Cole Jarman

GOSH Main Nurses Home, Guilford Street

Plant Noise Assessment

Report 206/0282/R1

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Great Ormond Street Hospital for Children

Great Ormond Street Hospital for Children NHS Foundation Trust

Mezzanine Floor
40 Bernard Street
London
WC1N 1LE

Revision	Description	Date	Prepared	Approved
0	First Issue	9th September 2021	Fred Davies	Alex Stronach
1	Minor amendments	27th September 2021	Fred Davies	Alex Stronach

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Attachments

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Plant Noise Assessment

1 Introduction

1.1 It is proposed to refurbish the 8th and 9th floors of the main nurses' house at Great Ormond Street Hospital for Children, Guilford Street, London WC1N 3JH. As part of this refurbishment mechanical services plant is to be installed on the 9th floor roof terrace of the building.

1.2 This report details a noise survey undertaken at the site to quantify the existing noise climate and derive atmospheric plant noise limits in accordance with the requirements of the Local Authority. A subsequent assessment of the plant noise emission levels of the proposed installation has been undertaken to determine if any mitigation is required to meet the plant noise limits.

2 Site Description

2.1 The proposed refurbishment is located at 8th and 9th floor level on Guilford Street to the rear of Great Ormond Street Hospital for Children WC1N 3JH. The application site and its surrounds are illustrated on the attached site plan 206/0282/F1.

2.2 The A501 runs to the north of the site beyond which is London Euston station, King's Cross station and St Pancras International.

2.3 The site is immediately bounded by Guilford Street to the north. Beyond Guilford Street are quiet roads such as Grenville Street and Brunswick Square which contain residential property ranging from ground to 7th floor level and some commercial property at ground floor level.

2.4 Green areas such as Queen Square Gardens and Russell Square lie to the west of the site and Brunswick Square Gardens to the north east.

2.5 The site belongs to Great Ormond Street Hospital for Children and to the south of the site are other buildings which also belong to this hospital.

2.6 The site is within the jurisdiction of the London Borough of Camden.

3 Environmental Noise Survey

3.1 **Methodology & Instrumentation**

3.1.1 An unattended noise survey was undertaken at the site between 1045 hours on Thursday 27th May and 1045 hours on Friday 28th May 2021.

3.1.2 Measurements of noise levels were taken from one measurement position indicated as MP1 on the attached site plan 206/0282/F1 and described below:

- MP1: Free-field measurement position out of a window overlooking Guilford Street at 8th floor level approximately 1 m from the façade.

3.1.3 Measurements of L_{Aeq}, L_{A90}, and L_{Amax} were recorded over consecutive 15-minute periods (see Glossary of Acoustic Terms for an explanation of the noise units used) for the duration of the survey using the equipment listed within table T1 below.

Item	Manufacturer	Type
Sound Level Analyser	Norsonic	118
Acoustic Calibrator	Norsonic	1251
Weatherproof windshield	Norsonic	1212

T1 Equipment used during unattended noise survey.

3.1.4 The microphone was enclosed within a weatherproof windshield and the sound level meter was calibrated before and after the survey to confirm an acceptable level of accuracy. No significant drift was noted to have occurred.

3.1.5 The weather conditions when setting up and collecting the equipment were warm, clear, dry and still. Conditions are understood to have remained suitable for noise monitoring throughout the duration of the survey.

3.2 Results

3.2.1 The results of the noise survey measurements are presented in the attached time-history graph 206/0282/TH1.

3.2.2 The measured background noise levels derived following guidance in BS 41412:2014+A1:2019[1] can be seen in table T2 below.

Location	Representative Measured Background Noise Levels, dB	
	Daytime (0700-1900)	Night time (2300-0700)
MP1: Guilford Street	53	46

T2 Representative measured background noise levels to the rear of Great Ormond Street Hospital.

[1] British Standard BS4142:2014 – Methods for rating and assessing industrial and commercial sound

3.2.3 The noise climate at the site was dominated by road noise from Guilford Street and the surrounding roads.

4 Noise Emission Criteria

4.1 Local Authority Criteria

4.1 Policy A4 of the London Borough of Camden's *Local Plan 2017* relates specifically to noise:

'We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity.

Planning conditions will be imposed to require that plant and equipment which may be a source of noise is kept working efficiently and within the required noise limits and time restrictions.

Conditions may also be imposed to ensure that attenuation measures are kept in place and are effective throughout the life of the development.'

4.1.1 With regard to noise from new mechanical services plant, Appendix 3 of the Local Plan sets out the following:

'A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15 dB if tonal components are present) should be considered as the design criterion).'

4.2 Noise Emission Limits

4.2.1 Based on the results of the background noise survey set out within table T2 above in addition to the guidance set out in Section 4.1 above, the following plant noise limits are recommended to apply at the nearest noise sensitive premises, denoted as position AP1 in 206/0282/F1.

Location	Noise Emission Limit, $L_{Ar,Tr}$ dB (for plant with no distinguishing feature)	
	Daytime (0700-2300 only)	Night time (24-hour)
Nearest residential receivers.	43	36

T3 Plant noise emission limits at the nearest residential properties.

4.2.2 These limits are to apply to all plant items running simultaneously in the representative time periods, when running at design duty and are to apply at 1m from the outside of nearby residential windows.

5 Noise Assessment

5.1 Proposed Installation

5.1.1 The proposed items to be installed with external noise emission limits are as follows:

- Variable Refrigerant Volume Unit – *Daikin* REYQ14U
- Variable Refrigerant Volume Unit – *Daikin* REYQ12U

5.1.2 It is assumed that plant has the potential to run 24-hours a day.

5.1.3 The noise data for the planned plant items can be seen in the attached plant noise schedule 206/0282/PNS1. This noise data was provided by the manufacturer and suggests no signs of tonality, intermittency, impulsivity or any other attention-drawing characteristic.

5.2 Methodology

5.2.1 Noise levels have been calculated to two assessment positions representing the nearest and most exposed noise sensitive receivers to the proposed plant. The assessment positions are labelled in the attached site plan 206/0282/F1 and detailed below:

- AP1: A residential window on the 4th floor of 83 Guilford Street, facing the site.
- AP2: A residential window on the 6th floor to the rear of Downing Court, Grenville Street facing the site.

5.2.2 The noise levels generated by the mechanical services plant at the assessment position have been calculated by correcting for radiation losses, façade reflections, distance and screening losses, where appropriate.

5.3 Assessment Results

5.3.1 The results of our assessment indicate that additional acoustic mitigation measures will not be required to meet the criteria as set out by the London Borough of Camden. A summary of the calculation results can be found in the attached sheets 206/0282/CS1 to CS6.

5.3.2 The results of our calculations can be seen in table T4 below.

Location	Noise Emission at Assessment Positions, dB (Limit)	
	Daytime (0700-1900 only)	Night time (24-hour)
AP1 – 83 Guilford Street	34 *(43)*	34 *(36)*
AP2 – Downing Court	31 *(43)*	31 *(36)*

T4 Plant noise emission at the nearest residential properties.

6 Conclusions

6.1 It is proposed to refurbish the 8th and 9th floors of the main nurses' house at Great Ormond Street Hospital for Children, Guilford Street, London WC1N 3JH. As part of this refurbishment mechanical services plant is to be installed on the 9th floor roof terrace of the building.

6.2 This report has provided details of the noise survey conducted at the site and has set noise emission limits for the proposed mechanical services items in line with the Local Authority requirements.

6.3 A noise impact assessment has been conducted of noise from the proposed plant items. The assessment has shown that the plant noise limits set will be met at all times without the need for extra acoustic mitigation measures.

End of Section

Glossary of Acoustic Terms

L_{Aeq}:

The notional steady sound level (in dB) which over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measurement over that period. Values are sometimes written using the alternative expression dB(A) L_{eq}.

L_{Amax}:

The maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise when occasional loud noises occur, which may have little effect on the L_{Aeq} noise level. Unless described otherwise, L_{Amax} is measured using the "fast" sound level meter response.

L_{A10} & L_{A90}:

If non-steady noise is to be described, it is necessary to know both its level and degree of fluctuation. The L_{An} indices are used for this purpose. The term refers to the A-weighted level (in dB) exceeded for n% of the time specified. L_{A10} is the level exceeded for 10% of the time and as such gives an indication of the upper limit of fluctuating noise. Similarly, L_{A90} gives an indication of the lower levels of fluctuating noise. It is often used to define the background noise.

L_{A10} is commonly used to describe traffic noise. Values of dB L_{An} are sometimes written using the alternative expression dB(A) L_n.

L_{AX}, L_{AE} or SEL

The single event noise exposure level which, when maintained for 1 second, contains the same quantity of sound energy as the actual time varying level of one noise event. L_{AX} values for contributing noise sources can be considered as individual building blocks in the construction of a calculated value of L_{Aeq} for the total noise. The L_{AX} term can sometimes be referred to as Exposure Level (L_{AE}) or Single Event Level (SEL).

End of Section

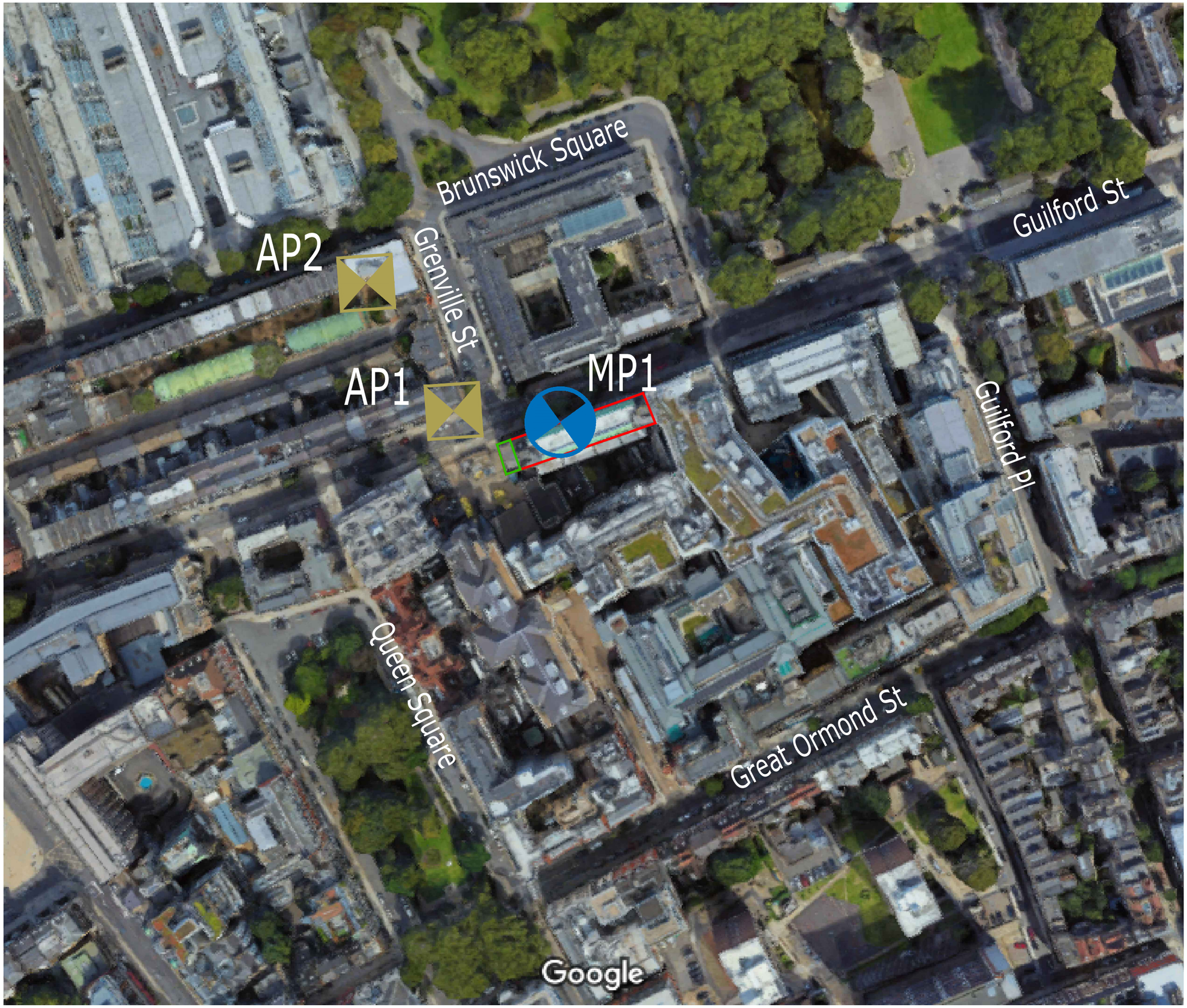

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Figure 206/0282/F1

Title:

Figure showing site location and the measurement and assessment positions.

Key:

- Measurement Position
- Assessment Position
- Approximate Site Boundary
- Flat Roof Area for Proposed Plant Items

North

Project:

GOSH Main Nurses Home, Guilford Street

Date: August 2021

Revision: -

Scale: Not to scale

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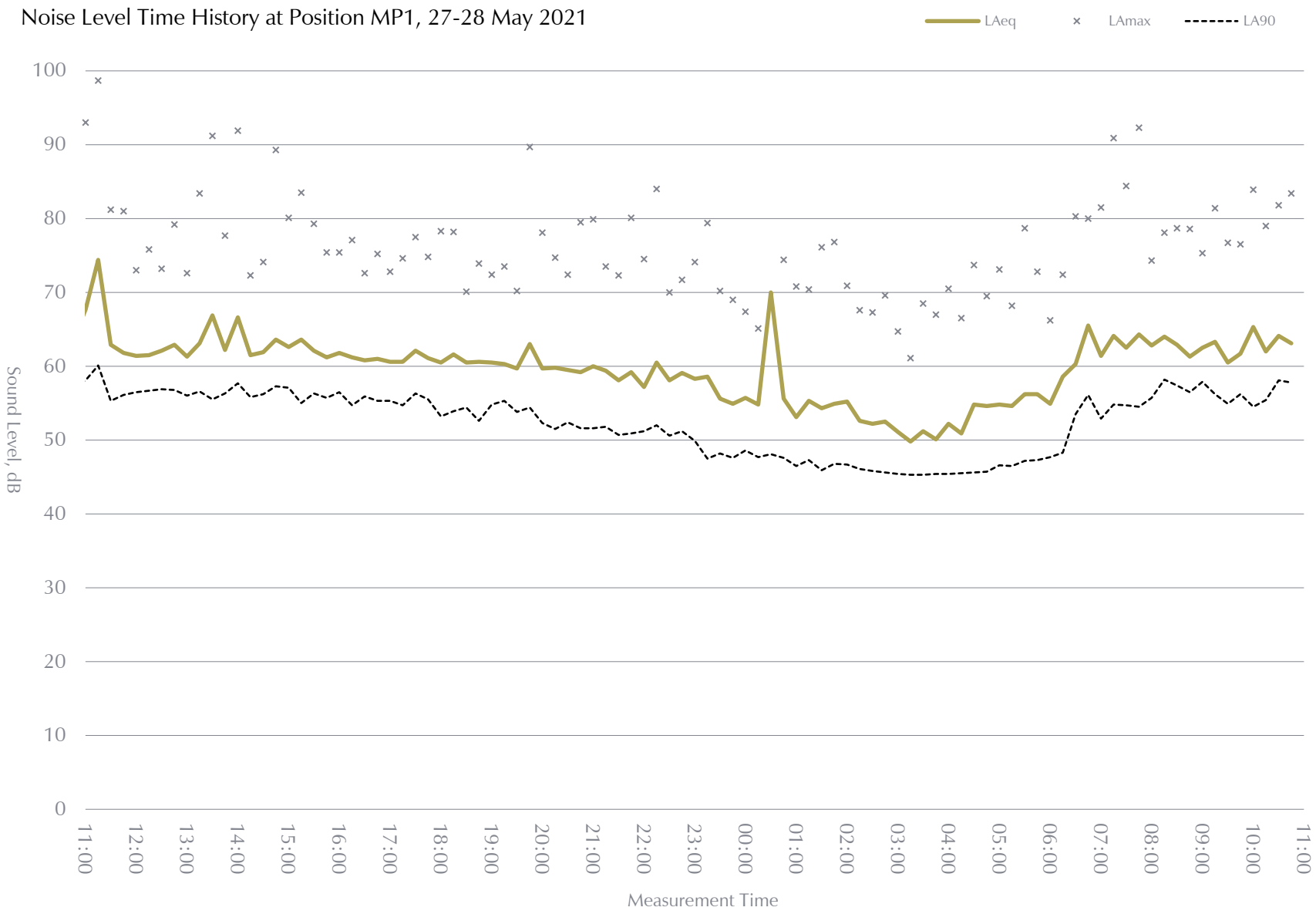


Figure 206/0282/TH01

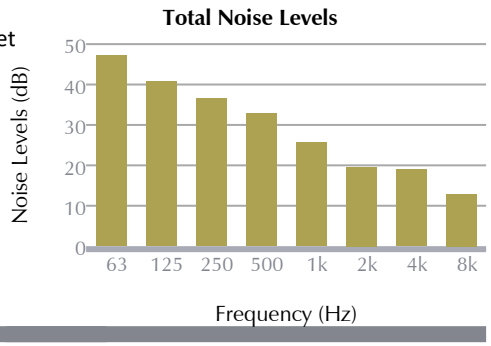
Schedule of Plant and Air Handling Equipment Sound Levels, dB

Reference	Description	Data Source [1]	Noise Level Type	Noise Levels (dB)							
				63	125	250	500	1k	2k	4k	8k
VRV 1	Daikin REYQ12U	Man	Sound Power, Lw	90.0	85.0	83.0	81.0	77.0	74.0	76.0	68.0
VRV 2	Daikin REYQ14U	Man	Sound Power, Lw	88.0	83.0	80.0	80.0	74.0	70.0	70.0	68.0

Notes

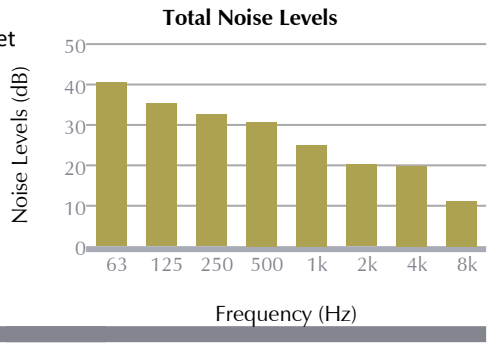
1 - Man refers to data supplied by the equipment manufacturer or supplier, Emp refers to data calculated using empirical formulae, and Meas refers to data measured by Cole Jarman

Project Name	GOSH Main Nurses Home, Guilford Street
Project Reference	206/0282
Receiver Reference	AP1
Description	83 Guilford Street
Noise Limit	36
dBA	34.1



Reference	Noise Levels (dB)							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
VRV 1	45.5	39.2	35.3	31.0	24.4	18.6	18.2	10.2
VRV 2	42.3	35.7	30.6	28.1	19.4	12.6	11.6	9.6

Project Name	GOSH Main Nurses Home, Guilford Street
Project Reference	206/0282
Receiver Reference	AP2
Description	Downing Court
Noise Limit	36
dBA	31.8



Reference	Noise Levels (dB)							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
VRV 1	38.5	33.3	31.0	28.4	23.4	19.0	19.0	8.7
VRV 2	36.2	31.0	27.6	27.0	19.9	14.2	12.1	7.7

VRV 1 to AP1

		Octave Band Centre Frequency (Hz)							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Noise Source									
Noise Source - VRV 1									
Sound Power Levels		**90.0**	**85.0**	**83.0**	**81.0**	**77.0**	**74.0**	**76.0**	**68.0**
Point Source Radiation Loss									
Radiation - Spherical									
Single Figure Read	11.0								
		-11.0	*-11.0*	*-11.0*	*-11.0*	*-11.0*	*-11.0*	*-11.0*	*-11.0*
Point Source Distance Loss									
Start Distance (m)	1.0								
End Distance (m)	31.0								
		-29.8	*-29.8*	*-29.8*	*-29.8*	*-29.8*	*-29.8*	*-29.8*	*-29.8*
Maekawa Screening Loss									
Path Difference (m)	0.2								
		-6.7	*-8.0*	*-9.9*	*-12.2*	*-14.7*	*-17.5*	*-20.0*	*-20.0*
Facade Reflection									
Reflection (dB)	3.0								
		3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
External Receiver									
External Receiver - AP1									
Sound Pressure, Lp		**45.5**	**39.2**	**35.3**	**31.0**	**24.4**	**18.6**	**18.2**	**10.2**

VRV 2 to AP1

		Octave Band Centre Frequency (Hz)							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Noise Source									
Noise Source - VRV 2									
Sound Power Levels		**88.0**	**83.0**	**80.0**	**80.0**	**74.0**	**70.0**	**70.0**	**68.0**
Point Source Radiation Loss									
Radiation - Spherical									
Single Figure Read	11.0								
		-11.0	*-11.0*	*-11.0*	*-11.0*	*-11.0*	*-11.0*	*-11.0*	*-11.0*
Point Source Distance Loss									
Start Distance (m)	1.0								
End Distance (m)	33.0								
		-30.4	*-30.4*	*-30.4*	*-30.4*	*-30.4*	*-30.4*	*-30.4*	*-30.4*
Maekawa Screening Loss									
Path Difference (m)	0.3								
		-7.4	*-9.0*	*-11.0*	*-13.5*	*-16.2*	*-19.1*	*-20.0*	*-20.0*
Facade Reflection									
Reflection (dB)	3.0								
		3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
External Receiver									
External Receiver - AP1									
Sound Pressure, Lp		**42.3**	**35.7**	**30.6**	**28.1**	**19.4**	**12.6**	**11.6**	**9.6**

VRV 1 to AP2

		Octave Band Centre Frequency (Hz)							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Noise Source									
Noise Source - VRV 1									
Sound Power Levels		**90.0**	**85.0**	**83.0**	**81.0**	**77.0**	**74.0**	**76.0**	**68.0**
Point Source Radiation Loss									
Radiation - Spherical									
Single Figure Read	11.0								
		-11.0	*-11.0*	*-11.0*	*-11.0*	*-11.0*	*-11.0*	*-11.0*	*-11.0*
Point Source Distance Loss									
Start Distance (m)	1.0								
End Distance (m)	85.0								
		-38.6	*-38.6*	*-38.6*	*-38.6*	*-38.6*	*-38.6*	*-38.6*	*-38.6*
Maekawa Screening Loss									
Path Difference (m)	0.0								
		-4.9	*-5.1*	*-5.4*	*-6.0*	*-7.0*	*-8.4*	*-10.4*	*-12.8*
Facade Reflection									
Reflection (dB)	3.0								
		3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
External Receiver									
External Receiver - AP2									
Sound Pressure, Lp		**38.5**	**33.3**	**31.0**	**28.4**	**23.4**	**19.0**	**19.0**	**8.7**

Calculation Sheet 206/0282/CS6

VRV 2 to AP2

		Octave Band Centre Frequency (Hz)							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Noise Source									
Noise Source - VRV 2									
Sound Power Levels		**88.0**	**83.0**	**80.0**	**80.0**	**74.0**	**70.0**	**70.0**	**68.0**
Point Source Radiation Loss									
Radiation - Spherical									
Single Figure Read	11.0								
		-11.0	*-11.0*	*-11.0*	*-11.0*	*-11.0*	*-11.0*	*-11.0*	*-11.0*
Point Source Distance Loss									
Start Distance (m)	1.0								
End Distance (m)	87.0								
		-38.8	*-38.8*	*-38.8*	*-38.8*	*-38.8*	*-38.8*	*-38.8*	*-38.8*
Maekawa Screening Loss									
Path Difference (m)	0.0								
		-5.0	*-5.2*	*-5.6*	*-6.3*	*-7.4*	*-9.0*	*-11.1*	*-13.5*
Facade Reflection									
Reflection (dB)	3.0								
		3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
External Receiver									
External Receiver - AP2									
Sound Pressure, Lp		**36.2**	**31.0**	**27.6**	**27.0**	**19.9**	**14.2**	**12.1**	**7.7**

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