00 - 19:00) dB	Evening Level (19:00 – 23:00) dB	Night-time Level (23:00 – 07:00) dB
	Minimum $L_{A90, 1\ hour}$	Minimum $L_{A90, 1\ hour}$	Minimum $L_{A90, 15\ min}$
Wed 2nd Sept	54	53	52
Thu 3rd Sept	54	53	52
Fri 4th Sept	54	53	52
Sat 5th Sept	54	53	52
Sun 6th Sept	53	52	52
Mon 7th Sept	54	53	52
Tue 8th Sept	55	-	-
Noise Level	**54**	**53**	**52**

Table 1: Measured Noise Levels, 16-18 Chenies Street – Free field conditions

5.6 Background noise measurements are considered representative of noise levels at the nearest sensitive properties. Noise from road traffic noise and existing plant were the dominant sources of background noise in the surrounding area, however, nearby commercial activities also contributed to background noise levels.

Assessment

5.7 Where plant does not contain a distinctive or tonal in noise character, based upon the requirements of the Local Planning Authority (as described in Section 3.4), noise from the plant should not exceed the following level as measured at 1m from the nearest noise sensitive window:

07:00 – 19:00 hours	49 dB $L_{Aeq, 1\ hour}$
19:00 – 23:00 hours	48 dB $L_{Aeq, 1\ hour}$
23:00 – 07:00 hours	47 dB $L_{Aeq, 15\ min}$

6.0 CALCULATIONS AND NOISE IMPACT ASSESSMENT

6.1 The proposed plant at basement level at the rear of 18 Chenies Street comprises two internally installed air handling units. The air handling unit supply and extracts are ducted through the southern façade to vent within the rear basement lightwell and at ground floor level to the rear. Four externally installed VRV air conditioning units are proposed for installation also in the basement level lightwell at the rear of 18 Chenies Street. In addition, a refectory kitchen air extract fan located internally will vent via ducting that extends to roof level from the basement level light well. Details of the kitchen extract fan are not yet known, however, provision for attenuators either side of the fan have been allowed to reduce noise levels as required. The location of plant within the basement level lightwell provides acoustic screening to the nearest noise sensitive receptors.

6.2 Plant proposed externally at first floor roof level at the rear of 16 Chenies Street comprises two air handling units and a VRV air conditioning unit. The rooftop topography and adjacent buildings provides significant acoustic screening from plant at first floor roof level to the nearest noise sensitive receptors.

6.3 The proposed plant at the rear of 16 Chenies Street comprises two air handling units and two VRV air conditioning units located externally within a plant enclosure at third floor level. The proposed plant at the rear of 16 Chenies Street will serve theatre and library areas.

6.4 It is understood that the air handling units and kitchen extract fan will operate during daytime and evening periods. The VRV plant units have the potential to operate during daytime, evening and night time periods. A summary of proposed plant is provided in Table 2.

No.	Plant Reference	Model No.	Location
1	VRV 1	Mitsubishi PUHY-P750	Rear of no. 16 Library Rooftop Plant Area
2	VRV 2	Daikin RXYSQ6TY1	Rear of no. 16 Library Rooftop Plant Area
3	VRV 3	Daikin RXYSQ12TY1	Rear of no. 16 West Aperture
4	VRV 4	Daikin RXYSQ12TY1	Basement no. 18
5	VRV 5	Daikin RXYSQ12TY1	Basement no. 18
6	VRV 6	Daikin RXYSQ12TY1	Basement no. 18
7	VRV 7	Daikin RXYSQ12TY1	Basement no. 18
8	AHU 1	Bespoke system inc. Ziehl Abegg Supply and Extract Fans and Daikin RYYQ16T heat pump	Rear of no. 16 Library Rooftop Plant Area
9	AHU 2	Bespoke system inc. Ziehl Abegg Supply and Extract Fans	Rear of no. 16 Library Rooftop Plant Area
10	AHU 3	Bespoke system inc. Ziehl Abegg Supply and Extract Fans	Rear of no. 16 West Aperture
11	AHU 4	Bespoke system inc. Ziehl Abegg Supply and Extract Fans	Rear of no. 16 East Aperture
12	AHU 5	Bespoke system inc. Ziehl Abegg Supply and Extract Fans	Basement no. 18
13	AHU 6	Bespoke system inc. Ziehl Abegg Supply and Extract Fans	Basement no. 18
14	Refectory Kitchen Extract	Details to be confirmed	Rear of no. 18

Table 2: Calculation Results Summary

6.5 The location of proposed plant units is shown in Figures 2, 3 and 4.

6.6 Manufacturers' noise level information for the proposed air conditioning plant (VRV units) is shown in Table 3.

Model	Sound Pressure Level at 1m (dB) per Octave Band Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Mitsubishi PUHY-P750	77	72	68	65	59	51	46	41	66
Daikin RXYSQ6TY1	51	53	51	48	46	43	38	28	51
Daikin RXYSQ12TY1	67	61	57	54	52	49	43	36	57
Daikin RYYQ16T	69	68	67	62	57	53	47	42	64

Table 3: Plant sound pressure levels at 1m - Manufacturer's noise data

6.7 Manufacturers' noise level data for proposed AHU supply and extract fans is shown in Table 4.

Model	Sound Pressure Level at 1m (dB) per Octave Band Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
AHU 1 - Extract Fan	65	69	77	75	73	67	65	66	77
AHU 1 - Supply Fan	60	69	74	67	67	64	61	59	72
AHU 2 - Extract Fan	60	64	70	68	72	62	58	51	73
AHU 2 - Supply Fan	55	61	62	60	61	53	51	49	64
AHU 3 - Extract Fan	56	57	66	65	66	62	58	55	70
AHU 3 - Supply Fan	58	55	66	63	59	58	56	53	66
AHU 4 - Extract Fan	63	64	67	63	63	61	56	49	68
AHU 4 - Supply Fan	69	66	69	65	58	57	55	50	66
AHU 5 - Extract Fan	62	62	71	71	74	65	61	59	76
AHU 5 - Supply Fan	61	59	73	66	66	64	62	60	72
AHU 6 - Extract Fan	60	59	71	68	71	64	61	60	74
AHU 6 - Supply Fan	61	58	72	65	66	63	60	62	71

Table 4: AHU Fan Sound Pressure Levels at 1m

6.8 Calculations have been undertaken to determine the noise level from proposed plant at the nearest sensitive properties based on the mechanical services outline design as described above. Due to the relatively large distances between proposed plant units at the site and significant acoustic screening from surrounding buildings calculations have included the closest proposed plant units only to each receptor location. Plant units not included in each respective calculation are considered insignificant to the overall resultant noise level due to distance and screening corrections.

6.9 In this instance noise from the proposed plant will be continuous and contain no distinctive tones when assessed at the nearest sensitive property due to the high level of ambient noise from road traffic and existing plant which will assist in masking noise from the plant and comprises a similar noise character. For this reason, it is not considered necessary to apply a penalty correction for noise character.

6.10 Calculations results are summarised in Table 5.

Location	Calculated Noise Level L_{Aeq}, dB		
	Daytime Level (07:00 - 19:00)	**Evening Level (19:00 – 23:00)**	**Night-time Level (23:00 – 07:00)**
Receptor 1: 25 Ridgemount Street	46	46	31
Receptor 2: Rossetti Court	46	46	40
Receptor 3: Whittington House	46	46	32
Receptor 4: 23 Ridgemount Place	46	46	31

Table 5: Calculation Results Summary

6.11 Calculations indicate noise from proposed plant will not exceed upper noise levels as described in Section 5.7 for day, evening and night time periods in accordance with local planning authority criteria. Noise from proposed plant is therefore considered acceptable.

7.0 CONCLUSIONS

7.1 24 Acoustics Ltd has been instructed by the Royal Academy of Dramatic Art to undertake an assessment of the noise impact associated with proposed plant at The Royal Academy of Dramatic Art, 16-18 Chenies Street, London.

7.2 Assessment of noise from the plant has been undertaken following background noise measurements at the site undertaken between 2nd and 8th September 2015.

7.3 Upper noise limit criteria have been established following guidance provided by the local planning authority, Camden Council.

7.4 Based on the proposed mechanical services plan, the assessment has determined that noise from the plant will not exceed the determined upper noise levels for day, evening and night time periods in accordance with local planning authority criteria.

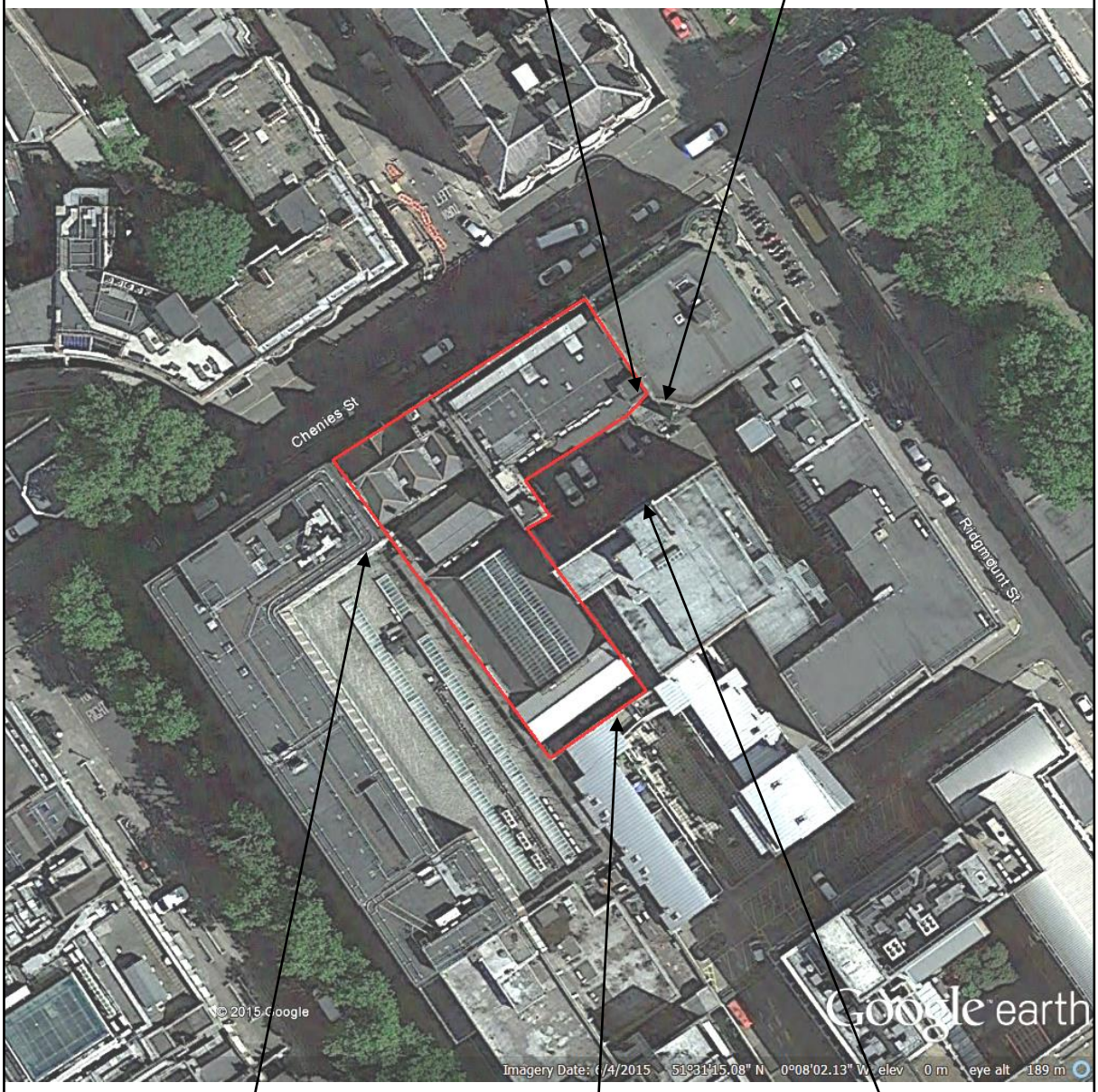
REFERENCES

1. National Planning Policy Framework, Department for Communities and Local Government, 2018.

2. Noise Policy Statement for England, Defra, 2010.

3. London Borough of Camden. Local Development Framework, Development Policies (DP28 – Noise and Vibration), 2010.

4. British Standards Institution. British Standard 4142: Methods for rating and assessing industrial and commercial sound, 2014.



Project: 16-18 Chenies Street	**Description:** Site location and noise measurement locations	
DWG No: Figure 1	**Scale:** N.T.S.	**Rev:** A
Date: June 2017	**Drawn By:** JE	**Job No:** 6861-1

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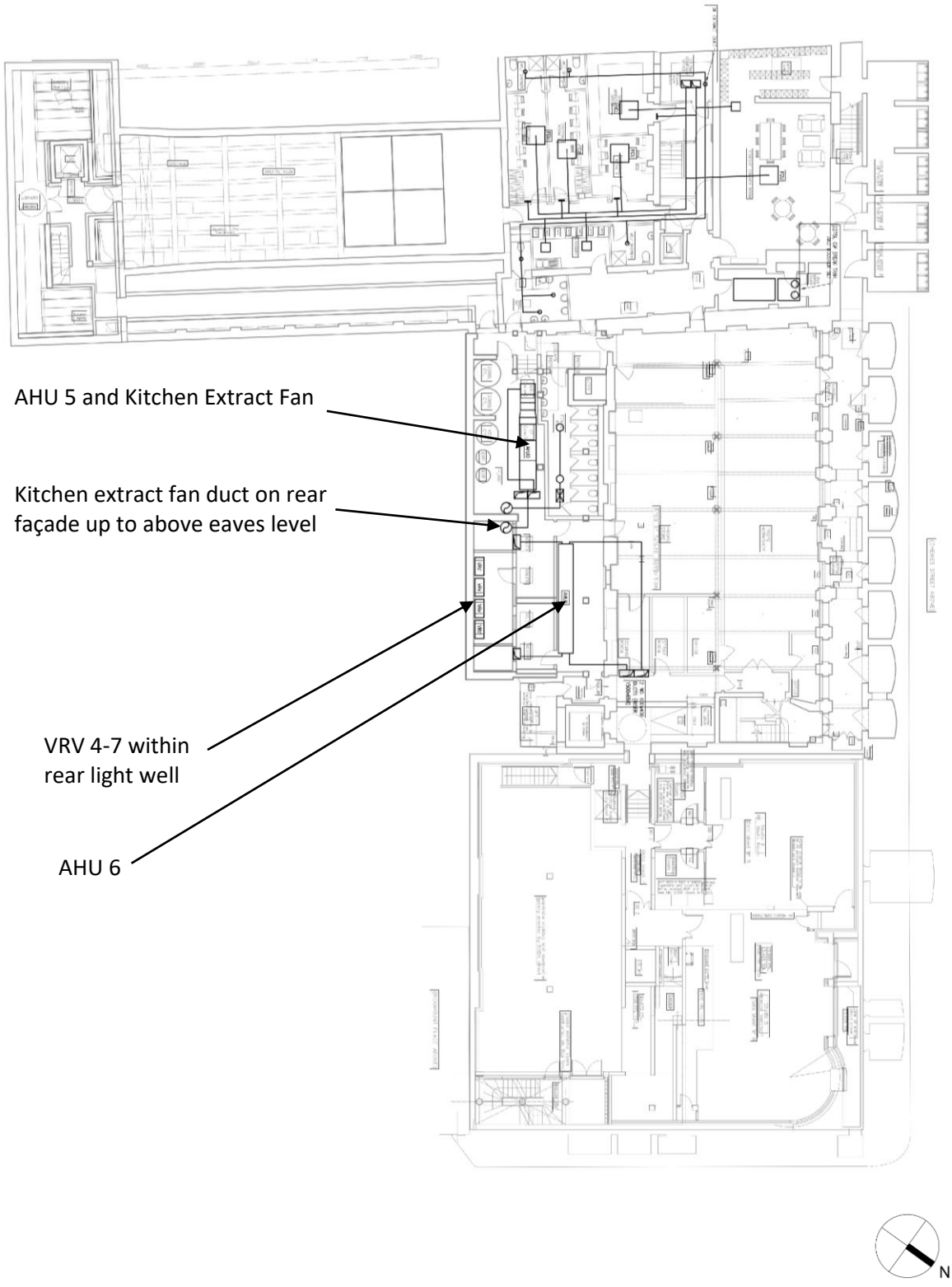

Project: 16-18 Chenies Street	**Description:** Proposed Basement Level Plan	
DWG No: Figure 2	**Scale:** N.T.S.	**Rev:** A
Date: June 2017	**Drawn By:** JE	**Job No:** 6861-1

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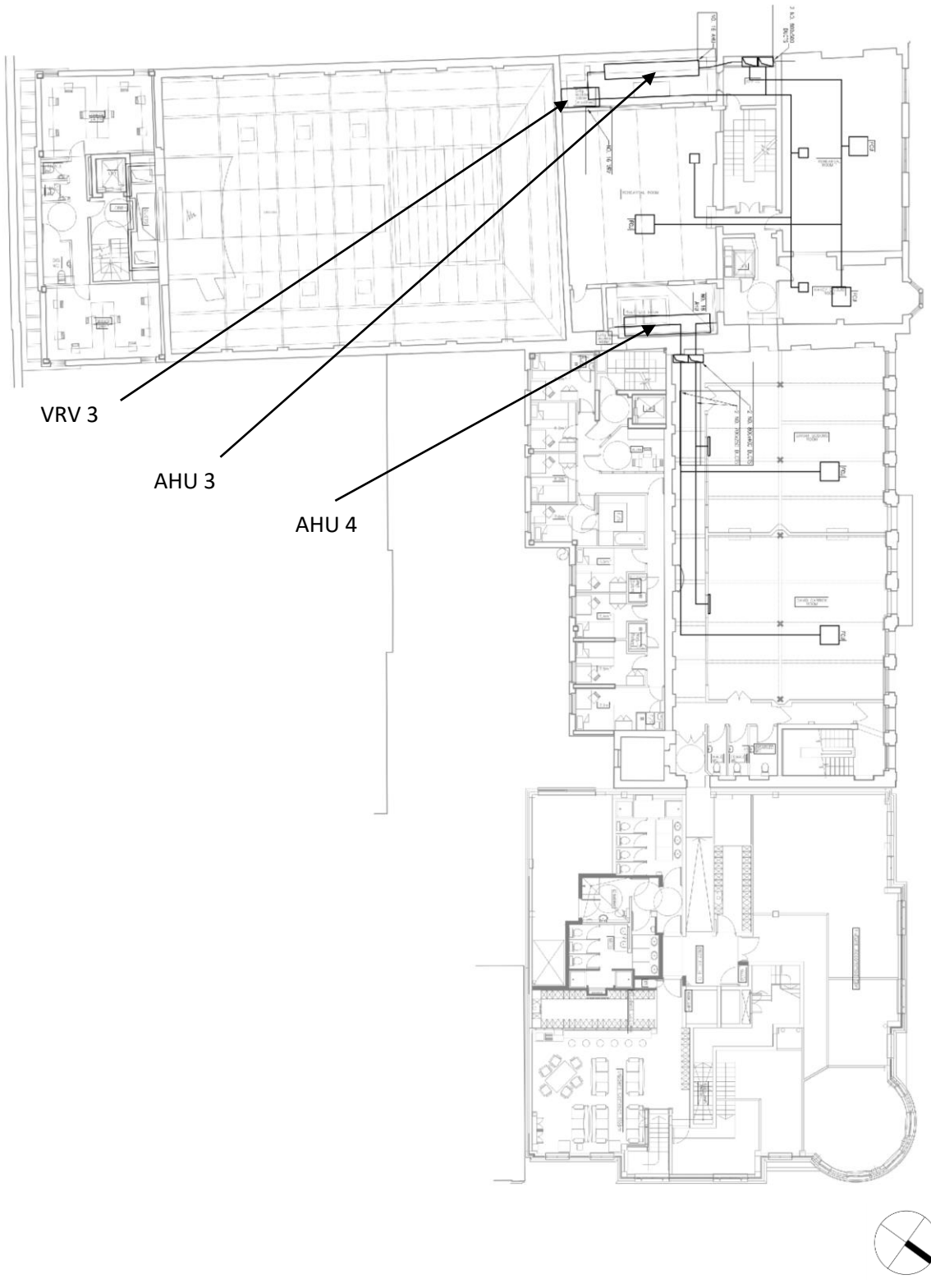

Project: 16-18 Chenies Street	**Description:** Proposed First Floor Level Plan	
DWG No: Figure 3	**Scale:** N.T.S.	**Rev:** A
Date: June 2017	**Drawn By:** JE	**Job No:** 6861-1

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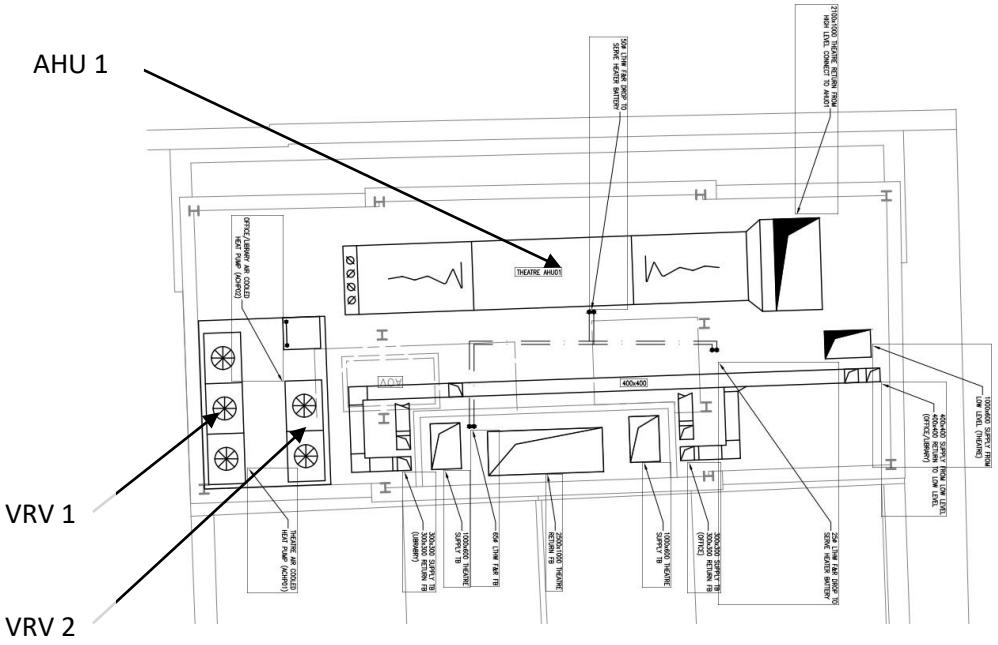
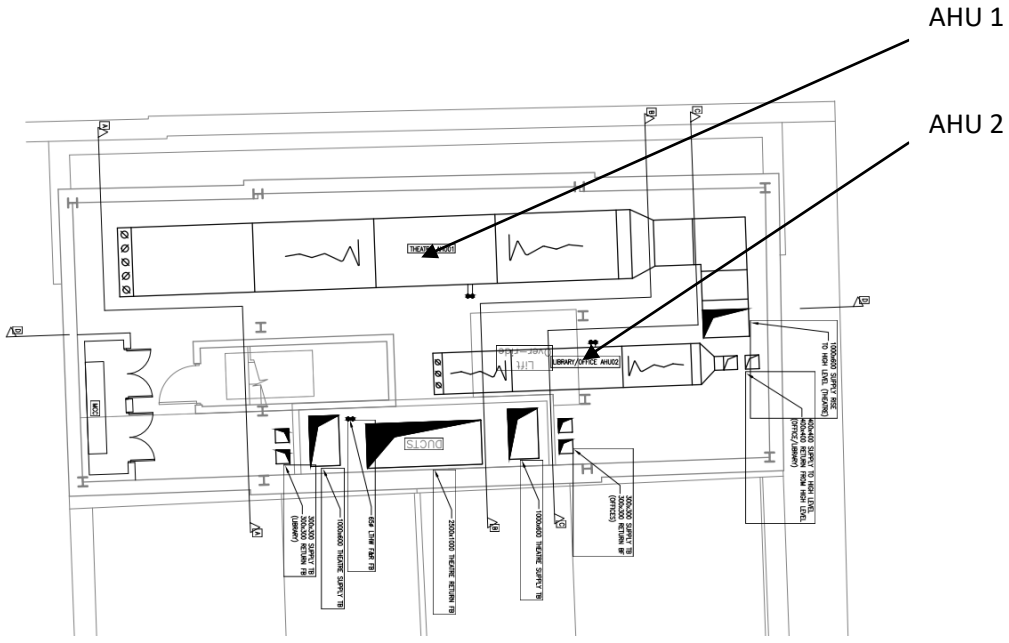


Upper Level – Plant Area



Lower Level – Plant Area

N

Project: 16-18 Chenies Street	**Description:** Proposed Third Floor Level Plan	
DWG No: Figure 4	**Scale:** N.T.S.	**Rev:** A
Date: June 2017	**Drawn By:** JE	**Job No:** 6861-1

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APPENDIX A: NOISE UNITS

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in important by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dB(A) weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB(A) is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB(A). The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB(A) corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time internal, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

APPENDIX B: AMBIENT NOISE MEASUREMENT RESULTS

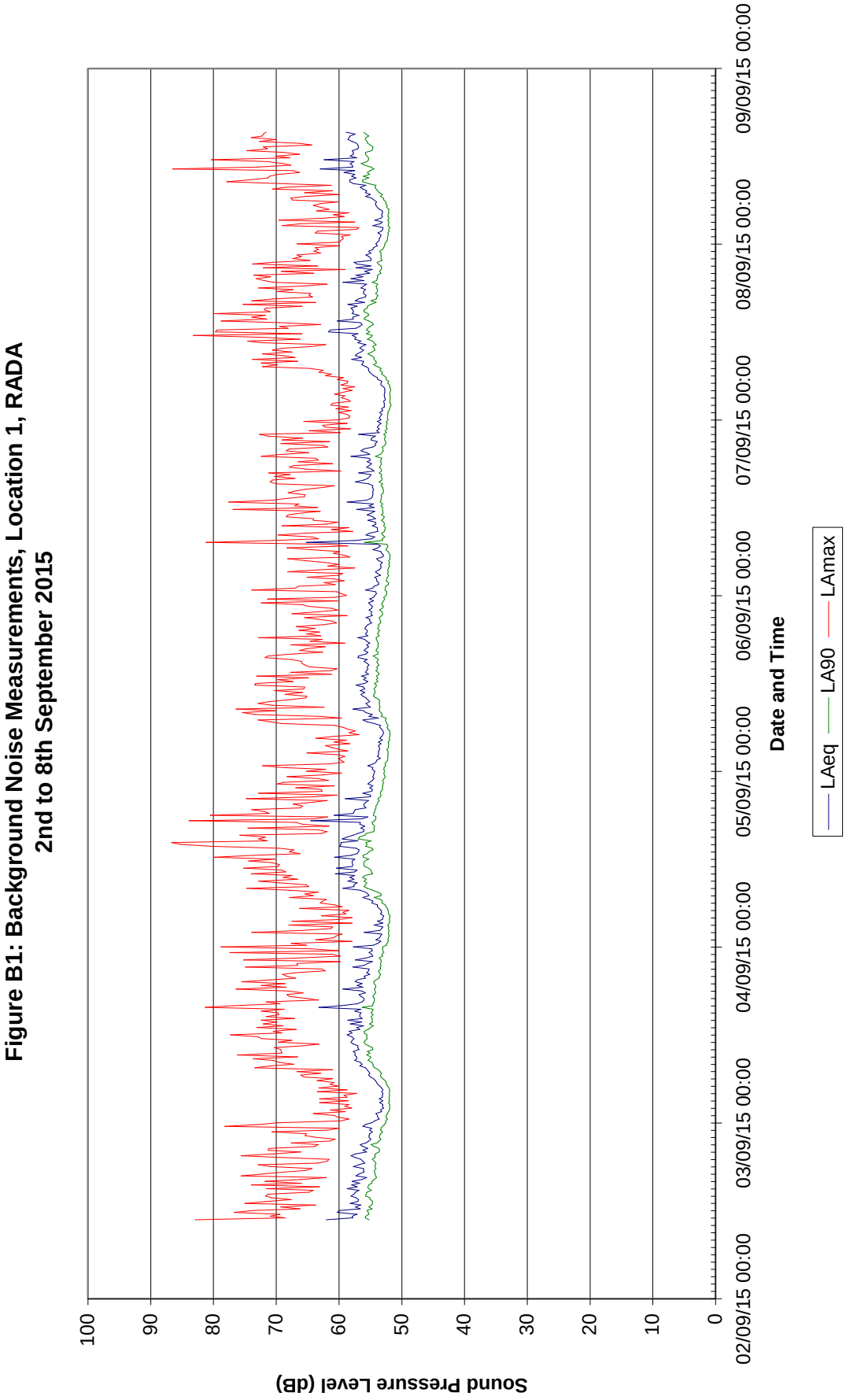

Figure B1: Background Noise Measurements, Location 1, RADA
2nd to 8th September 2015