SHARPS REDMORE

ACOUSTIC CONSULTANTS

Report

Headland House, London
Acoustic Planning Report

Prepared by
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Date 28th May 2015

Project No 1515269

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Contents

Appendices

1.0 Executive Summary

Sharps Redmore (SR) have been instructed by Pascall and Watson on behalf of the National Union of Journalists to undertake an acoustic assessment of the proposed refurbishment at Headland House.

The objective of the assessment is to consider the noise impacts from the proposed development on nearby sensitive receptors, namely the residential properties on the upper floors of 70 Acton Street and 243 Gray's Inn Road, as well as the offices in the adjacent building.

The assessment has been undertaken by a noise survey at the site and subsequent calculations/noise modelling.

The assessment has been based on the Camden Council's criteria defined in Development Policy DP28 within the Local Development Framework.

Where necessary, recommendations are made on mitigation measures necessary to ensure compliance with Camden Council's criteria.

The conclusions of the assessment are that atmospheric noise from the proposed building services plant and noise from the proposed eatery/licensed café and seminar event spaces can be suitably controlled.

2.0 Introduction

2.1 Sharps Redmore (SR) have been instructed by Pascall and Watson on behalf of the National Union of Journalists to undertake an acoustic assessment of the proposed refurbishment at Headland House. This assessment is to accompany a planning application.

2.2 The building which is currently used as offices is 6 storeys tall with a basement below on Gray's Inn Road, with a 3 storey tall element on Acton Street. The proposals are to refurbish the offices as well as introduce an eatery/licensed café space on the ground floor and a seminar event space on the lower ground floor. The proposed operating hours of the offices are 0700-1900 hours Monday-Friday. For the eatery/licensed café, the operating hours are 0700-2300 hours Monday-Friday and 1000-2300 hours on Saturdays, Sundays and bank holidays.

2.3 The proposed refurbishments are to include the addition of new plant both indoors and outdoors. The outdoor plant proposals consist of 3 heating and cooling units to be installed on the fifth floor roof. The indoor plant proposals include a total of 14 heat exchange units, kitchen extract and supply fans, and 7 toilet extract fans. These include air inlets and exhausts at various points at the rear of the building. Details of the make and model of each item of plant mentioned above can be found in Appendix D.

2.4 The Local Authority for this location is Camden Council.

2.5 It is believed that the closest residential property to the rear of the building is the flats on the first, second and third floors of the adjacent building, 70 Acton Street.

2.6 To the front of the building, the nearest residential property is believed to be the flats of 243 Gray's Inn Road on the second and third floors some 18 metres away.

2.7 Section 3.0 of this report includes the assessment methodology and criteria.

2.8 Details of the noise survey to establish the existing noise climate and to determine suitable design criteria at the closest residences are presented in Section 4.0.

2.9 Section 5.0 includes an assessment of the noise impact of the new plant to the nearest residential receivers, based on manufacturer's data and drawings provided. The assessment of noise from plant is based on a computer model which establishes the noise control scheme to comply with the noise criteria established in Section 3.0. This section also includes an assessment of the noise impact of the proposed eatery/licensed café and seminar event space to the offices of the neighbouring building.

2.10 Appendix A includes a plan of the proposed ground floor and an aerial view of the site including measurement locations and locations of noise sensitive receivers. Appendix B includes the results of the noise survey. A guide to the acoustic terminology used in this report is displayed in Appendix C.

2.11 Appendix E includes the source data used in the noise model. Appendix F includes a summary of the calculation.

3.0 Acoustic Design Criteria

3.1 The relevant local authority is Camden Council. SR has made contact with the Environmental Health Officer, Edward Davies at London Borough of Camden and our proposed methodology for our noise survey which was deemed appropriate.

3.2 The criteria relating to this development is defined in Table E of Camden's Development Policy DP28 which can be found in the document *"Camden Development Policies – Local Development Framework, 2010-2025"*. This table is reproduced below.

Table E: Noise levels from plant and machinery at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dB$L_{Aeq'}$

3.3 Table E sets a noise limit for residential premises for plant noise. The nearest noise sensitive receivers to the proposed plant are the flats on the upper floors of 70 Acton Street to the rear of the building and the flats at 243 Gray's Inn Road to the front of the building.

3.4 The results of the noise survey described in Section 4.0 of this report indicate a typical weekday (0700-1900 hours) background level of 53 dB L_{A90} at 70 Acton Street and 63 dB L_{A90} at 243 Gray's Inn Road. The typical representative weekday evening (1900-2300 hours) and weekend (0700-2300 hours) background level was found to be 50 dB L_{A90} at 70 Acton Street and 61 dB L_{A90} at 243 Gray's Inn Road.

3.5 It can be deduced the criteria is therefore as stated in Table 2.

Table 2: Plant noise criteria

Location	Plant Character	Criteria	Time Period
1 metre external to 70 Acton Street	No distinguishable feature	Noise level < 48 dB $L_{Aeq\ 1hour}$	Mon-Fri 0700-1900 hrs
		Noise level < 45 dB $L_{Aeq\ 1hour}$	Mon-Fri 1900-2300 hrs and Sat-Sun 0700-2300 hrs
	Distinguishable feature e.g. whine, clatters	Noise level < 43 dB $L_{Aeq\ 1hour}$	Mon-Fri 0700-1900 hrs
		Noise level < 40 dB $L_{Aeq\ 1hour}$	Mon-Fri 1900-2300 hrs and Sat-Sun 0700-2300 hrs
1 metre external to 243 Gray's Inn Road	No distinguishable feature	Noise level < 58 dB $L_{Aeq\ 1hour}$	Mon-Fri 0700-1900 hrs
		Noise level < 56 dB $L_{Aeq\ 1hour}$	Mon-Fri 1900-2300 hrs and Sat-Sun 0700-2300 hrs
	Distinguishable feature e.g. whine, clatters	Noise level < 53 dB $L_{Aeq\ 1hour}$	Mon-Fri 0700-1900 hrs
		Noise level < 51 dB $L_{Aeq\ 1hour}$	Mon-Fri 1900-2300 hrs and Sat-Sun 0700-2300 hrs

3.6 The measurement period of 1 hour relates to the methodology within BS 4142:2014 for plant running in the daytime. This standard assesses the likely impact by comparison of the existing background noise level, L_{A90}, with the specific 'rated' noise level, L_{Ar}, defined by the L_{Aeq} parameter.

4.0 Noise Survey

4.1 A survey of the existing noise levels was carried out from 22nd to 27th April 2015 at Location A, and from 22nd to 25th April 2015 at Location B.

4.2 At Location A, the microphone was positioned approximately 1.5 metres above the third floor level roof terrace near to 70 Acton Street.

4.3 Location B was selected to be representative of the noise levels external to 243 Gray's Inn Road. The microphone was positioned out of the existing fifth floor store room window approximately 300 mm from the Gray's Inn Road facing façade. It was not considered practical to position the microphone 1 metre from the façade for the duration of the survey. A sample of manned measurements was taken at 1 metre from the façade simultaneously with those at 300 mm and the difference between the two measurements was negligible (i.e. <1 dB for the L_{Aeq} and L_{A90} parameters).

4.4 The measurements were taken using Norsonic 118 Class 1 precision sound level meters. The meters were calibrated at the start and end of the survey with no significant drift.

4.5 Sound level measurements were taken automatically at 5 minute samples over the duration of the survey.

4.6 Weather conditions were dry and were considered suitable for carrying out sound level measurements. Wind speeds where typically less than 5 m/s with some marginal exceedances which when discarded are not considered to have affected the results. The microphones were fitted with an integrated weather kit and windshield.

4.7 The results of the noise survey can be found in Appendix B.

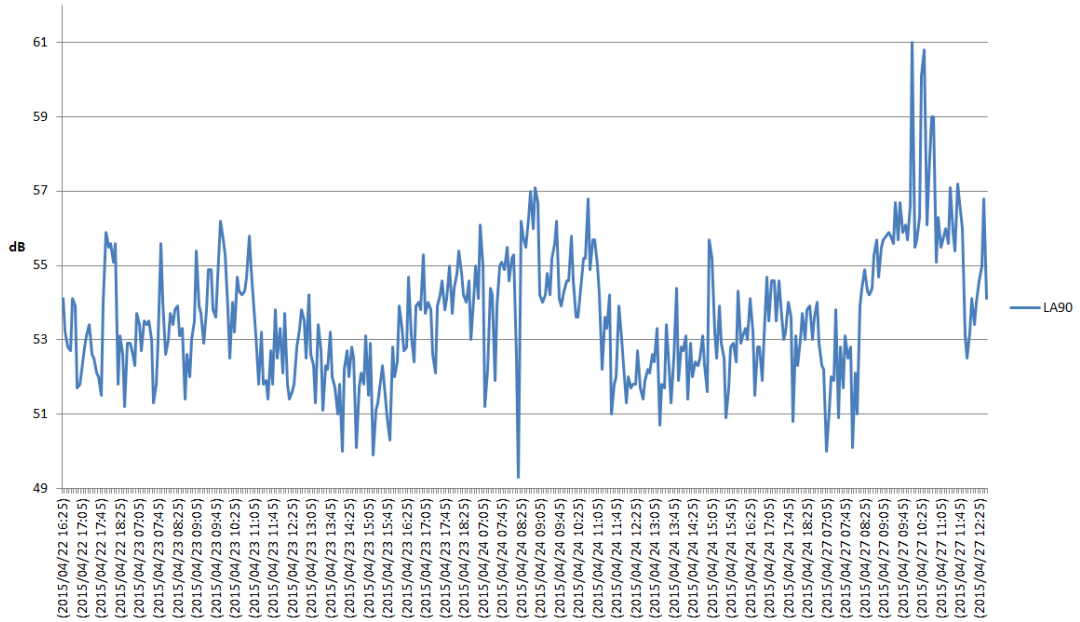
4.8 Camden require consideration of background noise level for assessment of plant noise.

4.9 SR has been advised that the operating hours for plant associated with the offices are:

- Weekdays (i.e. Mon-Fri) 0700-1900 hours

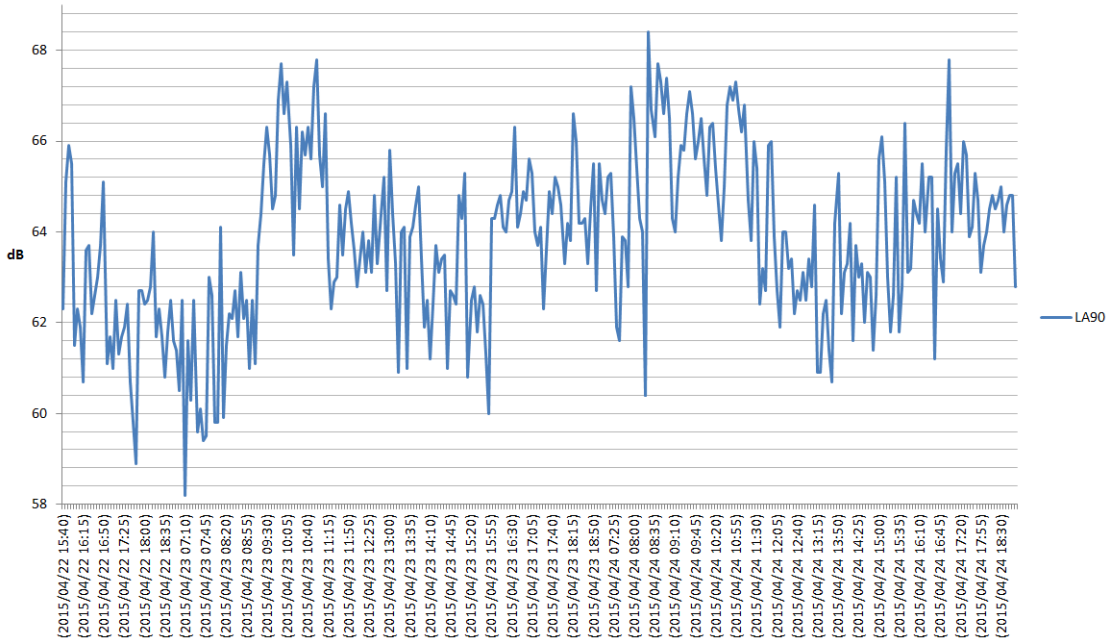
4.10 The following graphs show the background noise level results of the survey in graphical form for the operating hours mentioned above for the two locations.

Graph Showing the Measured Background Noise Levels on Weekdays 0700-1900 Hours at Location A



4.11 It is thus determined from visual inspection of the graph that the typical weekday background noise level is 53 dB L_{A90} at Location A.

Graph Showing the Measured Background Noise Levels on Weekdays 0700-1900 Hours at Location B



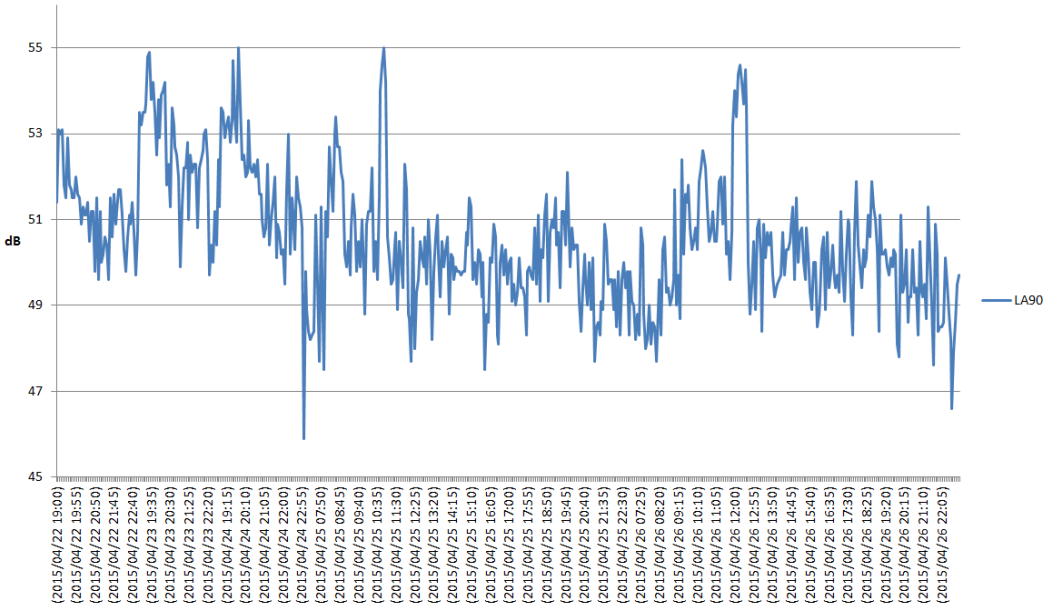
4.12 Visual inspection of the graph above indicates a typical weekday background noise level of 63 dB L_{A90} at Location B.

4.13 SR has been advised that the operating hours for plant associated with the eatery/licensed café are the same as for the offices, plus operation between 1900-2300 hours Monday to Friday, and between 1000-2300 on Saturdays, Sundays and bank holidays.

4.14 The following graphs show the background noise level results of the survey in graphical form for weekday evenings and weekend daytime for the two locations.

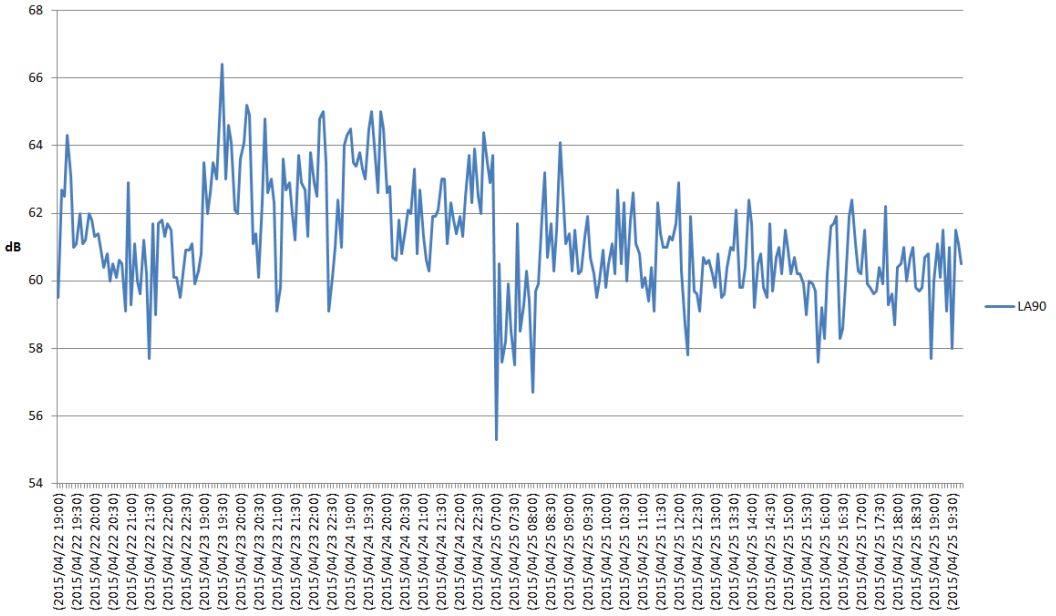
4.15 Although it is proposed that the plant associated with the eatery/licensed café does not operate until 1000 on a weekend, we have conducted the assessment from 0700, therefore providing a more robust assessment.

Graph Showing the Measured Background Noise Levels on Weekday Evenings 1900-2300 hours and Weekends 0700-2300 hours at Location A



4.16 Visual inspection of the graph indicates a typical evening and weekend background noise level of 50 dB L_{A90} at Location A.

Graph Showing the Measured Background Noise Levels on Weekday Evenings 1900-2300 hours and Weekends 0700-2300 hours at Location B



4.17 Visual inspection of the graph above indicates a typical evening and weekend background noise level of 61 dB L_{A90} at Location B.

5.0 Assessment

Atmospheric Noise Emissions From Building Services Plant

5.1 The assessment of plant noise was conducted using Noysplot, an in-house acoustic computer model which allows the assessment of a noise control scheme to comply with the noise criteria. The noise model provides an accurate prediction method for assessing environmental noise from, in particular, plant and equipment items which can be perceived as being point sources. X,Y and Z co-ordinates are used to specify the location of sources, receivers and screens.

5.2 The following information was input into the model:

- Locations of the building services plant and their atmospheric noise emissions, their orientation and their noise data.
    - The source data can be found in Appendix E.
- Locations and details of any screening, including the building itself.
- Locations of five receivers:
    - 70 Acton Street, first floor
    - 70 Acton Street, second floor
    - 70 Acton Street, third floor
    - 243 Gray's Inn Road second floor
    - 243 Gray's Inn Road third floor

5.3 The noise model carries out atmospheric side calculations at each receiver position from each source allowing for the attenuation such as from the calculated distance and screening, as well as including for reflections. The calculations are performed in octave bands from 63 Hz to 8 kHz and can be summarised as dBA values.

5.4 The computer model maintains a logarithmic total of the noise level in octave bands. At the end of each program "run", the overall noise level at each receiver position are calculated and ranked in descending order of noise level. Where this ranking shows that the receiver position's noise level exceeds the noise criterion, each calculation can be interrogated to determine the plant items needing more detailed inspection to establish attenuation needed. The process is repeated until either the noise level meets the noise criterion or the program demonstrates that other noise control methods are needed.

5.5 Whether there is a character or distinguishable feature to the plant is not known. The cumulative nature of multiple sources often blurs such character such that this is not evident as from a single dominant source. However to provide a robust assessment, the more onerous noise criteria are assumed.

5.6 The noise criteria assuming some of the plant has a distinguishable feature is:

70 Acton Street

- Noise level < 43 dB $L_{Aeq\ 1hour}$ (Monday-Friday 0700-1900 hours)
- Noise level < 40 dB $L_{Aeq\ 1hour}$ (Monday-Friday 1900-2300 hours and Saturday-Sunday 0700-2300 hours)

243 Gray's Inn Road

- Noise level < 53 dB $L_{Aeq\ 1hour}$ (Monday-Friday 0700-1900 hours)
- Noise level < 51 dB $L_{Aeq\ 1hour}$ (Monday-Friday 1900-2300 hours and Saturday-Sunday 0700-2300 hours)

5.7 The calculation is shown in summary in Appendix F which shows compliance with the noise limits stated above. The maximum predicted noise level at 70 Acton Street is 42 dB $L_{Aeq\ 1hour}$ between 0700-1900 hours Monday to Friday, and 38 dB $L_{Aeq\ 1hour}$ at 243 Gray's Inn Road. Between 1900-2300 hours Monday to Friday and 0700-2300 hours Saturday to Sunday, at 70 Acton Street, the maximum predicted noise level is 39 dB $L_{Aeq\ 1hour}$ and 31 dB at 243 Gray's Inn Road.

5.8 To achieve this, the following is required and proposed to be included to the scheme:

- Indoor heat exchange units Mitsubishi LGH-100RVX-E
  - These require an attenuator for the inlet and exhaust with the corresponding minimum insertion losses as follows:

	1/1 Octave Centre Frequencies							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Minimum Insertion Loss (dB)	5	8	13	24	30	31	22	11

- Indoor heat exchange units Mitsubishi LGH-50RVX-E
  - These require an attenuator for the inlet and exhaust with the corresponding minimum insertion losses as follows:

	1/1 Octave Centre Frequencies							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Minimum Insertion Loss (dB)	4	5	11	21	26	32	20	9

- Indoor heat exchange units Mitsubishi LGH-15RVX-E
  - These require an attenuator for the inlet and exhaust with the corresponding minimum insertion losses as follows:

	1/1 Octave Centre Frequencies							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Minimum Insertion Loss (dB)	3	4	10	18	23	25	25	12

- Indoor heat exchange units Nuaire XBC25
  - These require an attenuator for the inlet with the corresponding minimum insertion losses as follows:

	1/1 Octave Centre Frequencies							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Minimum Insertion Loss (dB)	9	14	22	29	36	32	26	20

  - These require an attenuator for the exhaust with the corresponding minimum insertion losses as follows:

	1/1 Octave Centre Frequencies							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Minimum Insertion Loss (dB)	12	19	32	45	50	42	32	24

- Indoor kitchen supply fan Vent-Axia LCA503212
  - This requires an attenuator for the inlet with the corresponding minimum insertion losses as follows:

	1/1 Octave Centre Frequencies							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Minimum Insertion Loss (dB)	14	19	32	45	50	42	32	24

- Indoor kitchen extract fan Vent-Axia EKF560E3
  - This requires an attenuator for the exhaust with the corresponding minimum insertion losses as follows:

	1/1 Octave Centre Frequencies							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Minimum Insertion Loss (dB)	12	19	32	45	50	42	32	24

5.9 It was found that the three roof top outdoor heating and heating cooling units do not require attenuation.

Sound Insulation between the Eatery/Licensed Café/Seminar Event Space and Neighbouring Offices

5.10 It is proposed the ground floor be used as an eatery/licensed Café. The offices on the lower ground floor are to be used as a seminar event space. The uses of this space include meetings, workshops, seminars, events in theatre and classroom style, conferences, breakfast meetings and book launches. None of these uses are expected to produce levels greater than raised voices, moderately amplified music levels at ground level or occasional amplified activity at lower ground level.

5.11 On the lower ground floor, there is a buffer zone between this space and the adjacent offices provided by the staircases and escape routes which are at least 1.8 metres wide.

This would provide adequate protection and it is not expected that such uses would be discernible in the offices of the adjacent building.

5.12 On the ground floor there is also a buffer zone provided by the staircase which is at least 2 metres wide which is present for part of the space. To control noise transfer from the eatery/licensed café space we recommend there is an independent lining to walls which are adjacent to the offices of the neighbouring building, i.e. the staircase wall and kitchen wall where no buffers are present. The independent lining should carry around at least to the window. Details of the lining are to be agreed post planning but would comprise of 2-3 layers of dense plasterboard on independent stud and insulated as practical.

5.13 Any additional noise control would need to be in the form of limiting background music and hours. The eatery/licensed café is not expected to operate with anything other than background music in the daytime, when the adjacent offices will be operating. Such measures would be agreed based on both planning and licencing consents.

6.0 Conclusions

6.1 SR have assessed the proposed refurbishment at Headland House.

6.2 A noise survey was carried out at the site to establish the background and ambient noise levels representative of the critical receptors.

6.3 Our assessment indicates with the inclusion of the mitigation described, the plant noise limits derived from the survey based on the criteria defined in Camden's Development Policy DP28 can be met.

6.4 Advice with respect to controlling noise from the proposed eatery/licensed café and seminar event space has been provided.

APPENDIX A

PROPOSED GROUND FLOOR PLAN AND PLANS SHOWING NOISE MEASUREMENT LOCATIONS, AND LOCATIONS OF ADJACENT NOISE SENSITIVE PREMISES

A1: Proposed Ground Floor Plan

Extract from drawing by Pascall + Watson

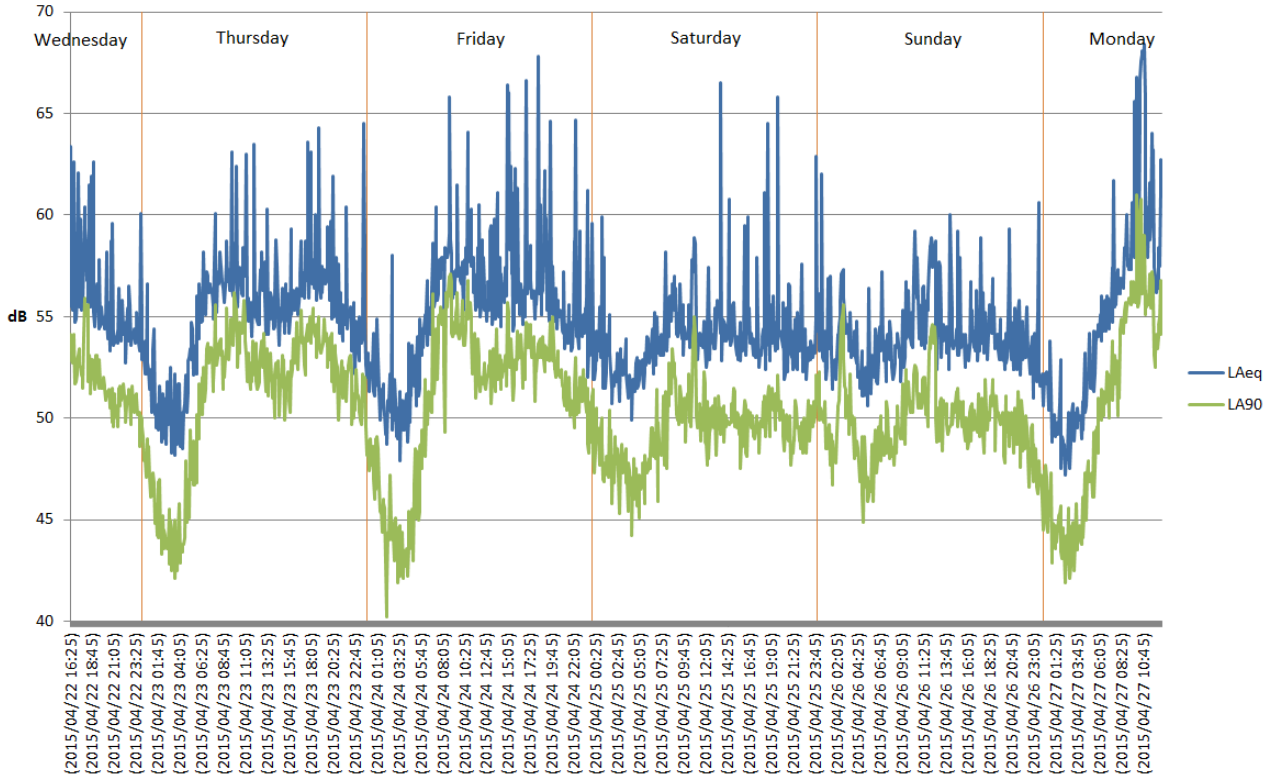
2 Proposed floor plan
1:100

A2: Plans showing noise measurement locations and locations of adjacent noise sensitive premises.

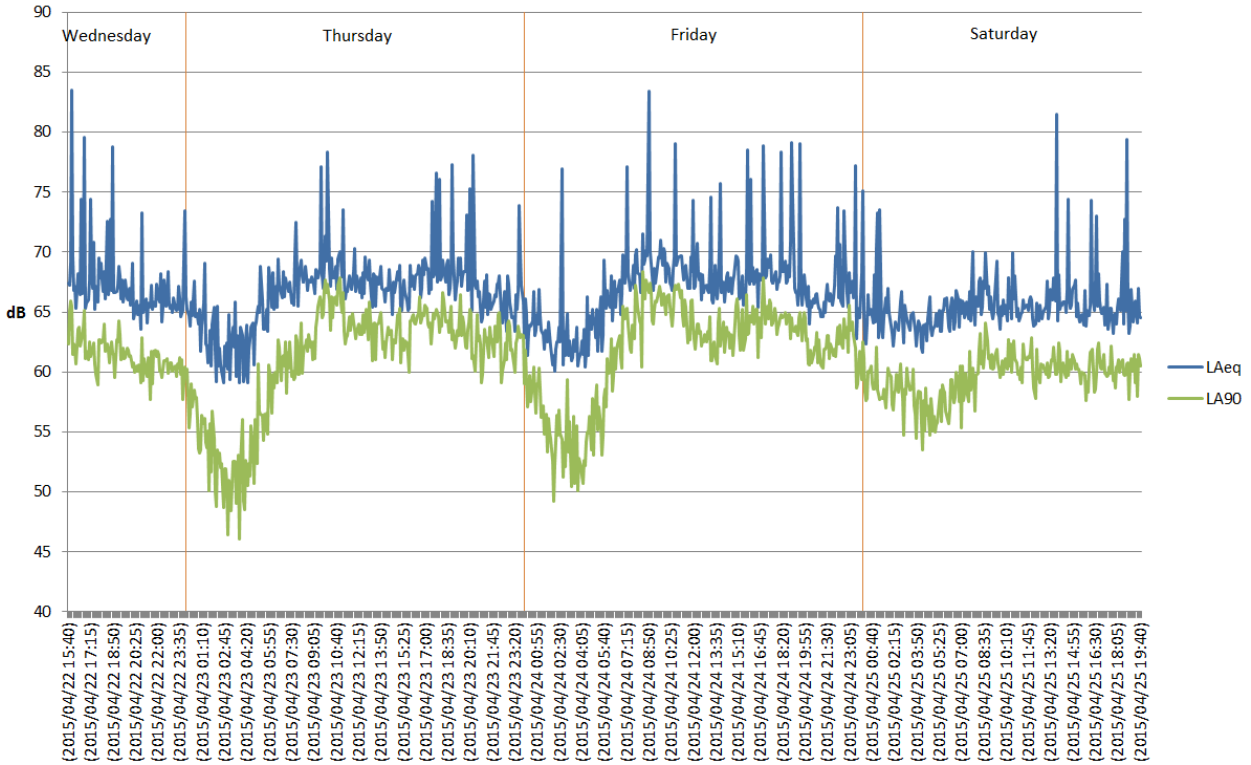
APPENDIX B

NOISE SURVEY RESULTS

Location A: Noise Survey Results



Location B: Noise Survey Results



APPENDIX C

COMMON ACOUSTIC PARAMETERS FOR ENVIRONMENTAL SURVEYS

These are the main noise indices in use in the UK:

L_{A90}: The sound level (in dBA) exceeded for 90% of the time. This unit gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the "background noise level" of an area.

L_{AeqT}: The equivalent continuous sound level over a period of time, T. This unit may be described as "the notional steady noise level that would provide, over a period, the same energy as the varying noise in question". In other words, the energy average level. This unit may be described as the ambient noise level and is used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as road traffic, aircraft and trains.

L_{A10}: The sound level (in dBA) exceeded for 10% of the time. This level gives an indication of the sound level during the noisier periods of time in any given sample. It has been used over many years to measure and assess road traffic noise.

L_{A1}: The sound level (in dBA) exceeded for 1% of the time. This unit can give an indication of a regular maximum noise level from such activities as dance music.

SEL: The sound exposure level, (often denoted LAE) is the noise level of an event, such as a train or aircraft event, normally expressed in a 1 second time period.

L_{Amax}: The maximum level of sound, i.e. the peak level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.

APPENDIX D

PLANT DETAILS

The proposed plant consists of the following:

Fifth Floor Roof

- Outdoor heating and cooling unit
  - 1 x Mitsubishi PURY-P450YLM-A1
  - 1 x Mitsubishi PURY-P600YSLM-A1
  - 1 x Mitsubishi PURY-P650YSLM-A1

Fifth Floor

- Indoor heat exchange units
  - 1 x Mitsubishi LGH-100RVX-E
  - Associated air inlets and exhausts
- 1 x Toilet extract fan, Vent-Axia 17104010

Fourth Floor

- Indoor heat exchange units
  - 1 x Mitsubishi LGH-100RVX-E
  - Associated air inlets and exhausts
- 1 x Toilet extract fan, Vent-Axia 17104010

Third Floor

- Indoor heat exchange units
  - 1 x Mitsubishi LGH-100RVX-E
  - Associated air inlets and exhausts
- 1 x Toilet extract fan, Vent-Axia 17104010

Second Floor

- Indoor heat exchange units
  - 1 x Mitsubishi LGH-100RVX-E and 1 x Mitsubishi LGH50RVX-E
  - Associated air inlets and exhausts
- 1 x Toilet extract fan, Vent-Axia 17104010

First Floor

- Indoor heat exchange units
  - 1 x Mitsubishi LGH-100RVX-E and 1 x Mitsubishi LGH50RVX-E
  - Associated air inlets and exhausts
- 1 x Toilet extract fan, Vent-Axia 17104010
- Indoor kitchen supply fan
  - 1 x Vent-Axia LCA503212
  - Associated air inlet
- Indoor kitchen extract fan
  - 1 x Vent-Axia EKF560E3
  - Associated exhaust

Ground Floor

- Indoor heat exchange units
  - 2 x Nuaire XBC25 and 1 x Mitsubishi LGH15RVX-E
  - Associated air inlets and exhausts
- 1 x Toilet extract fan, Vent-Axia 17104010

Lower Ground Floor

- Indoor heat exchange units
  - 4 x Nuaire XBC25
  - Associated air inlets and exhausts
- 1 x Toilet extract fan, Vent-Axia 17104010

APPENDIX E

SOURCE DATA

SHARPS REDMORE PARTNERSHIP, THE WHITE HOUSE, LONDON ROAD, COPDOCK, IPSWICH. IP8 3JH
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CLIENT :

PROJECT :Headland House - NUJ

PROJECT No:1515269

CONSULTANT:JJ

DATE :27 May 2015

SOUND POWER LEVELS (Lw) & SOUND PRESSURE LEVELS (Lp)
FOR FANS AND OTHER EQUIPMENT

EQUIPMENT NAME/REFERENCE	Lw/Lp	DIST. (m)	OP. TIME DNA	MID FREQUENCY OCTAVE BANDS (HZ) 63	125	250	500	1k	2k	4k	8k
Heating/Cooling Unit P450 Roof	Lp	1	A	73	70	65	61	56	51	47	41
Heating/Cooling Unit P600 Roof	Lp	1	D	77	72	68	65	59	51	45	40
Heating/Cooling Unit P650 Roof	Lp	1	D	77	72	68	65	59	51	46	40
Heat Exchange Unit LGH100 Inlet 5th Flr	Lw		D	72	72	68	69	67	67	63	52
Heat Exchange Unit LGH100 Exhaust 5th Fl	Lw		D	72	72	68	69	67	67	63	52
Heat Exchange Unit LGH100 Inlet 4th Flr	Lw		D	72	72	68	69	67	67	63	52
Heat Exchange Unit LGH100 Exhaust 4th Fl	Lw		D	72	72	68	69	67	67	63	52
Heat Exchange Unit LGH100 Inlet 3rd Flr	Lw		D	72	72	68	69	67	67	63	52
Heat Exchange Unit LGH100 Exhaust 3rd Fl	Lw		D	72	72	68	69	67	67	63	52
Heat Exchange Unit LGH100 Inlet 2nd Flr	Lw		D	72	72	68	69	67	67	63	52
Heat Exchange Unit LGH100 Exhaust 2nd Fl	Lw		D	72	72	68	69	67	67	63	52
Heat Exchange Unit LGH100 Inlet 1st Flr	Lw		D	72	72	68	69	67	67	63	52
Heat Exchange Unit LGH100 Exhaust 1st Fl	Lw		D	72	72	68	69	67	67	63	52
Heat Exchange Unit LGH50 Inlet 2nd Flr	Lw		D	65	68	66	63	59	61	57	45
Heat Exchange Unit LGH50 Exhaust 2nd Flr	Lw		D	65	68	66	63	59	61	57	45
Heat Exchange Unit LGH50 Inlet 1st Flr	Lw		D	65	68	66	63	59	61	57	45
Heat Exchange Unit LGH50 Exhaust 1st Flr	Lw		D	65	68	66	63	59	61	57	45
Heat Exchange Unit LGH15 Inlet Gnd Flr	Lw		A	54	57	54	53	51	46	41	33
Heat Exchange Unit LGH15 Exhaust Gnd Flr	Lw		A	54	57	54	53	51	46	41	33
Heat Exchange Unit XBC25 Inlet Gnd Flr (	Lw		A	80	74	72	74	69	65	57	56

NOTES:

1. Lw/Lp:
   Lw means sound power level (dB)
   Lp means sound pressure level at stated distance (dB/m)

2. Operational time (OP.TIME D/A) :
   D (Daytime only) - could operate at any time between 0700-1900 hours Monday to Friday
   A (All) - could operate at any time between 0700-2300 hours Monday to Sunday

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CLIENT :

PROJECT :Headland House - NUJ

PROJECT No:1515269

CONSULTANT:JJ

DATE :27 May 2015

SOUND POWER LEVELS (Lw) & SOUND PRESSURE LEVELS (Lp)
FOR FANS AND OTHER EQUIPMENT

EQUIPMENT NAME/REFERENCE	Lw/Lp	DIST. (m)	OP. TIME DNA	MID FREQUENCY OCTAVE BANDS (HZ) 63	125	250	500	1k	2k	4k	8k
Heat Exchange Unit XBC25 Exhaust Gnd Flr	Lw		A	86	87	81	84	75	75	73	74
Heat Exchange Unit XBC25 Inlet LG Flr (x	Lw		A	83	77	75	77	72	68	60	59
Heat Exchange Unit XBC25 Exhaust LG Flr	Lw		A	89	90	84	87	78	78	76	77
Toilet Extract 5th Flr	Lp	3	D	Maximum 23dBA at 3 metres							
Toilet Extract 4th Flr	Lp	3	D	Maximum 23dBA at 3 metres							
Toilet Extract 3rd Flr	Lp	3	D	Maximum 23dBA at 3 metres							
Toilet Extract 2nd Flr	Lp	3	D	Maximum 23dBA at 3 metres							
Toilet Extract 1st Flr	Lp	3	D	Maximum 23dBA at 3 metres							
Toilet Extract Gnd Flr	Lp	3	A	Maximum 23dBA at 3 metres							
Toilet Extract LG Flr	Lp	3	A	Maximum 23dBA at 3 metres							
Kitchen Extract Exhaust Gnd Fl	Lw		A	57	71	78	78	78	76	71	65
Kitchen Supply Intake Gnd Fl	Lw		A	92	83	90	90	90	86	84	77

NOTES:

1. Lw/Lp:
   Lw means sound power level (dB)
   Lp means sound pressure level at stated distance (dB/m)

2. Operational time (OP.TIME D/A) :
   D (Daytime only) - could operate at any time between 0700-1900 hours Monday to Friday
   A (All) - could operate at any time between 0700-2300 hours Monday to Sunday

SHARPS REDMORE PARTNERSHIP, THE WHITE HOUSE, LONDON ROAD, COPDOCK, IPSWICH. IP8 3JH
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CLIENT :	Sht: 1 of 2
PROJECT :Headland House - NUJ	PROJECT No:1515269
CONSULTANT:JJ	DATE :27 May 2015

ATMOSPHERIC SIDE DYNAMIC INSERTION LOSSES

FOR NOISE CONTROL EQUIPMENT

EQUIPMENT NAME/REFERENCE	MID FREQUENCY OCTAVE BANDS (HZ)							
	63	125	250	500	1k	2k	4k	8k
Heat Exchange Unit LGH100 Inlet 5th Flr	5	8	13	24	30	31	22	11
Heat Exchange Unit LGH100 Exhaust 5th Flr	5	8	13	24	30	31	22	11
Heat Exchange Unit LGH100 Inlet 4th Flr	5	8	13	24	30	31	22	11
Heat Exchange Unit LGH100 Exhaust 4th Flr	5	8	13	24	30	31	22	11
Heat Exchange Unit LGH100 Inlet 3rd Flr	5	8	13	24	30	31	22	11
Heat Exchange Unit LGH100 Exhaust 3rd Flr	5	8	13	24	30	31	22	11
Heat Exchange Unit LGH100 Inlet 2nd Flr	5	8	13	24	30	31	22	11
Heat Exchange Unit LGH100 Exhaust 2nd Flr	5	8	13	24	30	31	22	11
Heat Exchange Unit LGH100 Inlet 1st Flr	5	8	13	24	30	31	22	11
Heat Exchange Unit LGH100 Exhaust 1st Flr	5	8	13	24	30	31	22	11
Heat Exchange Unit LGH50 Inlet 2nd Flr	4	5	11	21	26	32	20	9
Heat Exchange Unit LGH50 Exhaust 2nd Flr	4	5	11	21	26	32	20	9
Heat Exchange Unit LGH50 Inlet 1st Flr	4	5	11	21	26	32	20	9
Heat Exchange Unit LGH50 Exhaust 1st Flr	4	5	11	21	26	32	20	9
Heat Exchange Unit LGH15 Inlet Gnd Flr	3	4	10	18	23	25	25	12
Heat Exchange Unit LGH15 Exhaust Gnd Flr	3	4	10	18	23	25	25	12
Heat Exchange Unit XBC25 Inlet Gnd Flr (x2)	9	14	22	29	36	32	26	20
Heat Exchange Unit XBC25 Exhaust Gnd Flr (x2)	12	19	32	45	50	42	32	24
Heat Exchange Unit XBC25 Inlet LG Flr (x4)	9	14	22	29	36	32	26	20
Heat Exchange Unit XBC25 Exhaust LG Flr (x4)	12	19	32	45	50	42	32	24

NOTES:

Dynamic insertion loss is the logarithmic summation of the air regenerated sound power level and the residual fan sound power level after subtracting the proposed static insertion loss. If this concept is unclear or if you have other queries, contact Sharps Redmore Partnership.

After tendering, please send a copy of your proposed insertion losses, air regenerated Lw, passage velocities, pressure losses, air volumes, weights and dimensions to SRP.

SHARPS REDMORE PARTNERSHIP, THE WHITE HOUSE, LONDON ROAD, COPDOCK, IPSWICH. IP8 3JH
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CLIENT :	Sht: 2 of 2
PROJECT :Headland House - NUJ	PROJECT No:1515269
CONSULTANT:JJ	DATE :27 May 2015

ATMOSPHERIC SIDE DYNAMIC INSERTION LOSSES

FOR NOISE CONTROL EQUIPMENT

EQUIPMENT NAME/REFERENCE	MID FREQUENCY OCTAVE BANDS (HZ)							
	63	125	250	500	1k	2k	4k	8k
Kitchen Extract Exhaust Gnd Fl	12	19	32	45	50	42	32	24
Kitchen Supply Intake Gnd Fl	14	19	32	45	50	42	32	24

NOTES:

Dynamic insertion loss is the logarithmic summation of the air regenerated sound power level and the residual fan sound power level after subtracting the proposed static insertion loss. If this concept is unclear or if you have other queries, contact Sharps Redmore Partnership.

After tendering, please send a copy of your proposed insertion losses, air regenerated Lw, passage velocities, pressure losses, air volumes, weights and dimensions to SRP.

APPENDIX F

CALCULATION SUMMARY

0700-1900 hours Monday to Friday

Overall receptor noise levels

Overall receptor listings	Mid frequency octave bands (Hz) 63	125	250	500	1k	2k	4k	8k	dBA
70 Acton Street 1st Floor	56	50	42	35	28	27	33	37	42
70 Acton Street 2nd Floor	56	50	43	35	28	28	33	36	42
70 Acton Street 3rd Floor	56	49	43	36	29	28	33	35	41
243 Grays Inn Road 3rd Floor	53	47	41	36	28	18	10	1	38
243 Grays Inn Road 2nd Floor	51	44	38	33	24	14	8	1	35

Source noise levels at each receiver

Source noise levels at receiver: 70 Acton Street 1st Floor	Mid frequency octave bands (Hz) 63	125	250	500	1k	2k	4k	8k	dBA
Heat Exchange Unit XBC25 Exhaust Gnd Flr (x2)	47	46	30	21	7	16	24	33	35
Kitchen Supply Intake Gnd Fl	54	40	34	21	16	20	28	29	35
Heat Exchange Unit XBC25 Exhaust LG Flr (x4)	43	42	27	18	4	13	21	30	32
Heat Exchange Unit LGH100 Exhaust 1st Flr	34	36	33	26	19	18	24	24	31
Heat Exchange Unit LGH100 Exhaust 2nd Flr	33	35	31	24	17	16	22	22	29
Heating/Cooling Unit P650 Roof	45	38	31	25	18	10	5	0	28
Heat Exchange Unit LGH100 Inlet 1st Flr	31	33	30	23	16	15	21	21	28
Heat Exchange Unit LGH100 Exhaust 3rd Flr	32	34	30	22	15	14	20	20	27
Heating/Cooling Unit P600 Roof	45	37	30	24	18	10	4	0	27
Heat Exchange Unit LGH100 Inlet 2nd Flr	30	32	28	21	14	13	19	19	26
Heat Exchange Unit XBC25 Inlet LG Flr (x4)	40	33	28	24	13	14	12	17	26
Heat Exchange Unit LGH100 Exhaust 4th Flr	31	32	28	20	12	11	17	17	25
Heat Exchange Unit LGH100 Inlet 3rd Flr	29	31	27	19	12	11	17	17	24
Kitchen Extract Exhaust Gnd Fl	12	23	22	11	6	12	18	20	23
Heating/Cooling Unit P450 Roof	39	34	26	19	14	9	5	0	23
Heat Exchange Unit LGH100 Exhaust 5th Flr	31	31	26	18	10	9	13	13	23
Heat Exchange Unit LGH100 Inlet 4th Flr	28	29	25	17	9	8	14	14	22
Heat Exchange Unit LGH50 Exhaust 1st Flr	30	34	26	15	4	0	5	1	21
Toilet Extract 1st Flr	21	16	13	13	13	13	13	16	21
Toilet Extract Gnd Flr	21	16	13	13	13	13	13	16	21
Heat Exchange Unit LGH50 Exhaust 2nd Flr	29	33	25	14	3	0	4	0	20
Heat Exchange Unit LGH100 Inlet 5th Flr	28	28	23	15	7	6	10	10	20
Heat Exchange Unit LGH50 Inlet 2nd Flr	28	32	24	13	2	0	3	0	19
Heat Exchange Unit LGH50 Inlet 1st Flr	28	32	24	13	2	0	3	0	19
Toilet Extract 2nd Flr	20	15	12	11	11	11	11	14	19
Toilet Extract LG Flr	20	15	11	11	10	10	10	13	18
Toilet Extract 3rd Flr	19	14	10	10	9	9	9	12	17
Toilet Extract 4th Flr	18	12	9	8	7	6	6	9	14
Toilet Extract 5th Flr	18	11	7	6	5	4	4	5	12
Heat Exchange Unit LGH15 Exhaust Gnd Flr	20	23	15	8	0	0	0	0	11
Heat Exchange Unit LGH15 Inlet Gnd Flr	19	22	14	7	0	0	0	0	10
Heat Exchange Unit XBC25 Inlet Gnd Flr (x2)	20	14	7	3	0	0	0	0	0
Total Facade Lp and dBA	56	50	42	35	28	27	33	37	42

Source noise levels at receiver: 70 Acton Street 2nd Floor	Mid frequency octave bands (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
Kitchen Supply Intake Gnd Fl	54	40	34	21	16	20	28	29	35
Heat Exchange Unit XBC25 Exhaust Gnd Flr (x2)	46	44	28	19	5	14	22	31	33
Heat Exchange Unit LGH100 Exhaust 2nd Flr	34	36	33	26	19	18	24	24	31
Heat Exchange Unit LGH100 Exhaust 1st Flr	34	36	33	26	19	18	24	24	31
Heat Exchange Unit LGH100 Exhaust 3rd Flr	33	35	31	24	17	16	22	22	29
Heating/Cooling Unit P650 Roof	45	38	31	25	18	10	5	0	28
Heat Exchange Unit LGH100 Inlet 1st Flr	31	33	30	23	16	15	21	21	28
Heat Exchange Unit LGH100 Inlet 2nd Flr	31	33	30	23	16	15	21	21	28
Heat Exchange Unit XBC25 Exhaust LG Flr (x4)	41	39	24	15	1	8	16	25	28
Heat Exchange Unit LGH100 Exhaust 4th Flr	32	34	30	22	15	14	20	20	27
Heating/Cooling Unit P600 Roof	45	37	30	24	18	10	4	0	27
Heat Exchange Unit LGH100 Inlet 3rd Flr	30	32	28	21	14	13	19	19	26
Heat Exchange Unit LGH100 Exhaust 5th Flr	31	32	28	20	12	11	17	17	25
Heating/Cooling Unit P450 Roof	41	35	27	20	15	10	6	0	24
Heat Exchange Unit LGH100 Inlet 4th Flr	29	31	27	19	12	11	17	17	24
Heat Exchange Unit XBC25 Inlet LG Flr (x4)	38	32	26	22	10	11	9	14	24
Kitchen Extract Exhaust Gnd Fl	12	23	22	11	6	12	18	20	23
Heat Exchange Unit LGH100 Inlet 5th Flr	28	29	25	17	9	8	14	14	22
Heat Exchange Unit LGH50 Exhaust 2nd Flr	30	34	26	15	4	0	5	1	21
Heat Exchange Unit LGH50 Exhaust 1st Flr	30	34	26	15	4	0	5	1	21
Toilet Extract 1st Flr	21	16	13	13	13	13	13	16	21
Toilet Extract 2nd Flr	21	16	13	13	13	13	13	16	21
Heat Exchange Unit LGH50 Inlet 1st Flr	28	32	24	13	2	0	3	0	19
Heat Exchange Unit LGH50 Inlet 2nd Flr	28	32	24	13	2	0	3	0	19
Toilet Extract Gnd Flr	20	15	12	11	11	11	11	14	19
Toilet Extract 3rd Flr	20	15	12	11	11	11	11	14	19
Toilet Extract 4th Flr	19	14	10	10	9	9	9	12	17
Toilet Extract LG Flr	19	13	10	9	8	7	7	10	15
Toilet Extract 5th Flr	18	12	9	8	7	6	6	9	14
Heat Exchange Unit LGH15 Exhaust Gnd Flr	19	22	14	7	0	0	0	0	10
Heat Exchange Unit LGH15 Inlet Gnd Flr	18	21	13	6	0	0	0	0	9
Heat Exchange Unit XBC25 Inlet Gnd Flr (x2)	19	12	5	1	0	0	0	0	0
Total Facade Lp and dBA	56	50	43	35	28	28	33	36	42

Source noise levels at receiver: 70 Acton Street 3rd Floor	Mid frequency octave bands (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
Kitchen Supply Intake Gnd Fl	53	39	33	20	15	19	27	28	34
Heat Exchange Unit LGH100 Exhaust 2nd Flr	34	36	33	26	19	18	24	24	31
Heat Exchange Unit LGH100 Exhaust 3rd Flr	34	36	33	26	19	18	24	24	31
Heat Exchange Unit XBC25 Exhaust Gnd Flr (x2)	44	42	25	15	1	10	18	27	30
Heating/Cooling Unit P650 Roof	47	39	32	26	19	11	6	0	29
Heating/Cooling Unit P600 Roof	46	39	32	26	19	11	5	0	29
Heat Exchange Unit LGH100 Exhaust 1st Flr	33	35	31	24	17	16	22	22	29
Heat Exchange Unit LGH100 Exhaust 4th Flr	33	35	31	24	17	16	22	22	29
Heat Exchange Unit LGH100 Inlet 2nd Flr	31	33	30	23	16	15	21	21	28
Heat Exchange Unit LGH100 Inlet 3rd Flr	31	33	30	23	16	15	21	21	28
Heat Exchange Unit LGH100 Exhaust 5th Flr	32	34	30	22	15	14	20	20	27
Heat Exchange Unit XBC25 Exhaust LG Flr (x4)	40	38	23	14	0	7	15	24	27
Heat Exchange Unit LGH100 Inlet 1st Flr	30	32	28	21	14	13	19	19	26
Heat Exchange Unit LGH100 Inlet 4th Flr	30	32	28	21	14	13	19	19	26
Heating/Cooling Unit P450 Roof	42	36	29	22	16	11	7	1	26
Heat Exchange Unit LGH100 Inlet 5th Flr	29	31	27	19	12	11	17	17	24
Kitchen Extract Exhaust Gnd Fl	11	22	21	10	5	11	17	19	22
Heat Exchange Unit LGH50 Exhaust 2nd Flr	30	34	26	15	4	0	5	1	21
Heat Exchange Unit XBC25 Inlet LG Flr (x4)	36	29	23	19	7	6	4	9	21
Toilet Extract 2nd Flr	21	16	13	13	13	13	13	16	21
Toilet Extract 3rd Flr	21	16	13	13	13	13	13	16	21
Heat Exchange Unit LGH50 Exhaust 1st Flr	29	33	25	14	3	0	4	0	20
Heat Exchange Unit LGH50 Inlet 2nd Flr	28	32	24	13	2	0	3	0	19
Toilet Extract 1st Flr	20	15	12	11	11	11	11	14	19
Toilet Extract 4th Flr	20	15	12	11	11	11	11	14	19
Heat Exchange Unit LGH50 Inlet 1st Flr	27	31	23	12	1	0	2	0	18
Toilet Extract 5th Flr	19	14	10	10	9	9	9	12	17
Toilet Extract Gnd Flr	19	13	10	9	8	7	7	10	15
Toilet Extract LG Flr	19	12	8	7	6	5	5	6	13
Heat Exchange Unit LGH15 Exhaust Gnd Flr	17	20	12	5	0	0	0	0	9
Heat Exchange Unit LGH15 Inlet Gnd Flr	16	19	11	4	0	0	0	0	8
Heat Exchange Unit XBC25 Inlet Gnd Flr (x2)	17	11	3	0	0	0	0	0	0
Total Facade Lp and dBA	56	49	43	36	29	28	33	35	41

Source noise levels at receiver: 243 Grays Inn Road 2nd Floor	Mid frequency octave bands (Hz) 63	125	250	500	1k	2k	4k	8k	dBA
Heating/Cooling Unit P650 Roof	47	40	34	29	20	9	3	0	31
Heating/Cooling Unit P600 Roof	47	40	34	29	20	9	2	0	31
Heating/Cooling Unit P450 Roof	43	38	31	25	17	9	4	0	28
Kitchen Supply Intake Gnd Fl	34	17	8	0	0	0	0	1	9
Heat Exchange Unit XBC25 Exhaust Gnd Flr (x2)	19	12	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Exhaust 2nd Flr	16	11	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Exhaust 3rd Flr	15	10	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Exhaust 4th Flr	16	11	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Inlet 2nd Flr	13	8	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Inlet 3rd Flr	13	8	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Exhaust 5th Flr	17	12	0	0	0	0	0	0	0
Heat Exchange Unit XBC25 Exhaust LG Flr (x4)	20	12	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Inlet 1st Flr	13	8	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Inlet 4th Flr	13	8	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Exhaust 1st Flr	15	11	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Inlet 5th Flr	15	10	0	0	0	0	0	0	0
Kitchen Extract Exhaust Gnd Fl	0	0	0	0	0	0	0	0	0
Heat Exchange Unit LGH50 Exhaust 2nd Flr	4	5	0	0	0	0	0	0	0
Heat Exchange Unit XBC25 Inlet LG Flr (x4)	17	4	0	0	0	0	0	0	0
Toilet Extract 2nd Flr	3	0	0	0	0	0	0	0	0
Toilet Extract 3rd Flr	2	0	0	0	0	0	0	0	0
Heat Exchange Unit LGH50 Exhaust 1st Flr	4	5	0	0	0	0	0	0	0
Heat Exchange Unit LGH50 Inlet 2nd Flr	3	4	0	0	0	0	0	0	0
Toilet Extract 1st Flr	2	0	0	0	0	0	0	0	0
Toilet Extract 4th Flr	3	0	0	0	0	0	0	0	0
Heat Exchange Unit LGH50 Inlet 1st Flr	3	4	0	0	0	0	0	0	0
Toilet Extract 5th Flr	4	0	0	0	0	0	0	0	0
Toilet Extract Gnd Flr	1	0	0	0	0	0	0	0	0
Toilet Extract LG Flr	1	0	0	0	0	0	0	0	0
Heat Exchange Unit LGH15 Exhaust Gnd Flr	0	0	0	0	0	0	0	0	0
Heat Exchange Unit LGH15 Inlet Gnd Flr	0	0	0	0	0	0	0	0	0
Heat Exchange Unit XBC25 Inlet Gnd Flr (x2)	10	1	0	0	0	0	0	0	0
Total Facade Lp and dBA	51	44	38	33	24	14	8	1	35

Source noise levels at receiver: 243 Grays Inn Road 3rd Floor	Mid frequency octave bands (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
Heating/Cooling Unit P650 Roof	49	43	37	32	24	13	5	0	34
Heating/Cooling Unit P600 Roof	49	43	37	32	24	13	4	0	34
Heating/Cooling Unit P450 Roof	45	41	34	28	21	13	6	0	31
Kitchen Supply Intake Gnd Fl	34	17	8	0	0	0	0	1	9
Heat Exchange Unit XBC25 Exhaust Gnd Flr (x2)	19	13	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Exhaust 2nd Flr	16	11	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Exhaust 3rd Flr	16	11	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Exhaust 4th Flr	16	11	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Inlet 2nd Flr	13	9	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Inlet 3rd Flr	14	9	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Exhaust 5th Flr	17	13	0	0	0	0	0	0	0
Heat Exchange Unit XBC25 Exhaust LG Flr (x4)	20	12	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Inlet 1st Flr	12	7	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Inlet 4th Flr	13	8	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Exhaust 1st Flr	15	10	0	0	0	0	0	0	0
Heat Exchange Unit LGH100 Inlet 5th Flr	15	10	0	0	0	0	0	0	0
Kitchen Extract Exhaust Gnd Fl	0	0	0	0	0	0	0	0	0
Heat Exchange Unit LGH50 Exhaust 2nd Flr	4	5	0	0	0	0	0	0	0
Heat Exchange Unit XBC25 Inlet LG Flr (x4)	17	4	0	0	0	0	0	0	0
Toilet Extract 2nd Flr	3	0	0	0	0	0	0	0	0
Toilet Extract 3rd Flr	3	0	0	0	0	0	0	0	0
Heat Exchange Unit LGH50 Exhaust 1st Flr	3	4	0	0	0	0	0	0	0
Heat Exchange Unit LGH50 Inlet 2nd Flr	3	4	0	0	0	0	0	0	0
Toilet Extract 1st Flr	2	0	0	0	0	0	0	0	0
Toilet Extract 4th Flr	3	0	0	0	0	0	0	0	0
Heat Exchange Unit LGH50 Inlet 1st Flr	3	4	0	0	0	0	0	0	0
Toilet Extract 5th Flr	4	0	0	0	0	0	0	0	0
Toilet Extract Gnd Flr	1	0	0	0	0	0	0	0	0
Toilet Extract LG Flr	1	0	0	0	0	0	0	0	0
Heat Exchange Unit LGH15 Exhaust Gnd Flr	0	0	0	0	0	0	0	0	0
Heat Exchange Unit LGH15 Inlet Gnd Flr	0	0	0	0	0	0	0	0	0
Heat Exchange Unit XBC25 Inlet Gnd Flr (x2)	11	1	0	0	0	0	0	0	0
Total Facade Lp and dBA	53	47	41	36	28	18	10	1	38

1900-2300 hours Monday to Friday and 0700-2300 hours Saturday to Sunday

Overall receptor noise levels

Overall receptor listings	Mid frequency octave bands (Hz) 63	125	250	500	1k	2k	4k	8k	dBA
70 Acton Street 1st Floor	55	49	37	28	21	24	30	36	39
70 Acton Street 2nd Floor	55	47	37	27	20	23	30	34	38
70 Acton Street 3rd Floor	54	45	36	26	20	21	28	32	36
243 Grays Inn Road 3rd Floor	45	41	34	28	21	13	6	1	31
243 Grays Inn Road 2nd Floor	44	38	31	25	17	9	4	1	28

Source noise levels at each receiver

Source noise levels at receiver: 70 Acton Street 1st Floor	Mid frequency octave bands (Hz) 63	125	250	500	1k	2k	4k	8k	dBA
Heat Exchange Unit XBC25 Exhaust Gnd Flr (x2)	47	46	30	21	7	16	24	33	35
Kitchen Supply Intake Gnd Fl	54	40	34	21	16	20	28	29	35
Heat Exchange Unit XBC25 Exhaust LG Flr (x4)	43	42	27	18	4	13	21	30	32
Heat Exchange Unit XBC25 Inlet LG Flr (x4)	40	33	28	24	13	14	12	17	26
Kitchen Extract Exhaust Gnd Fl	12	23	22	11	6	12	18	20	23
Heating/Cooling Unit P450 Roof	39	34	26	19	14	9	5	0	23
Toilet Extract Gnd Flr	21	16	13	13	13	13	13	16	21
Toilet Extract LG Flr	20	15	11	11	10	10	10	13	18
Heat Exchange Unit LGH15 Exhaust Gnd Flr	20	23	15	8	0	0	0	0	11
Heat Exchange Unit LGH15 Inlet Gnd Flr	19	22	14	7	0	0	0	0	10
Heat Exchange Unit XBC25 Inlet Gnd Flr (x2)	20	14	7	3	0	0	0	0	0
Total Facade Lp and dBA	55	49	37	28	21	24	30	36	39

Source noise levels at receiver: 70 Acton Street 2nd Floor	Mid frequency octave bands (Hz) 63	125	250	500	1k	2k	4k	8k	dBA
Kitchen Supply Intake Gnd Fl	54	40	34	21	16	20	28	29	35
Heat Exchange Unit XBC25 Exhaust Gnd Flr (x2)	46	44	28	19	5	14	22	31	33
Heat Exchange Unit XBC25 Exhaust LG Flr (x4)	41	39	24	15	1	8	16	25	28
Heating/Cooling Unit P450 Roof	41	35	27	20	15	10	6	0	24
Heat Exchange Unit XBC25 Inlet LG Flr (x4)	38	32	26	22	10	11	9	14	24
Kitchen Extract Exhaust Gnd Fl	12	23	22	11	6	12	18	20	23
Toilet Extract Gnd Flr	20	15	12	11	11	11	11	14	19
Toilet Extract LG Flr	19	13	10	9	8	7	7	10	15
Heat Exchange Unit LGH15 Exhaust Gnd Flr	19	22	14	7	0	0	0	0	10
Heat Exchange Unit LGH15 Inlet Gnd Flr	18	21	13	6	0	0	0	0	9
Heat Exchange Unit XBC25 Inlet Gnd Flr (x2)	19	12	5	1	0	0	0	0	0
Total Facade Lp and dBA	55	47	37	27	20	23	30	34	38

Source noise levels at receiver: 70 Acton Street 3rd Floor	Mid frequency octave bands (Hz) 63	125	250	500	1k	2k	4k	8k	dBA
Kitchen Supply Intake Gnd Fl	53	39	33	20	15	19	27	28	34
Heat Exchange Unit XBC25 Exhaust Gnd Flr (x2)	44	42	25	15	1	10	18	27	30
Heat Exchange Unit XBC25 Exhaust LG Flr (x4)	40	38	23	14	0	7	15	24	27
Heating/Cooling Unit P450 Roof	42	36	29	22	16	11	7	1	26
Kitchen Extract Exhaust Gnd Fl	11	22	21	10	5	11	17	19	22
Heat Exchange Unit XBC25 Inlet LG Flr (x4)	36	29	23	19	7	6	4	9	21
Toilet Extract Gnd Flr	19	13	10	9	8	7	7	10	15
Toilet Extract LG Flr	19	12	8	7	6	5	5	6	13
Heat Exchange Unit LGH15 Exhaust Gnd Flr	17	20	12	5	0	0	0	0	9
Heat Exchange Unit LGH15 Inlet Gnd Flr	16	19	11	4	0	0	0	0	8
Heat Exchange Unit XBC25 Inlet Gnd Flr (x2)	17	11	3	0	0	0	0	0	0
Total Facade Lp and dBA	54	45	36	26	20	21	28	32	36

Source noise levels at receiver: 243 Grays Inn Road 2nd Floor	Mid frequency octave bands (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
Heating/Cooling Unit P450 Roof	43	38	31	25	17	9	4	0	28
Kitchen Supply Intake Gnd Fl	34	17	8	0	0	0	0	1	9
Heat Exchange Unit XBC25 Exhaust LG Flr (x4)	20	12	0	0	0	0	0	0	0
Heat Exchange Unit XBC25 Exhaust Gnd Flr (x2)	19	12	0	0	0	0	0	0	0
Kitchen Extract Exhaust Gnd Fl	0	0	0	0	0	0	0	0	0
Heat Exchange Unit XBC25 Inlet LG Flr (x4)	17	4	0	0	0	0	0	0	0
Toilet Extract Gnd Flr	1	0	0	0	0	0	0	0	0
Toilet Extract LG Flr	1	0	0	0	0	0	0	0	0
Heat Exchange Unit LGH15 Exhaust Gnd Flr	0	0	0	0	0	0	0	0	0
Heat Exchange Unit LGH15 Inlet Gnd Flr	0	0	0	0	0	0	0	0	0
Heat Exchange Unit XBC25 Inlet Gnd Flr (x2)	10	1	0	0	0	0	0	0	0
Total Facade Lp and dBA	44	38	31	25	17	9	4	1	28

Source noise levels at receiver: 243 Grays Inn Road 3rd Floor	Mid frequency octave bands (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
Heating/Cooling Unit P450 Roof	45	41	34	28	21	13	6	0	31
Kitchen Supply Intake Gnd Fl	34	17	8	0	0	0	0	1	9
Heat Exchange Unit XBC25 Exhaust LG Flr (x4)	20	12	0	0	0	0	0	0	0
Heat Exchange Unit XBC25 Exhaust Gnd Flr (x2)	19	13	0	0	0	0	0	0	0
Kitchen Extract Exhaust Gnd Fl	0	0	0	0	0	0	0	0	0
Heat Exchange Unit XBC25 Inlet LG Flr (x4)	17	4	0	0	0	0	0	0	0
Toilet Extract Gnd Flr	1	0	0	0	0	0	0	0	0
Toilet Extract LG Flr	1	0	0	0	0	0	0	0	0
Heat Exchange Unit LGH15 Exhaust Gnd Flr	0	0	0	0	0	0	0	0	0
Heat Exchange Unit LGH15 Inlet Gnd Flr	0	0	0	0	0	0	0	0	0
Heat Exchange Unit XBC25 Inlet Gnd Flr (x2)	11	1	0	0	0	0	0	0	0
Total Facade Lp and dBA	45	41	34	28	21	13	6	1	31