



WOBURN HOUSE,
20- 24 TAVISTOCK
SQUARE, LONDON

Planning Stage-
Plant Noise
Assessment

Reference: 12697.RP01.PNA.0

Prepared: 18 May 2023

Revision Number: 0

CBG Consultants

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	18 May 2023	Pritham D'Souza	Robert Barlow

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The recommendations within this report relate to acoustics performance only and will need to be integrated within the overall design by the lead designer to incorporate all other design disciplines such as fire, structural integrity, setting-out, etc. Similarly, any sketches appended to this report illustrate acoustic principles only and will need to be developed into full working drawings by the lead designer to incorporate all other design disciplines.



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1. INTRODUCTION

As part of a new M&E strategy, it is proposed to replace some existing items of plant at Woburn House, 20-24 Tavistock Square, London WC1H 9HU ('the Project Site'), replacing them with new condenser units.

As part of the planning application, the London Borough of Camden ('the Local Authority') requires consideration be given to atmospheric noise emissions from the proposed equipment to the nearest noise-sensitive receptors.

RBA Acoustics have been commissioned to undertake measurements of the prevailing noise conditions at the site and to determine the atmospheric noise emission limits in accordance with Local Authority's requirements. This report presents the results of the noise measurements, associated criteria and provides the required assessment.

This report sometimes uses technical acoustic terminology. To assist the reader, a summary of these terms is included in Appendix A.

2. SITE DESCRIPTION

The site is shown in relation to its surroundings in the site plan in Figure 1 (Appendix B).

The project site, Woburn House, at 20-24 Tavistock Square is in a busy, mixed-use area of Camden in central London. The building itself mainly serves as a commercial building, with conference facilities on the lower floors and offices on the upper floors.

The site overlooks the A4200 road to the north and Tavistock Square to the south. The A4200 is a busy thoroughfare, with considerable road traffic and pedestrian activity. Tavistock Square itself is a relatively quieter road, however due to the proximity to the A4200, there is high level of pedestrian and vehicular activity still noted. Directly adjacent to the project site is Tavistock Court, which we understand is a residential building, with windows overlooking both Tavistock Square and the rear courtyard formed with the surrounding buildings.

From our time on site and from discussion with the Client Team, we understand the nearest noise sensitive residential receptors to the project site would be the upper floor windows belonging to Endsleigh Court (rear-facing and facing the A4200) and the upper floor windows belonging to Tavistock Court (windows facing Tavistock Square). The existing offices belonging to the project site are noted to be the nearest commercial receptors located along the rear and front elevations of the development site.

3. ENVIRONMENTAL NOISE SURVEY

3.1 Survey Methodology

Monitoring of the prevailing background noise was undertaken over the following 24-hour period:

15:30 Tuesday 2 May to 15:30 Wednesday 3 May 2023.

As the survey was unattended it is not possible to comment with certainty regarding meteorological conditions throughout the entire survey period. However, based on historic meteorological data for the area, and our observations during the site visits, conditions were generally considered suitable for obtaining representative noise measurements, it being predominantly dry with little wind.

Measurements were made of the L_{A90} , L_{Amax} and L_{Aeq} noise levels over sample periods of 15 minutes.

3.2 Measurement Location

To determine the existing noise climate around the site, measurements were undertaken at the following location:

Measurement Position 1 – Rear of Project Site, at Roof level

The microphone at this position was installed at roof level overlooking the rear of Woburn House. The microphone itself was installed on an extension pole, which was secured to a railing along the edge of the roof. We consider this position to be representative of the nearest noise sensitive receptors to the rear of the project site. The noise climate at this location was noted to be mainly affected by noise from existing building services plant and screened noise from movements along A4200 and Tavistock Square.

The measurement position is also illustrated on the site plan attached in Figure 1 and photos in Figure 2 (Appendix B).

3.3 Instrumentation

For information regarding the equipment used for the measurements please refer to Appendix C.

The sound level meters were calibrated both prior to and on completion of the survey with no significant calibration drifts observed.

3.4 Results

The noise levels measured are shown as time-histories on the attached Graphs 1-2 (Appendix D).

The lowest L_{A90} and the period averaged L_{Aeq} noise levels measured are summarised in Table 1.

Table 1 – Measured Levels

Measurement Period (T)	Measurement Position 1 – Rear of Project Site, at Roof level	
	Lowest $L_{A90,15min}$ (dB)	$L_{Aeq,T}$ (dB)
Daytime (07:00 – 23:00)	48	56
Night-time (23:00 – 07:00)	46	52
Office Hours (07:00 – 19:00)	49	57

4. PLANT NOISE CRITERIA

4.1 Camden Local Plan (2017)

Policy A1 of the Camden Local Plan (2017) sets out the Council's objective to protect the amenity and quality of life of occupiers and neighbours. The factors affecting this include noise and vibration from newly proposed developments. Policy A4 of the Camden Local Plan (2017) further re-iterates the Council's stance on controlling noise and vibration from new developments. In this regard it states:

The Council will seek to ensure that noise and vibration is controlled and managed.

Development should have regard to Camden's Noise and Vibration Thresholds (provided in Appendix 3 of the Camden Plan 2017). We will not grant planning permission for:

- a. Developments likely to generate unacceptable noise and vibration impacts; or*
- b. Development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.*

We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development.

Appendix 3 of the Camden Local Plan 2017 provides further information in relation to the applicable noise thresholds for new developments. In this regard it states:

The significance of noise impact varies dependent on the different noise sources, receptors and times of operation presented for consideration within a planning application. Therefore, Camden's thresholds for noise and vibration evaluate noise impact in terms of various 'effect levels' described in the National Planning Policy Framework and Planning Practice Guidance: NOEL, LOAEL and SOAEL [...].

With specific regard to industrial and commercial noise sources the document in Appendix 3 further goes on to state:

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' (BS4142) will be used. For such cases a 'Rating Level' of 10dB below background (15dB if tonal components are present) should be considered as the design criterion.

Table C of Appendix 3 of the document provides further clarity on the applicable noise levels for proposed industrial and commercial developments and the receptors to which it is applicable.

Table 2 - *Noise levels applicable to proposed plant and machinery (Table C of Appendix 3 in Camden Local Plan)*

Existing Noise Sensitive Receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAEL (Red)
Dwellings	Garden used for main amenity (free field) and outside living or dining or bedroom window (façade)	Day	'Rating Level' 10dB* below background	'Rating Level' between 9dB below and 5dB above background	'Rating Level' greater than 5dB above background
Dwellings	Outside bedroom window (façade)	Night	'Rating Level' 10dB* below background and no events exceeding 57dB L_{Amax}	'Rating Level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	Rating Level greater than 5dB above background and/or events exceeding 88dB L_{Amax}

*Further penalty of 5dB to be applied if the noise contains audible tonal elements

The above noise threshold levels are provided for dwellings only and it has been further clarified within the document that levels for other uses will be dependent on the use of the premises.

4.2 Criteria applicable to Residential Receptors

In line with the above requirements, we would propose items of mechanical services be designed so that atmospheric noise emissions from the items of plant do not exceed the levels as noted within Table 3, when assessed at the nearest residential receptors. These are 10dB below the lowest measured background noise levels on site (as noted in Table 1). The noise level limits are provided for standard office hours of 07:00 – 19:00, in addition to the standard daytime and night-time periods.

Table 3 – Plant Noise Emissions Criteria – Residential Receptors

Time Period	Plant Noise Emissions Criterion
	Measurement Position 1 – Applicable to noise sensitive residential receptors to the rear of the project site
Daytime (07:00 – 23:00)	38
Night-time (23:00 – 07:00)	36
Office Hours (07:00 – 19:00)	39

In line with BS 4142: 2014, should the proposed plant be identified as having intermittent or tonal characteristics, a further penalty should be subtracted from any of the above proposed noise emission limits.

It should be noted that the above requirements are applied at the nearest residential adjacencies and alternative criteria should be incorporated if there are also commercial properties affected by the proposed plant installations.

4.3 Criteria Applicable to Commercial Receptors (Offices)

The development site also has multiple offices in the near vicinity. As such, a noise limit commensurate with achieving appropriate internal noise levels is proposed for commercial receptors.

A noise criterion of 50-55dBA outside office windows will ensure that noise levels fit for function as advised within BS8233:2014 can be achieved assuming 10-15dB reduction through a partially open window. The relevant internal noise levels are:

Executive Office	35-40dB $L_{Aeq,T}$
Open Plan Offices	45-50dB $L_{Aeq,T}$

5. PLANT NOISE ASSESSMENT

This assessment has been based on the information provided by CBG Consultants, the project M&E Consultants and is described in the following sections.

5.1 Proposed Plant Items

The new proposals include the installation of 6No. condenser units, to serve the Basement to 4th floor areas of Woburn House. These new units are to replace existing condenser units that were previously serving the scheme. Specific selections for the proposed items of plant are provided in Table 4. These newly proposed condenser units are shown in their context, including the existing and retained items of plant in Figures B3 of Appendix B.

Table 4 – Plant Types

Ref.	Manufacturer/Model/Duty	Plant Type
OU-A, OU-C, OU-D, OU-E (4Nos.)	Mitsubishi PURY-P500YSNW-A	Condenser Unit (Serving Basement, Ground, 1 st 2 nd and 3 rd floors)
OU-B, OU-F (2Nos.)	Mitsubishi PURY-P250YNW-A	Condenser Unit (Serving Mezzanine level and 4 th floor)

5.2 Plant Locations

The new condenser units are proposed to be installed at roof level of the project site. The equipment positions are indicated on the site plan in Figure B3 in Appendix B.

5.3 Proposed Operational Hours

We understand the proposed new items of plant will operate during standard office hours only (07:00 – 19:00).

5.4 Plant Noise Levels

Information regarding the noise levels of the proposed plant has been provided by the manufacturer of the unit. The associated plant noise levels are detailed as follows:

Table 5 – Plant Noise Levels

Unit Ref:	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
OU-A, OU-C, OU-D, OU-E	L_p at 1m (Standard mode)	77	68	66	61	56	54	51	44	63
OU-B, OU-F	L_p at 1m (Standard mode)	78	63	62	59	52	49	49	43	61

Review of the octave band data provides no indication of any tonal characteristics associated with the proposed plant.

5.5 Location of the Nearest Noise-Sensitive Receptors

Based on observations made on site, we understand the nearest noise-sensitive receptors to the proposed plant to be as follows:

Receptor 1 – Residential Windows belonging to Endsleigh Court (towards rear of Project Site)

Endsleigh Court is directly adjacent to the Project Site. Existing residential windows towards the rear of the building are understood to be the nearest noise sensitive residential receptors to the newly proposed items of plant. The worst-affected windows are noted to be approximately 21m away from the newly proposed condenser units. Although there are residential windows (belonging to Endsleigh Court) that are closer to the units, these are noted to be significantly screened by virtue of the roof edge.

Receptor 2 – Office Windows belonging to Woburn House (to the rear of site)

The nearest affected commercial receptors are noted to be those belonging to the project site itself. Receptor 2 has been assigned to the top floor office windows belonging to 20-24 Tavistock Square and facing the rear of the building. These are noted to be approximately 11m away from the proposed items of plant and benefiting from significant line-of-sight screening (by virtue of the roof edge).

Receptor 3 – Office Windows belonging to Woburn House (to the front of site)

The nearest affected commercial receptors are noted to be those belonging to the project site itself. Receptor 3 has been assigned to the top floor mansard windows belonging to 20-24 Tavistock Square and facing the front of the building. These are noted to be approximately 5m away from the proposed items of plant and benefiting from significant line-of-sight screening (by virtue of the roof edge).

The receptors are shown in the site plan in Figure B1 in Appendix B.

5.6 Calculation of Noise Levels at Nearest Noise-Sensitive Receptors

Our calculation method for predicting noise levels from the proposed plant at the nearest noise-sensitive receptors, based on the information above, is summarised below.

- Source Term SPL
- Distance Attenuation
- Screening

Calculation sheets are attached for further information in Appendix E.

The results of the calculations indicate the following noise levels at the nearest affected residential windows:

Table 6 – Predicted Noise Levels

Operating Period	Noise Level (dB) at Receptor 1: Residential Windows belonging to Endsleigh Court (To the rear of Woburn House)		Noise Level (dB) at Receptor 2: Office Windows belonging to Woburn House (To the rear of Woburn House)		Noise Level (dB) at Receptor 3: Office Windows belonging to Woburn House (To the front of Woburn House)	
	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion
Office Hours (07:00 – 19:00)	39	39	39	50-55	46	50-55

Noise from the proposed plant installations is within the required target criteria.

6. VIBRATION CONTROL

In addition to the control of airborne noise transfer, it is also important to consider the transfer of noise as vibration to adjacent properties (as well as to any sensitive areas of the same building).

We would typically advise that condensing units be isolated from the supporting structure by means of either steel spring isolators or rubber footings. For particularly sensitive locations, or when on lightweight structures the mounts should ideally be caged and be of the restrained type.

It is important the isolation is not “short-circuited” by associated pipework or conduits. To this end, any conduits should be looped and flexible connectors should be introduced between the condenser and any associated pipework. Pipework should be supported by brackets containing neoprene inserts.

7. CONCLUSION

RBA Acoustics have undertaken noise monitoring at Woburn House, 20-24 Tavistock Square. The measured noise levels are presented within this report. The resultant noise levels have been used to determine the required criteria for atmospheric noise emissions from the proposed plant installations.

The results of the assessment indicate atmospheric noise emissions from the proposed plant are within the criteria required by the London Borough of Camden. As such, the proposed plant installations should be considered acceptable in terms of noise.

Appendix A – Acoustic Terminology

A-weighting
(e.g. dB(A))

A correction applied across the frequency bands to take into account the response of the human ear, and therefore considered to be more representative of the sound levels people hear.

DeciBel (dB)

Unit used for many different acoustic parameters. It is the logarithmic ratio of the level being assessed to a standard reference level.

L_{eq}

The level of a notional steady sound which, over a stated period of time, T , would have the same acoustic energy as the fluctuating noise measured over that period. Typically used to represent the average or ambient noise level.

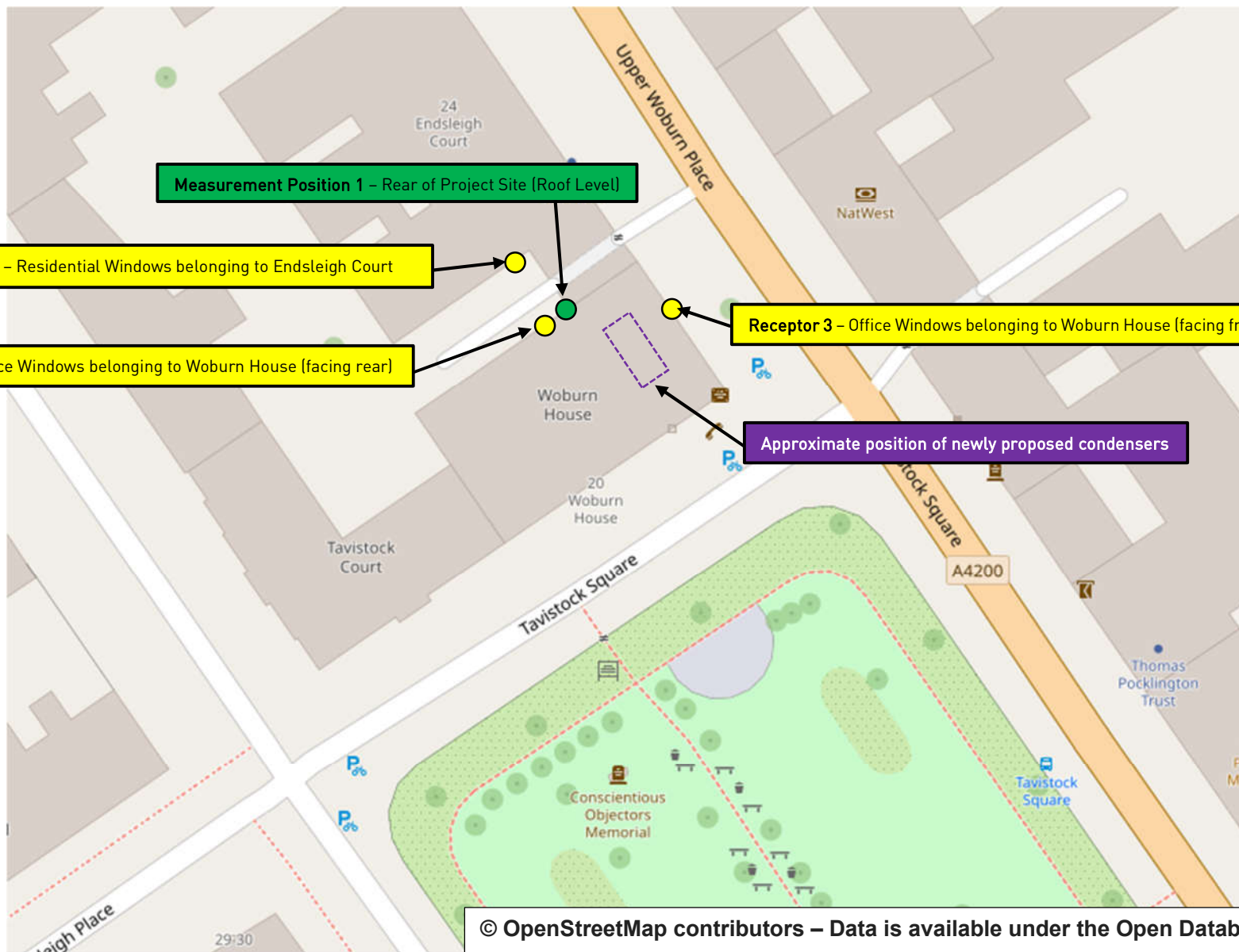
$L_{Aeq,T}$

The A-weighted level of a notional steady sound which, over a stated period of time, T , would have the same acoustic energy as the fluctuating noise measured over that period. Typically used to represent the average or ambient noise level.

L_{An} (e.g. L_{A10} , L_{A90})

The sound level exceeded for n% of the time. E.g. L_{A10} is the A-weighted level exceeded for 10% of the time and as such can be used to represent a typical maximum level. Similarly, L_{A90} is the level exceeded for 90% of the measurement period, and is often used to describe the underlying background noise.

Appendix B – Site Plan and Photos



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Woburn House, 20- 24 Tavistock Square, London

Site Overview

Project 12697

Figure 1

18 May 2023

Not to Scale





Measurement Position 1 – Rear of Project Site, Roof Level
Position overlooking rear of Woburn House and existing office windows.

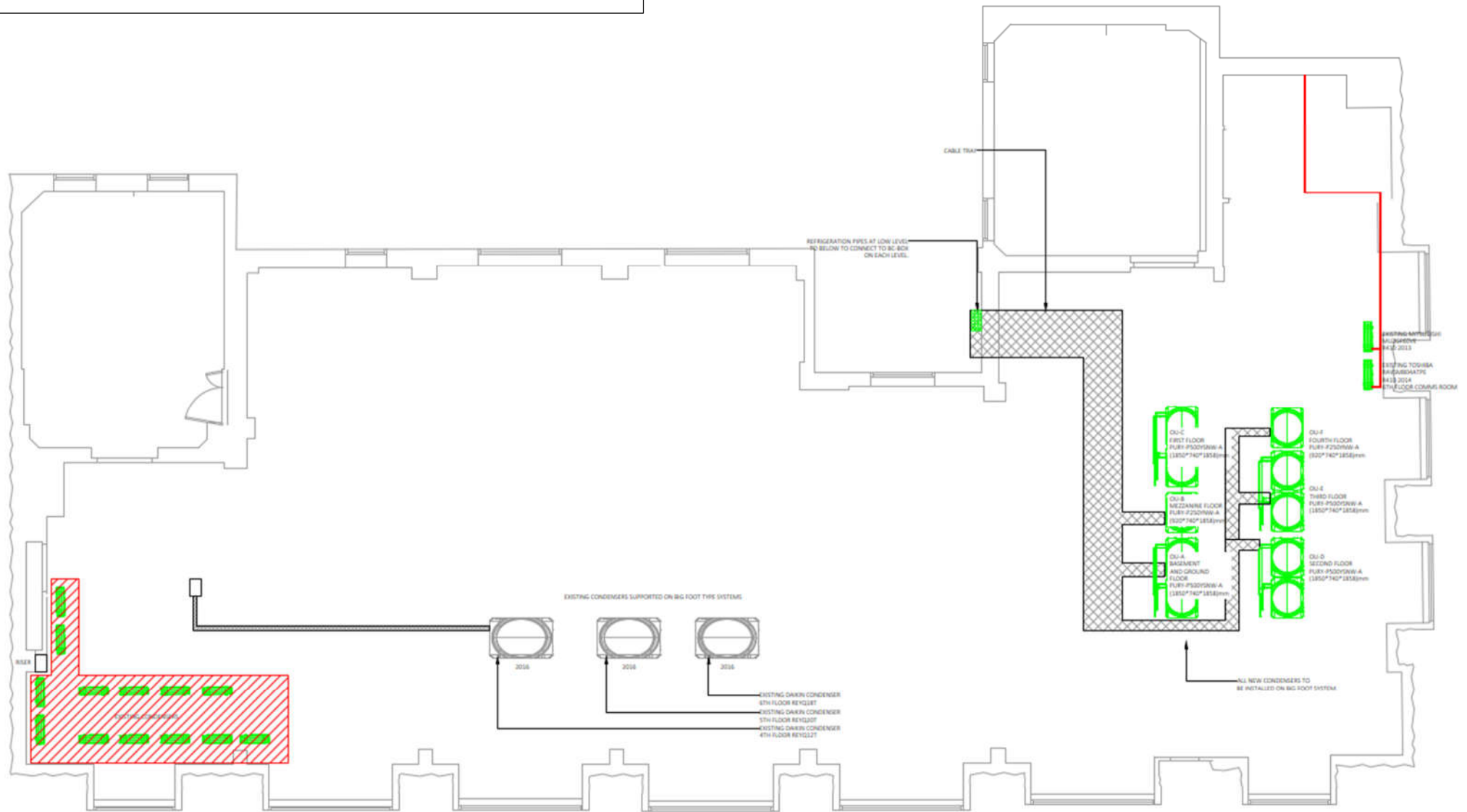


Measurement Position 1 – Rear of Project Site, Roof Level (from opposite side)
Position overlooking rear of Woburn House in context of Endsleigh Court windows.

Woburn House, 20- 24 Tavistock Square, London
 Photos of Measurement Position
 Project 12697

Figure 2
 18 May 2023
 Not to Scale





Woburn House, 20- 24 Tavistock Square, London
 Proposed Roof Layout
 Project 12697

Figure 3
 18 May 2023
 Not to Scale



Appendix C – Instrumentation

The following equipment was used for the measurements.

Table C1– Equipment Calibration Details

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Valid Until
Norsonic Type 1 Sound Level Meter	Nor140	1407792	4712332262	9 December 2023
Norsonic Pre Amplifier	1209	23227		
Norsonic ½" Microphone	1225	469028		3 December 2023
Norsonic Sound Calibrator	1255	125525797	Cal 022-2021-14780	8 December 2023

Appendix D – Graphs & Time Histories

20-24 Tavistock Square, London WC1H

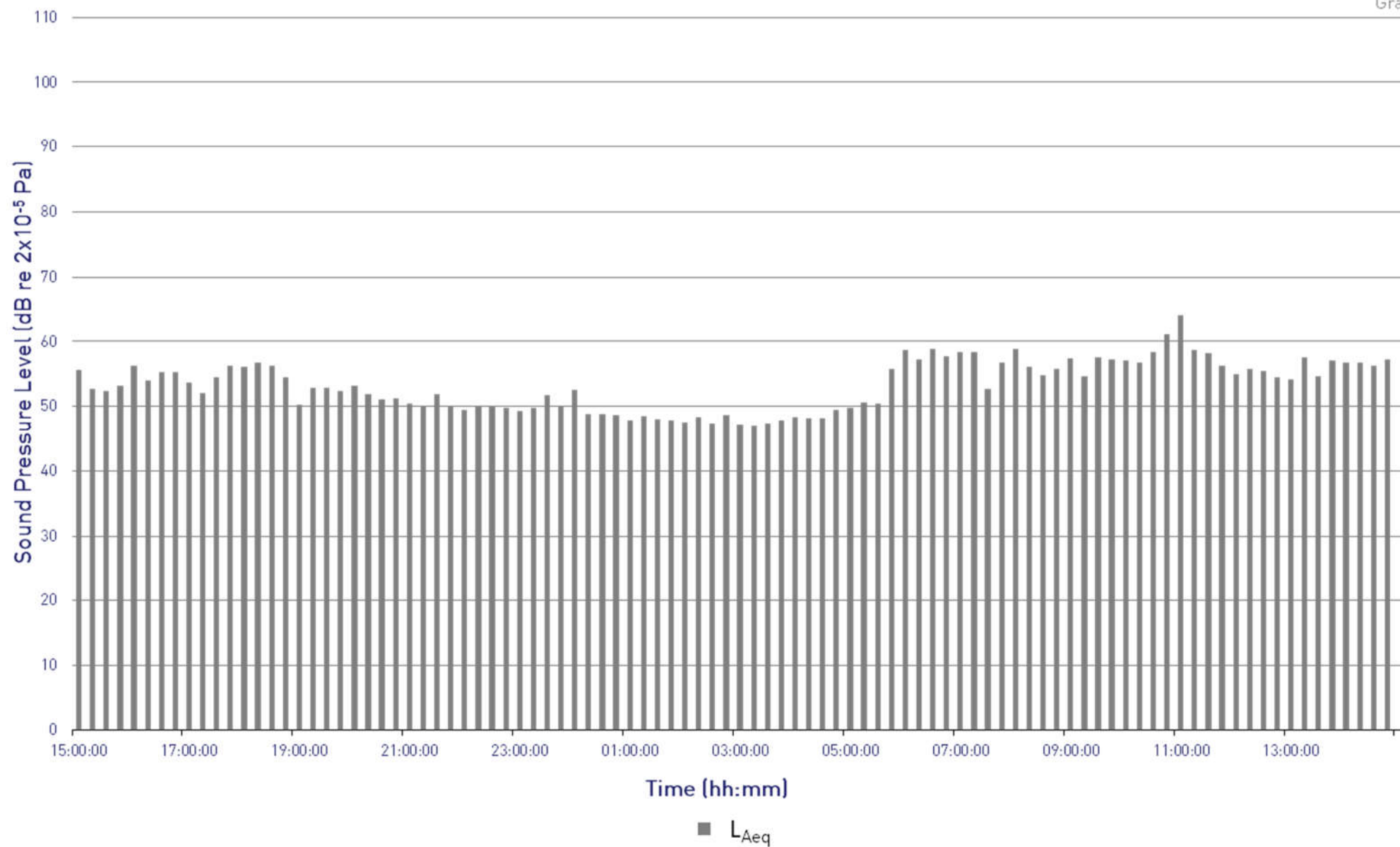
L_{Aeq} Time History

Measurement Position 1 - Rear of Project Site (Roof Level)



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Graph 1



20-24 Tavistock Square, London WC1H

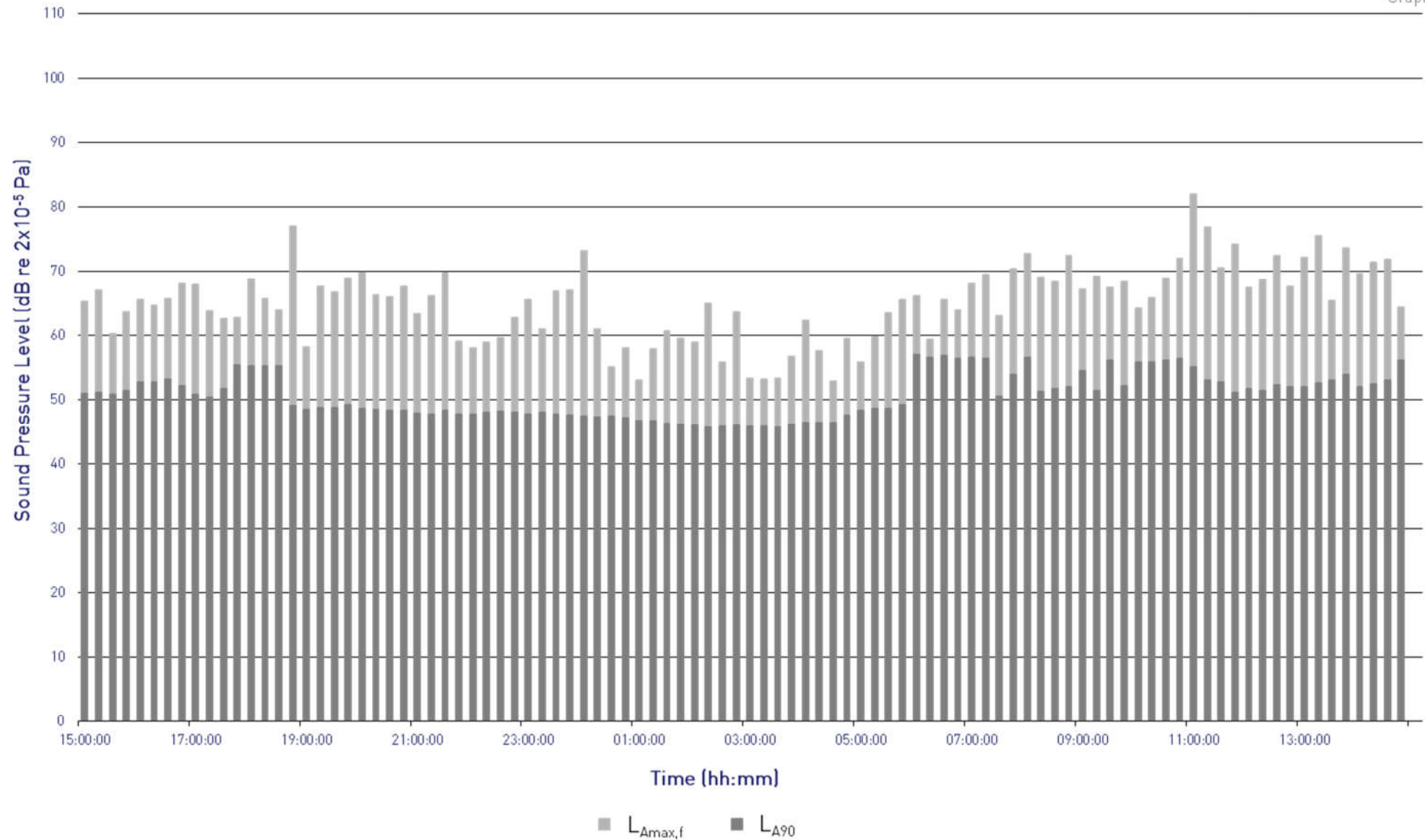
$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 1 - Rear of Project Site (Roof Level)



Project: 12697

Graph 2



Appendix E – Example Plant Calculations

Table D1 – Example Calculation, OU-A, OU-C, OU-D, OU-E to R1

Parameter	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
<i>Mitsubishi PURY-P500</i> - L_p at 1m (Standard Mode)	77	67.5	66	61	55.5	53.5	50.5	44	63
4Nos units	6	6	6	6	6	6	6	6	
Distance Loss (to Endsleigh Court - 21m)	-26	-26	-26	-26	-26	-26	-26	-26	
Line-of-sight Screening Loss	-5	-5	-5	-5	-5	-4	-3	-1	
Resultant Level at Receptor R1	52	42	41	36	30	29	27	22	38

Table D2 – Example Calculation, OU-B & OU-F to R1

Parameter	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
<i>Mitsubishi PURY-P250</i> - L_p at 1m (Standard Mode)	78	63	62	59	52	49	49	43	61
2Nos units	3	3	3	3	3	3	3	3	
Distance Loss (to Endsleigh Court - 21m)	-26	-26	-26	-26	-26	-26	-26	-26	
Line-of-sight Screening Loss	-5	-5	-5	-5	-5	-4	-3	-1	
Resultant Level at Receptor R1	50	34	33	31	24	21	22	18	33

Table D3 – Summary Noise Levels

Unit	Received noise level (dB) at 1m from Receptor 1	Received noise level (dB) at 1m from Receptor 2	Received noise level (dB) at 1m from Receptor 3
OU-A, OU-C, OU-D, OU-E	38	38	45
OU-B & OU-F	33	33	40
Total Received Level	39	39	46

Appendix F – CDM Considerations

The likelihood the harm will occur can be assessed by applying an indicative score (from 1 to 5) as follows:

- 1 – Remote (almost never)
- 2 – Unlikely (occurs rarely)
- 3 – Possible (could occur, but uncommon)
- 4 – Likely (recurrent but not frequent)
- 5 – Very likely (occurs frequently)

The severity of harm can be assessed by applying an indicative score (from 1 to 5) as follows:

- 1 – Trivial (e.g. discomfort, slight bruising, self-help recovery)
- 2 – Minor (e.g. small cut, abrasion, basic first aid need)
- 3 – Moderate (e.g. strain, sprain, incapacitation for more than 3 days)
- 4 – Serious (e.g. fracture, hospitalisation for more than 24 hours, incapacitation for more than 4 weeks)
- 5 – Fatal (single or multiple)

The rating value is obtained by multiplying the two scores and is then used to determine the course of action.

Table D1 – Risk Ratings

Rating Bands (Severity x Likelihood)		
Low Risk (1 – 8)	Medium Risk (9 -12)	High Risk (15 – 25)
May be ignored but ensure controls remain effective	Continue, but implement additional reasonable practicable controls where possible	Avoidance action is required; therefore alternative design solutions must be examined. Activity must not proceed until risks are reduced to a low or medium level

The following hazards pertinent to our design input have been identified and control measures suggested:

Table D2 – Risk Assessment

Hazard	Risk Of	At Risk	Rating			Control Measures	Controlled		
			L	S	R		L	S	R
Vibration Isolators	Injury to hands	Contractors	3	3	9	Care needs to be taken during adjustment. Follow manufacturers guidance	1	3	3

L: Likelihood S: Severity R: Rating

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