SHARPS REDMORE

ACOUSTIC CONSULTANTS

Report

34 Great Queen Street, London

Assessment of fixed plant noise at the proposed refurbishment

Prepared by

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Project No 1414253

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Appendices

1.0 Introduction

1.1 Sharps Redmore (SR) has been instructed by CgMs Consulting on behalf of EFE Barbers Limited Trading as 'Coffee and Jam' to undertake a plant noise assessment of the proposed new plant at 34 Great Queen Street, London, WC2B 5AA, in line with the Local Authority requirements. This assessment is to accompany a planning application.

1.2 The Local Authority for this location is the London Borough of Camden.

1.3 The proposed plant consists of an air conditioning unit, to be mounted onto the rear wall in the lightwell area, above an existing condenser, as well as extract ventilation which will include a kitchen hood fan and external duct work running to roof level. In addition to this, a kitchen supply window fan and extract fan are proposed. See Appendix B for plans showing the locations of proposed plant. The model type of the units are as follows:

- Kitchen Hood Fan: Vent-Axia LCA251245
- Air Conditioning Unit: Mitsubishi SUZ-KA60VA3
- Kitchen Extract Fan: Vent-Axia ACP10012
- Kitchen Supply Window Fan: Vent-Axia W162110

1.4 The site is the ground floor and basement unit of a four storey Grade II* listed building located on Great Queen Street. It is proposed that the unit be used as a café. The area is typically made up of offices from first floor level and above, with retail units on the ground floor. To the front of the site lies Freemasons' House. To the rear of the site are residential flats within 5 and 6 storey buildings. Due to the positioning of the plant, there are two closest residential properties to be considered. It is believed that the closest residential properties to the proposed plant, and that most likely to be affected by plant noise, are a flat located on the second floor of the rear part of the building of 35 Great Queen Street, some 8 metres away from the basement level plant and the third floor of 34 Great Queen Street which is closest to where the kitchen extract duct will terminate.

1.5 There is some nearby plant which is believed to be associated with 33 Great Queen Street.

1.6 This report is structured as follows. Section 2.0 includes the assessment methodology and criteria used within this report. 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 3.0.

1.7 An assessment of the noise impact from the new plant, based on manufacturer's data and drawings provided is included in Section 4.0.

1.8 A guide to the acoustic terminology used in this report is displayed in Appendix A.

2.0 Local Authority Requirements

2.1 SR has previously made contact with the Environmental Health Officer at London Borough of Camden, Maya Rhodes for our assessment of a proposed condensing unit at the neighbouring property, 33 Great Queen Street. Our proposed methodology for our noise survey was deemed appropriate.

2.2 The document entitled Camden Development Policies 2010-2025 was consulted to determine the noise requirements for new plant. It contains a development policy specifically for Noise and Vibration called DP28. A screenshot of the table relating to the noise levels from plant and machinery at which planning permission will **not** be granted is included below.

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$L_{Aeq'}$

2.3 It can be deduced that the noise at 1 metre external to a sensitive façade should be more than 5 dB lower than the background level, L_{A90} and if the noise is deemed to have a distinguishable feature which draws attention to itself, more than 10 dB lower than the background level. In this case, the sensitive façades are taken to be that of the second floor level flat of number 35 Great Queen Street which is north east facing and the third floor of number 34 Great Queen Street which is north west facing.

3.0 Survey Details

3.1 A survey of the existing noise levels was carried out between 5th July and 8th July 2013 at the measurement location shown below. The measurement position was chosen to be representative of the noise levels 1 metre from the nearest residence. It was also positioned as far away from the plant associated with the office of 33 Great Queen Street as practical. Scaffolding on the site enabled the microphone to be positioned approximately 8 metres above the ground, roughly the same height as the window of the critical receptor at 35 Great Queen Street. Measurements at this location are also considered representative of the noise levels at the critical receptor at 34 Great Queen Street.

3.2 The measurements were taken using a Norsonic 118 Class 1 precision sound level meter. The meter was calibrated at the start and end of the survey with no significant drift. Sound level measurements were taken automatically at 5 minute samples over the duration of the survey.

3.3 Weather conditions were dry, with moderate temperatures and winds typically less than 5 m/s throughout the survey period. The weather conditions were suitable for carrying out sound level measurements.

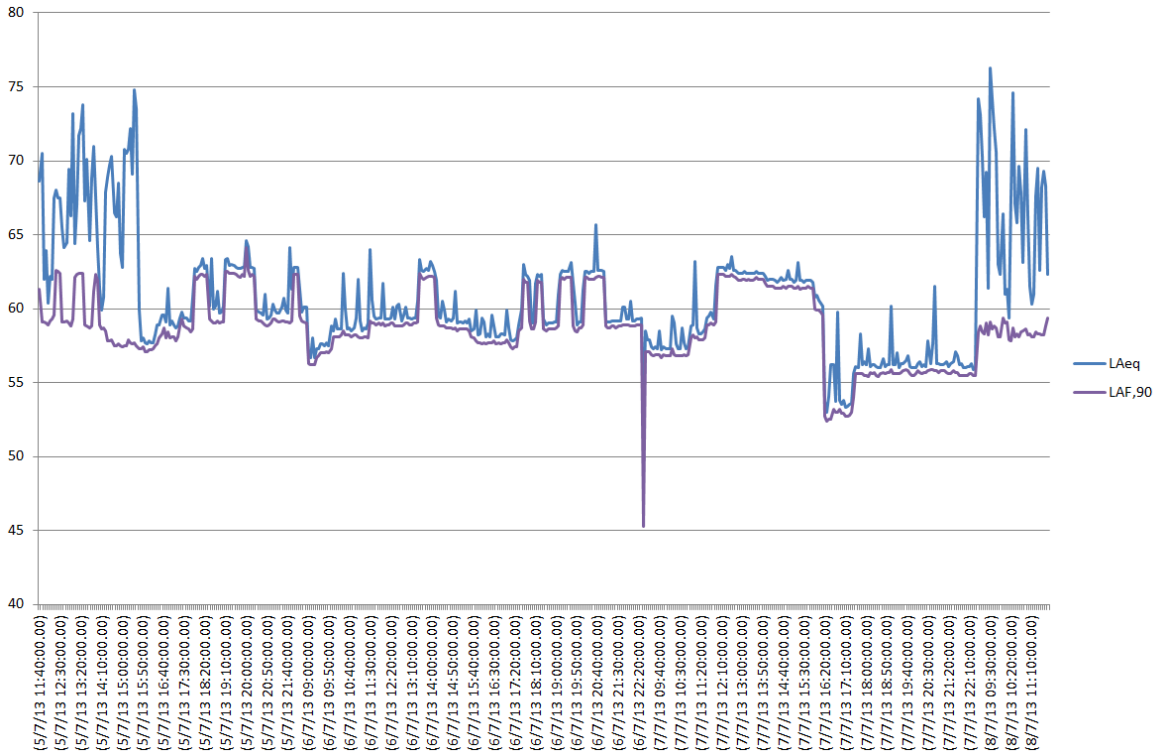
3.4 The microphone was fitted with an integrated weather kit and windshield, and mounted on a tripod, positioning the microphone approximately 1.5 metres above second floor level.

3.5 The results of the survey can be found in Appendix C.

3.6 SR has been advised that the operating hours of the plant are as follows:

- Daily (i.e. Mon-Sun) 0900-2230 hours

3.7 The graph below shows the results of the survey in graphical form for the operating hours mentioned above.



Note: Intermittent site activities are known to have taken place on Friday 5th July and Monday 8th July only, between the hours of 0730 and 1630.

3.8 The background levels measured during the survey within these operating hours were typically 57-58 dB L_{A90}. By taking the lowest typical background level, 53 dB L_{A90}, a robust assessment can be made. There was a 5 minute period during the Sunday where the background level was found to be 45 dB L_{A90} although this is not typical of the background level and therefore not considered appropriate for the assessment.

3.9 Therefore based on Local Authority requirements, the following criteria will apply:

- Noise level < 48 dB $L_{Aeq,1hour}$ (No distinguishable feature)
- Noise level < 43 dB $L_{Aeq,1hour}$ (Distinguishable feature e.g. whine, clatters)

3.10 The measurement period of 1 hour relates to the methodology within BS 4142:1997 for plant running in the daytime. This standard assesses the likelihood of complaint by comparison of the existing background noise level, L_{A90}, with the specific 'rated' noise level, L_{Ar}, defined by the L_{Aeq} parameter. The 'rated' level, L_{Ar} is the L_{Aeq} noise level plus a 5 dB penalty if the noise source is judged to have any characteristics which draw attention to itself. The method of assessment states that if the difference between the 'rated' noise level of the plant is 5 dB greater than the background level, then the likelihood of complaint is of marginal significance. If the rated level is 10 dB above the background level, then complaints are likely. If the rated level is 10 dB below the background level, then complaints are unlikely.

4.0 Noise Assessment

4.1 The proposed plant to be installed is a condensing unit, a kitchen supply window fan, a kitchen extract fan and a kitchen hood fan which is linked to 400 x 400 mm duck work which rises to roof level, terminating with a circular cowl.

4.2 Where data is available both in terms of sound power level and sound pressure level, the calculation is based on sound power data to provide a robust assessment. The full calculation is contained in Appendix D.

4.3 An acoustic attenuator is to be included as close as possible to the kitchen hood fan providing the following minimum insertion loss:

	1/1 Octave Centre Frequencies (Hz)							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Minimum Insertion Loss (dB)	7	10	15	22	38	30	23	16

4.4 An acoustic attenuator is also to be included for the kitchen extract fan to provide a minimum overall insertion loss of 5 dBA.

4.5 The octave band spectrum data of the units can be found in Appendix E. The data shows no indication of tonality, and therefore the units do not attract the 5 dB penalty. No spectral data has been obtained for the kitchen supply fan, although as can be seen in the calculations in Appendix D, even if the fan did possess tonal characteristics, the predicted noise level at the receptors due to this fan in isolation is at least 14 dB below the total predicted noise level and thus is not expected to attract attention.

4.6 The assessment indicates that 1 metre external to the noise sensitive façade of the 35 Great Queen Street, the predicted noise level is 47 dB L_{Aeq}. This meets the criteria provided in Camden Development Policy DP28 and provides a level which is typically at least 6 dB below the background. This indicates a less than marginal possibility of complaint according to BS 4142:1997.

4.7 At 1 metre external to the noise sensitive façade of 34 Great Queen Street, the assessment indicates a predicted noise level of 45 dB L_{Aeq}. This meets the criteria provided in Camden Development Policy DP28 and provides a level which is typically at least 8 dB below the background. This indicates a less than marginal possibility of complaint according to BS 4142:1997 and is not far off that which would indicate an unlikely possibility of complaint.

5.0 Conclusions

5.1 A plant noise assessment has been undertaken in accordance with London Borough of Camden's development policy, DP28.

5.2 A noise survey had been performed at the site to establish the background noise level representative of that 1 metre from the façade of the critical receptors.

5.3 Our calculation shows that the predicted noise level complies with the criteria in the London Borough of Camden criteria contained in DP28.

5.4 The assessment is based on a robust approach, of heaviest load operation at all times, the actual noise output of the plant is likely to be reduced at times and therefore the emissions could be expected to meet the criteria by an increased margin under normal operation.

Appendix A: Acoustic Terminology

The main noise indices in use in the UK are:

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

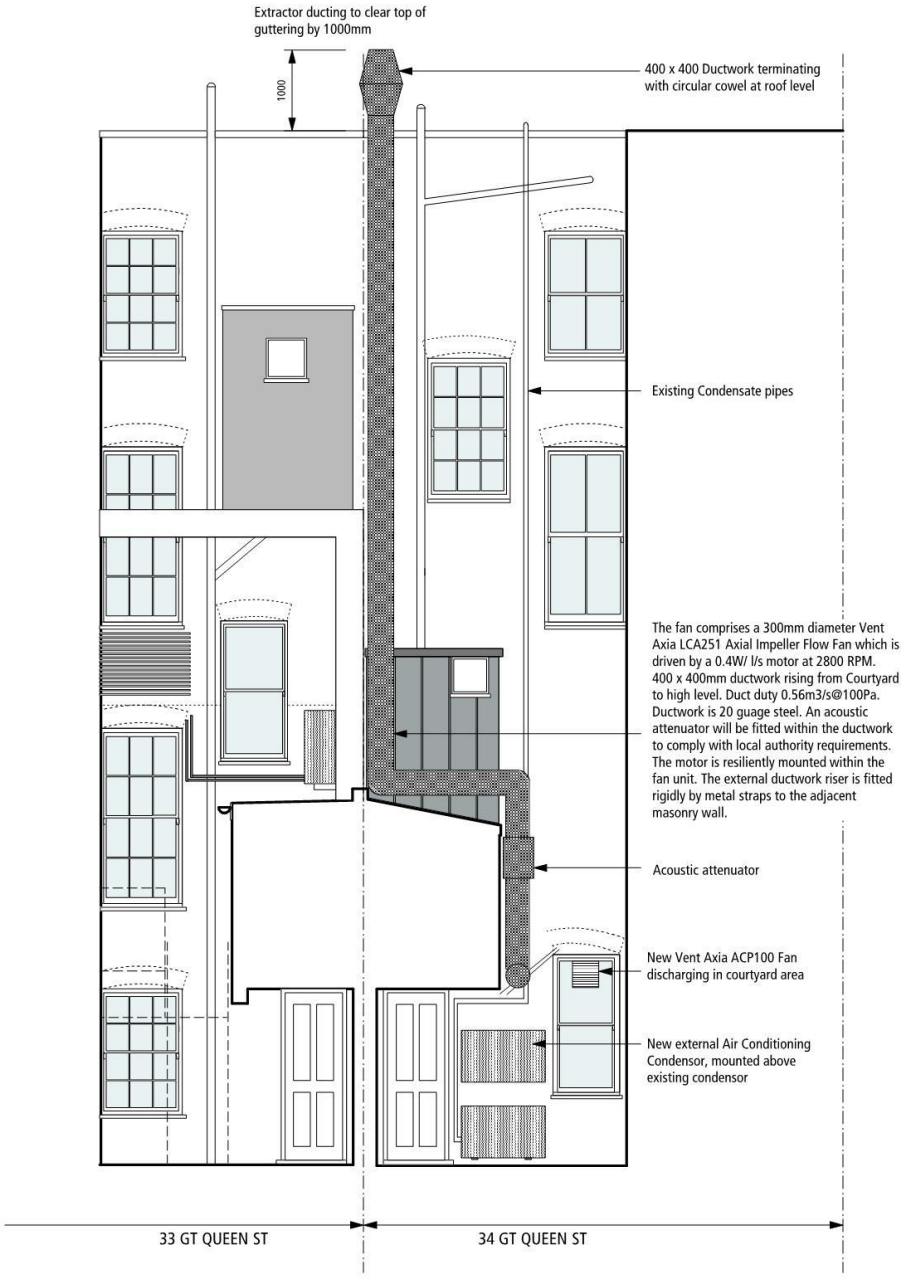
L_{Aeq}: The equivalent continuous sound level in dBA. This unit may be described as "the notional steady noise level that would provide, over a period, the same energy as the intermittent noise". In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as 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.

$L_{AMAX:}$ The maximum 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 B: Plans Showing the Proposed Plant Location

B1: Elevation of proposed plant location



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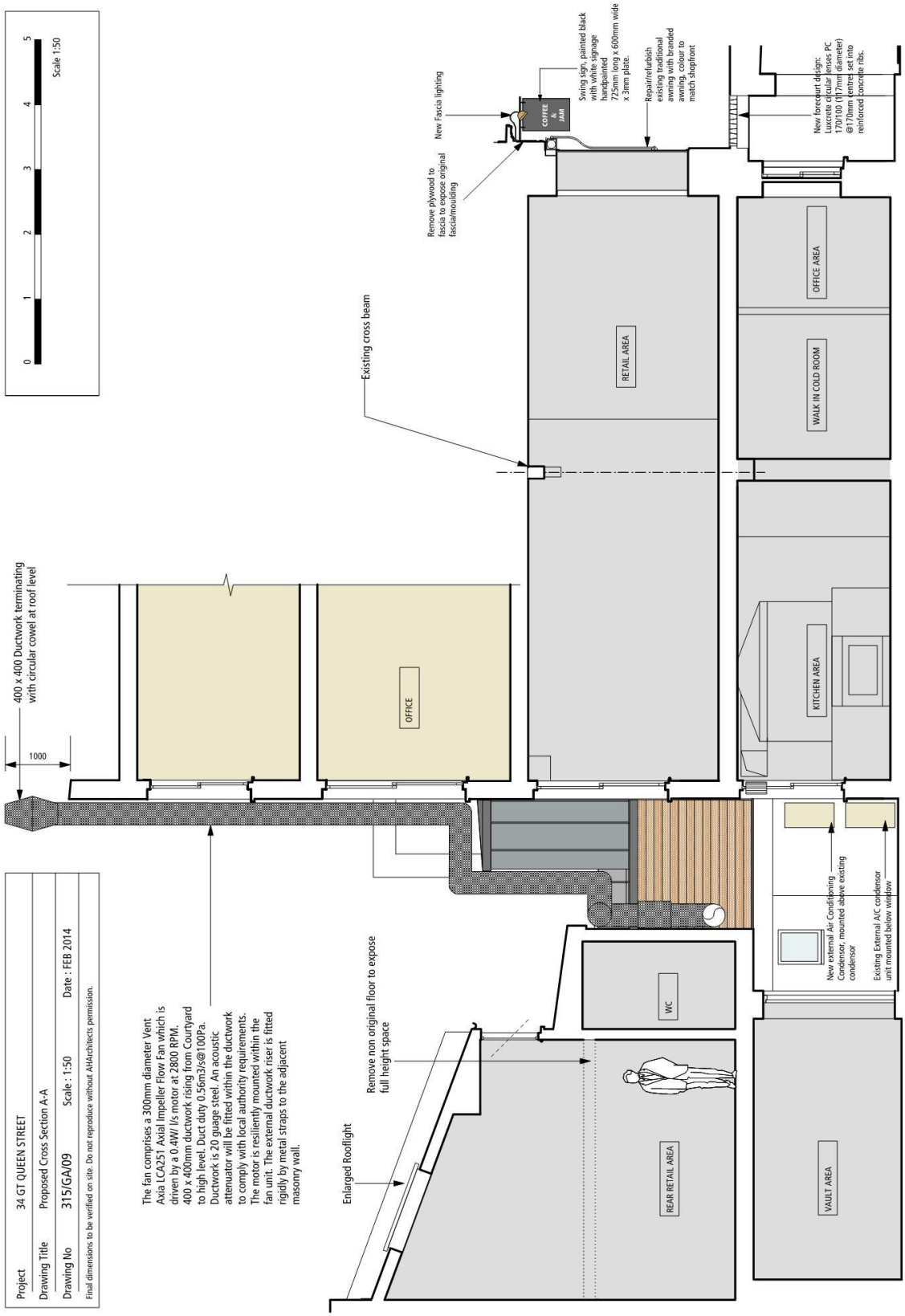
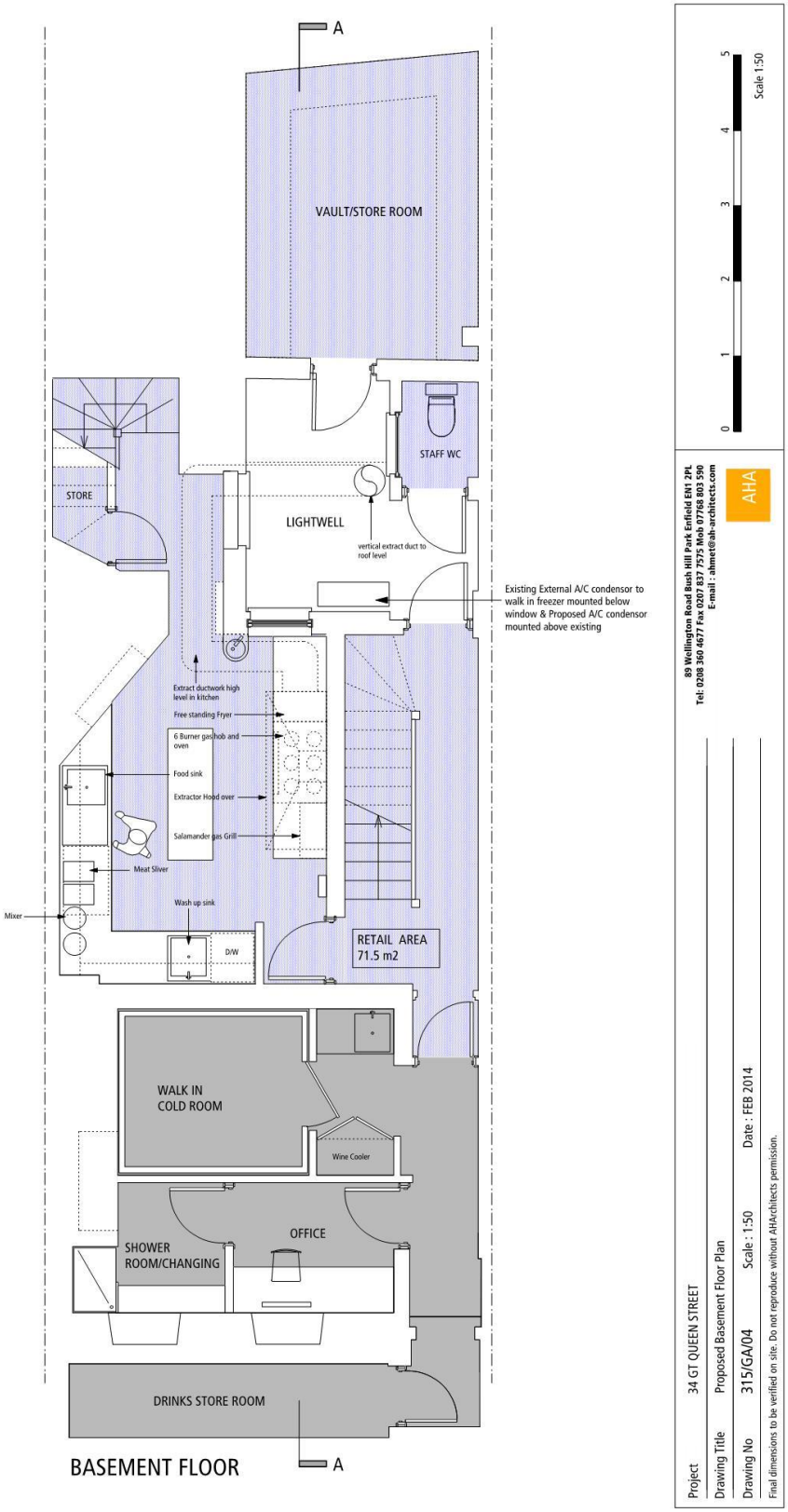
0 1 2 3 4 5 Scale 1:50

Project	34 GT QUEEN STREET
Drawing Title	Proposed Rear Elevation
Drawing No	315/GA/08 Scale : 1:50 Date : FEB 2014

B2: Section of proposed plant location



B3: Plan of proposed plant location



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Project	34 GT QUEEN STREET
Drawing Title	Proposed Basement Floor Plan
Drawing No	315/GA/04
Scale : 1:50	Date : FEB 2014

Appendix C: Noise Survey Results

Date	LAeq	LAF(max)	LAF(min)	LAF,90
(5/7/13 11:40:00.00)	68.6	89.9	60.3	61.3
(5/7/13 11:45:00.00)	70.5	99.1	58	59.1
(5/7/13 11:50:00.00)	62	79.4	58.2	59.1
(5/7/13 11:55:00.00)	63.9	77.9	58	59
(5/7/13 12:00:00.00)	60.4	77.2	58.2	58.9
(5/7/13 12:05:00.00)	62.2	81.3	58.3	59.2
(5/7/13 12:10:00.00)	62	81.6	58.2	59.3
(5/7/13 12:15:00.00)	67.5	79.9	58.4	59.6
(5/7/13 12:20:00.00)	68	91.4	61.8	62.6
(5/7/13 12:25:00.00)	67.5	89.7	61.5	62.5
(5/7/13 12:30:00.00)	67.5	81.5	58.7	62.4
(5/7/13 12:35:00.00)	65.5	90.9	57.9	59.1
(5/7/13 12:40:00.00)	64.1	86.1	57.7	59.1
(5/7/13 12:45:00.00)	64.5	79.2	58.1	59.2
(5/7/13 12:50:00.00)	69.4	84.8	57.8	59
(5/7/13 12:55:00.00)	66.3	85.2	57.8	58.8
(5/7/13 13:00:00.00)	73.2	85.2	58.1	59.3
(5/7/13 13:05:00.00)	64.4	89.5	61.4	62.1
(5/7/13 13:10:00.00)	67	85.5	61.5	62.3
(5/7/13 13:15:00.00)	71.7	88.8	61.7	62.4
(5/7/13 13:20:00.00)	72.2	88.2	61.3	62.4
(5/7/13 13:25:00.00)	73.8	86.7	58.5	62.4
(5/7/13 13:30:00.00)	67.3	86.5	57.9	58.9
(5/7/13 13:35:00.00)	70.1	83.6	57.8	58.8
(5/7/13 13:40:00.00)	64.6	82.5	57.7	58.7
(5/7/13 13:45:00.00)	68.8	81.4	57.9	58.8
(5/7/13 13:50:00.00)	71	85.9	58.2	61.2
(5/7/13 13:55:00.00)	67.6	83.7	61.6	62.3
(5/7/13 14:00:00.00)	64.1	82.2	58.5	61.9
(5/7/13 14:05:00.00)	61.4	79.7	57.9	58.9
(5/7/13 14:10:00.00)	59.9	80.5	57.8	58.6
(5/7/13 14:15:00.00)	60.8	79.4	57.9	58.7
(5/7/13 14:20:00.00)	67.9	85.2	57	58.5
(5/7/13 14:25:00.00)	68.9	82.7	56.7	57.8
(5/7/13 14:30:00.00)	69.7	85.5	56.8	57.8
(5/7/13 14:35:00.00)	70.3	86.3	56.8	57.9
(5/7/13 14:40:00.00)	66.5	82.5	56.6	57.5
(5/7/13 14:45:00.00)	66.2	80.4	56.5	57.5
(5/7/13 14:50:00.00)	68.5	82.6	56.7	57.6
(5/7/13 14:55:00.00)	63.7	83.5	56.2	57.5
(5/7/13 15:00:00.00)	62.8	85.3	56.4	57.4
(5/7/13 15:05:00.00)	70.8	87.6	56.6	57.5
(5/7/13 15:10:00.00)	70.5	86.7	56.6	57.5
(5/7/13 15:15:00.00)	70.8	88.4	56.7	57.9
(5/7/13 15:20:00.00)	72.2	86.5	56.8	57.7
(5/7/13 15:25:00.00)	69.1	88.9	56.4	57.6

Date	LAeq	LAF(max)	LAF(min)	LAF,90
(5/7/13 15:30:00.00)	74.8	92.1	56.8	57.7
(5/7/13 15:35:00.00)	73.5	97.1	56.4	57.5
(5/7/13 15:40:00.00)	59.9	80.9	56.5	57.3
(5/7/13 15:45:00.00)	57.8	59.8	56.5	57.3
(5/7/13 15:50:00.00)	58	63.6	56.6	57.4
(5/7/13 15:55:00.00)	57.7	61.9	56.3	57.1
(5/7/13 16:00:00.00)	57.6	60	56.4	57.1
(5/7/13 16:05:00.00)	57.8	61.9	56.5	57.2
(5/7/13 16:10:00.00)	57.7	59.9	56.5	57.2
(5/7/13 16:15:00.00)	57.7	59.7	56.4	57.3
(5/7/13 16:20:00.00)	58.2	62.2	56.7	57.5
(5/7/13 16:25:00.00)	58.9	61.7	56.6	57.6
(5/7/13 16:30:00.00)	58.9	63.6	57	58
(5/7/13 16:35:00.00)	59.6	77.2	57.3	58.3
(5/7/13 16:40:00.00)	59.6	63.6	57.5	58.7
(5/7/13 16:45:00.00)	59.1	64.2	57	58
(5/7/13 16:50:00.00)	61.4	75.9	57.6	58.4
(5/7/13 16:55:00.00)	58.9	63.7	57.1	58
(5/7/13 17:00:00.00)	59.2	63.3	57.1	58.1
(5/7/13 17:05:00.00)	58.9	62	57.3	58.1
(5/7/13 17:10:00.00)	58.7	61.9	56.9	57.8
(5/7/13 17:15:00.00)	58.8	64.8	57.2	58.1
(5/7/13 17:20:00.00)	59.4	61.5	57.7	58.8
(5/7/13 17:25:00.00)	59.8	61.9	58.4	59.3
(5/7/13 17:30:00.00)	59.4	65.3	57.8	58.8
(5/7/13 17:35:00.00)	59.4	72.4	58	58.7
(5/7/13 17:40:00.00)	59.2	64.6	57.8	58.6
(5/7/13 17:45:00.00)	59.2	63.7	57.6	58.4
(5/7/13 17:50:00.00)	60.8	70.1	57.6	58.6
(5/7/13 17:55:00.00)	62.7	65.2	61.4	62.2
(5/7/13 18:00:00.00)	62.5	65	61.2	62
(5/7/13 18:05:00.00)	62.8	68.7	61.1	62.2
(5/7/13 18:10:00.00)	62.9	66.5	61.5	62.3
(5/7/13 18:15:00.00)	63.4	71.4	61.5	62.3
(5/7/13 18:20:00.00)	62.7	66.6	61.5	62.2
(5/7/13 18:25:00.00)	62.9	69.2	59.1	62.3
(5/7/13 18:30:00.00)	60.2	65.1	58.2	59.3
(5/7/13 18:35:00.00)	63.4	78.5	58.3	59.2
(5/7/13 18:40:00.00)	60	74.9	58.3	59
(5/7/13 18:45:00.00)	60.2	67.6	58.2	59
(5/7/13 18:50:00.00)	61.2	72.1	58.3	59.2
(5/7/13 18:55:00.00)	59.7	67.2	58.3	59
(5/7/13 19:00:00.00)	59.8	64.2	58.3	59.1
(5/7/13 19:05:00.00)	60.2	64.8	57.9	59.1
(5/7/13 19:10:00.00)	63.3	70.2	61.8	62.5
(5/7/13 19:15:00.00)	63.4	71.1	61.9	62.5
(5/7/13 19:20:00.00)	62.9	67.7	61.7	62.4

Date	LAeq	LAF(max)	LAF(min)	LAF,90
(5/7/13 19:25:00.00)	63	66.4	61.7	62.4
(5/7/13 19:30:00.00)	62.9	64.9	61.8	62.4
(5/7/13 19:35:00.00)	62.8	65.9	61.8	62.3
(5/7/13 19:40:00.00)	62.7	64.8	61.4	62.2
(5/7/13 19:45:00.00)	62.7	66.8	61.4	62.1
(5/7/13 19:50:00.00)	62.8	66.1	61.4	62.3
(5/7/13 19:55:00.00)	62.8	69.3	61.5	62.2
(5/7/13 20:00:00.00)	64.6	66.6	62.1	64.1
(5/7/13 20:05:00.00)	64.2	75.9	61.7	62.6
(5/7/13 20:10:00.00)	62.8	66.3	61.6	62.2
(5/7/13 20:15:00.00)	62.8	65.4	61.7	62.3
(5/7/13 20:20:00.00)	62.7	64.5	60.4	62.2
(5/7/13 20:25:00.00)	59.9	64.8	58.5	59.3
(5/7/13 20:30:00.00)	59.8	64	58.3	59.2
(5/7/13 20:35:00.00)	59.7	63.7	58.5	59.2
(5/7/13 20:40:00.00)	59.6	66.1	58.1	59
(5/7/13 20:45:00.00)	61	84.7	58.1	58.9
(5/7/13 20:50:00.00)	59.3	63.1	58	58.8
(5/7/13 20:55:00.00)	59.4	62.4	58.1	58.9
(5/7/13 21:00:00.00)	59.6	64.2	58.3	59
(5/7/13 21:05:00.00)	60.3	68.2	58.5	59.3
(5/7/13 21:10:00.00)	59.9	62.6	58.5	59.3
(5/7/13 21:15:00.00)	59.7	63.9	58.3	59.2
(5/7/13 21:20:00.00)	59.7	64.3	58.5	59.1
(5/7/13 21:25:00.00)	60.1	67	58.5	59.2
(5/7/13 21:30:00.00)	60.7	72.1	58.4	59.2
(5/7/13 21:35:00.00)	59.9	67.8	58.4	59.1
(5/7/13 21:40:00.00)	59.7	65.4	58.3	59.1
(5/7/13 21:45:00.00)	64.1	88.3	58.4	59
(5/7/13 21:50:00.00)	61.3	71.6	58.5	59.2
(5/7/13 21:55:00.00)	62.8	64.5	61.7	62.3
(5/7/13 22:00:00.00)	62.8	65.5	61.7	62.3
(5/7/13 22:05:00.00)	62.8	65.1	61.6	62.3
(5/7/13 22:10:00.00)	61.3	64.6	58.5	59.5
(5/7/13 22:15:00.00)	59.8	62.7	58.4	59.2
(5/7/13 22:20:00.00)	60.1	75.9	58.3	59.1
(5/7/13 22:25:00.00)	60.1	67.5	58.3	59
(6/7/13 09:00:00.00)	56.8	59.9	55.6	56.3
(6/7/13 09:05:00.00)	56.7	58.9	55.4	56.2
(6/7/13 09:10:00.00)	58	70.8	55.3	56.2
(6/7/13 09:15:00.00)	56.7	60.7	55.3	56.2
(6/7/13 09:20:00.00)	57.3	60.3	55.6	56.7
(6/7/13 09:25:00.00)	57.3	60	56.1	56.8
(6/7/13 09:30:00.00)	57.6	62.2	56.3	57
(6/7/13 09:35:00.00)	57.6	62.6	56.2	57
(6/7/13 09:40:00.00)	57.5	60.5	56.1	57
(6/7/13 09:45:00.00)	57.7	69	56.4	57.1

Date	LAeq	LAF(max)	LAF(min)	LAF,90
(6/7/13 09:50:00.00)	57.5	64.9	56	57
(6/7/13 09:55:00.00)	58.8	69.3	56.1	57.3
(6/7/13 10:00:00.00)	58.5	61.2	57.4	58.1
(6/7/13 10:05:00.00)	59.3	67.4	57.3	58.1
(6/7/13 10:10:00.00)	58.6	61.2	57.3	58.1
(6/7/13 10:15:00.00)	58.6	61	57.3	58.1
(6/7/13 10:20:00.00)	58.6	59.9	57	58.2
(6/7/13 10:25:00.00)	62.4	77.3	57.5	58.5
(6/7/13 10:30:00.00)	60	70.6	57.2	58.2
(6/7/13 10:35:00.00)	58.6	60	57.5	58.2
(6/7/13 10:40:00.00)	58.7	59.9	57.5	58.2
(6/7/13 10:45:00.00)	58.5	61.7	57.4	58.1
(6/7/13 10:50:00.00)	58.7	66.3	57.5	58.2
(6/7/13 10:55:00.00)	59.4	69.9	57.4	58.2
(6/7/13 11:00:00.00)	62	77.9	57.1	58.1
(6/7/13 11:05:00.00)	59.2	78.5	57.1	58
(6/7/13 11:10:00.00)	58.5	62	57.2	58
(6/7/13 11:15:00.00)	58.7	66.7	57.2	58.1
(6/7/13 11:20:00.00)	58.6	60.3	57.3	58.1
(6/7/13 11:25:00.00)	59	68.6	57.2	58
(6/7/13 11:30:00.00)	64	81.3	58.5	59.2
(6/7/13 11:35:00.00)	60.6	70	58	59
(6/7/13 11:40:00.00)	59.5	63.9	58.3	59
(6/7/13 11:45:00.00)	59.3	61	58	58.9
(6/7/13 11:50:00.00)	59.4	64.5	58.2	59
(6/7/13 11:55:00.00)	59.4	62.9	58.2	58.9
(6/7/13 12:00:00.00)	61.7	73.6	58	59
(6/7/13 12:05:00.00)	59.3	62.3	58.1	58.8
(6/7/13 12:10:00.00)	59.3	62.5	58.2	58.9
(6/7/13 12:15:00.00)	59.3	62.4	58.2	58.9
(6/7/13 12:20:00.00)	59.4	67.5	58.3	59
(6/7/13 12:25:00.00)	60.1	79.7	58.3	59
(6/7/13 12:30:00.00)	59.3	64.5	58	58.8
(6/7/13 12:35:00.00)	60.2	77.4	58.1	58.8
(6/7/13 12:40:00.00)	60.3	77.5	58.2	58.8
(6/7/13 12:45:00.00)	59.2	61.1	58.1	58.8
(6/7/13 12:50:00.00)	59.6	75.3	58.1	58.9
(6/7/13 12:55:00.00)	60.1	78.2	58.4	59
(6/7/13 13:00:00.00)	59.4	62.3	58.4	59
(6/7/13 13:05:00.00)	59.4	70.1	58.2	58.9
(6/7/13 13:10:00.00)	59.3	63	58.2	58.9
(6/7/13 13:15:00.00)	59.4	62.5	58.3	59
(6/7/13 13:20:00.00)	59.4	61	58.3	59
(6/7/13 13:25:00.00)	60.5	68.8	58.3	59.1
(6/7/13 13:30:00.00)	63.3	69.1	61.8	62.4
(6/7/13 13:35:00.00)	62.6	64.9	61.4	62.1
(6/7/13 13:40:00.00)	62.5	64.2	61.4	62

Date	LAeq	LAF(max)	LAF(min)	LAF,90
(6/7/13 13:45:00.00)	62.7	65.5	61.4	62.1
(6/7/13 13:50:00.00)	62.6	64.9	61.6	62.2
(6/7/13 13:55:00.00)	63.2	70.3	61.6	62.2
(6/7/13 14:00:00.00)	62.9	73.9	61.5	62.2
(6/7/13 14:05:00.00)	62.5	65.5	61.5	62.1
(6/7/13 14:10:00.00)	61.9	65.3	58.5	59.4
(6/7/13 14:15:00.00)	59.5	62.6	58	58.9
(6/7/13 14:20:00.00)	59.4	63	58	58.8
(6/7/13 14:25:00.00)	60.5	75.7	58.1	58.8
(6/7/13 14:30:00.00)	59.9	65.2	58	58.8
(6/7/13 14:35:00.00)	59.1	61.1	58	58.7
(6/7/13 14:40:00.00)	59.3	63.5	57.8	58.7
(6/7/13 14:45:00.00)	59.2	62.1	57.9	58.7
(6/7/13 14:50:00.00)	59.4	75	58	58.6
(6/7/13 14:55:00.00)	61.2	73.2	57.9	58.7
(6/7/13 15:00:00.00)	59	65.2	57.9	58.5
(6/7/13 15:05:00.00)	59.1	62.6	57.7	58.6
(6/7/13 15:10:00.00)	59.1	61.4	57.9	58.6
(6/7/13 15:15:00.00)	59	63.3	57.9	58.6
(6/7/13 15:20:00.00)	59.2	63.5	58	58.6
(6/7/13 15:25:00.00)	59	61.9	57.9	58.6
(6/7/13 15:30:00.00)	59.3	62.4	57.5	58.5
(6/7/13 15:35:00.00)	58.5	62.2	57.3	58.1
(6/7/13 15:40:00.00)	58.6	62.8	57.2	58
(6/7/13 15:45:00.00)	59.9	71.9	56.9	57.8
(6/7/13 15:50:00.00)	58.2	63.2	56.9	57.7
(6/7/13 15:55:00.00)	58.3	63.3	56.9	57.7
(6/7/13 16:00:00.00)	59.4	70	56.8	57.6
(6/7/13 16:05:00.00)	59.1	66.6	56.8	57.7
(6/7/13 16:10:00.00)	58.1	59.7	56.8	57.6
(6/7/13 16:15:00.00)	58.3	65.2	56.9	57.7
(6/7/13 16:20:00.00)	58.1	62.6	56.9	57.7
(6/7/13 16:25:00.00)	59.6	71.1	56.9	57.7
(6/7/13 16:30:00.00)	58.8	64.9	57.1	57.8
(6/7/13 16:35:00.00)	58.1	59.4	56.7	57.6
(6/7/13 16:40:00.00)	58.1	63.1	56.7	57.7
(6/7/13 16:45:00.00)	58.3	62.7	56.8	57.6
(6/7/13 16:50:00.00)	58.3	65.2	56.8	57.7
(6/7/13 16:55:00.00)	58.2	61.8	57	57.7
(6/7/13 17:00:00.00)	59.9	69.7	56.8	57.9
(6/7/13 17:05:00.00)	58.7	72.3	56.8	57.7
(6/7/13 17:10:00.00)	57.9	62.2	56.6	57.4
(6/7/13 17:15:00.00)	57.8	59.3	56.6	57.3
(6/7/13 17:20:00.00)	57.9	61.4	56.7	57.4
(6/7/13 17:25:00.00)	58	62	56.4	57.4
(6/7/13 17:30:00.00)	58.9	60.7	57.8	58.5
(6/7/13 17:35:00.00)	60	63.8	57.9	58.7

Date	LAeq	LAF(max)	LAF(min)	LAF,90
(6/7/13 17:40:00.00)	63	70	61.3	62
(6/7/13 17:45:00.00)	62.3	65.6	61.2	61.8
(6/7/13 17:50:00.00)	62.2	63.8	61	61.8
(6/7/13 17:55:00.00)	61.9	64.5	55.8	59.2
(6/7/13 18:00:00.00)	59	60.5	58	58.6
(6/7/13 18:05:00.00)	59	61.9	57.9	58.6
(6/7/13 18:10:00.00)	61.7	63.6	58.2	59.1
(6/7/13 18:15:00.00)	62.3	63.7	61.3	61.9
(6/7/13 18:20:00.00)	62.2	63.7	61	61.8
(6/7/13 18:25:00.00)	62.3	63.9	61.2	61.8
(6/7/13 18:30:00.00)	59.3	63.4	57.9	58.6
(6/7/13 18:35:00.00)	58.9	60.7	57.9	58.5
(6/7/13 18:40:00.00)	59	60.5	57.8	58.6
(6/7/13 18:45:00.00)	59	63	58.1	58.6
(6/7/13 18:50:00.00)	59	60.1	58	58.6
(6/7/13 18:55:00.00)	59.1	60.3	57.9	58.6
(6/7/13 19:00:00.00)	59.1	61.8	58	58.7
(6/7/13 19:05:00.00)	61	64	57.5	58.8
(6/7/13 19:10:00.00)	62.3	63.9	61.2	61.9
(6/7/13 19:15:00.00)	62.6	68	61.4	62.1
(6/7/13 19:20:00.00)	62.5	63.8	61.4	62
(6/7/13 19:25:00.00)	62.5	63.9	61.5	62.1
(6/7/13 19:30:00.00)	62.5	65.2	61.5	62.1
(6/7/13 19:35:00.00)	63.1	73.7	61.4	62.1
(6/7/13 19:40:00.00)	61.7	71.9	57.9	58.8
(6/7/13 19:45:00.00)	60.4	69.1	57.5	58.5
(6/7/13 19:50:00.00)	58.9	63.3	57.8	58.4
(6/7/13 19:55:00.00)	59.1	61.3	58	58.7
(6/7/13 20:00:00.00)	59.1	60.2	58	58.7
(6/7/13 20:05:00.00)	61.3	63.8	58.1	58.9
(6/7/13 20:10:00.00)	62.5	64.7	61.4	62.1
(6/7/13 20:15:00.00)	62.5	63.9	61.4	62.1
(6/7/13 20:20:00.00)	62.4	63.8	61.4	62
(6/7/13 20:25:00.00)	62.5	63.8	61.3	62
(6/7/13 20:30:00.00)	62.5	63.8	61.4	62
(6/7/13 20:35:00.00)	65.7	88.1	61.5	62.1
(6/7/13 20:40:00.00)	62.6	64.3	61.6	62.2
(6/7/13 20:45:00.00)	62.6	66.3	61.4	62.2
(6/7/13 20:50:00.00)	62.6	64.6	61.4	62.1
(6/7/13 20:55:00.00)	62.5	66	58.3	62.1
(6/7/13 21:00:00.00)	59.2	62.6	58	58.8
(6/7/13 21:05:00.00)	59.1	60.5	58.1	58.7
(6/7/13 21:10:00.00)	59.1	60.3	58	58.7
(6/7/13 21:15:00.00)	59.2	62.3	58.2	58.8
(6/7/13 21:20:00.00)	59.2	60.5	57.7	58.8
(6/7/13 21:25:00.00)	59.2	60.3	58	58.7
(6/7/13 21:30:00.00)	59.2	66.2	58	58.8

Date	LAeq	LAF(max)	LAF(min)	LAF,90
(6/7/13 21:35:00.00)	59.2	61	58.1	58.8
(6/7/13 21:40:00.00)	60.1	71.5	58.2	58.9
(6/7/13 21:45:00.00)	60.1	71.1	58.2	58.9
(6/7/13 21:50:00.00)	59.3	60.9	58.1	58.9
(6/7/13 21:55:00.00)	59.3	65.4	58.1	58.9
(6/7/13 22:00:00.00)	60.5	79.7	58.2	58.8
(6/7/13 22:05:00.00)	59.2	61.1	58.2	58.8
(6/7/13 22:10:00.00)	59.2	63.1	58.1	58.8
(6/7/13 22:15:00.00)	59.3	60.9	58.1	58.9
(6/7/13 22:20:00.00)	59.3	63.7	58.3	58.9
(6/7/13 22:25:00.00)	59.4	63.7	57.9	58.9
(7/7/13 09:00:00.00)	52.8	61.3	44.3	45.3
(7/7/13 09:05:00.00)	58.5	66.7	56.2	57.1
(7/7/13 09:10:00.00)	57.9	65.3	56.3	57.1
(7/7/13 09:15:00.00)	57.9	69.8	56.2	57.1
(7/7/13 09:20:00.00)	57.4	59.6	56.2	56.9
(7/7/13 09:25:00.00)	57.3	60.6	56.1	56.8
(7/7/13 09:30:00.00)	57.4	60.9	56	56.9
(7/7/13 09:35:00.00)	57.3	58.9	55.7	56.9
(7/7/13 09:40:00.00)	58.5	74.1	56.2	56.9
(7/7/13 09:45:00.00)	57.2	59.4	55.9	56.7
(7/7/13 09:50:00.00)	57.4	64.7	56.1	56.9
(7/7/13 09:55:00.00)	57.3	63	56	56.8
(7/7/13 10:00:00.00)	57.3	63.4	56.1	56.8
(7/7/13 10:05:00.00)	57.3	59.4	56	56.8
(7/7/13 10:10:00.00)	59.5	69.7	56.3	57.3
(7/7/13 10:15:00.00)	59	72	56	56.9
(7/7/13 10:20:00.00)	57.6	68	56.1	56.8
(7/7/13 10:25:00.00)	57.3	66.7	56.1	56.8
(7/7/13 10:30:00.00)	57.3	60.9	56	56.8
(7/7/13 10:35:00.00)	58.7	68.8	55.9	56.8
(7/7/13 10:40:00.00)	57.7	66	56.1	56.9
(7/7/13 10:45:00.00)	57.3	61	56	56.8
(7/7/13 10:50:00.00)	57.4	61	56	56.9
(7/7/13 10:55:00.00)	58.8	71	56.2	58
(7/7/13 11:00:00.00)	58.9	64	57.3	58.2
(7/7/13 11:05:00.00)	63.2	86.3	57.1	58
(7/7/13 11:10:00.00)	58.7	61.6	57.3	58.1
(7/7/13 11:15:00.00)	58.3	61.3	57.1	57.9
(7/7/13 11:20:00.00)	58.3	60.5	57.2	57.9
(7/7/13 11:25:00.00)	58.4	63.5	57.1	57.9
(7/7/13 11:30:00.00)	58.6	60.2	56.9	58
(7/7/13 11:35:00.00)	59.4	67.8	58	58.9
(7/7/13 11:40:00.00)	59.5	64.7	58.3	58.9
(7/7/13 11:45:00.00)	59.8	65.3	58.2	59
(7/7/13 11:50:00.00)	59.3	60.5	58.1	58.9
(7/7/13 11:55:00.00)	61.6	64.3	58.4	59.1

Date	LAeq	LAF(max)	LAF(min)	LAF,90
(7/7/13 12:00:00.00)	62.8	64.1	61.6	62.3
(7/7/13 12:05:00.00)	62.8	64	61.7	62.3
(7/7/13 12:10:00.00)	62.8	66.6	61.6	62.3
(7/7/13 12:15:00.00)	62.8	64.5	61.4	62.3
(7/7/13 12:20:00.00)	62.6	64.1	61.6	62.2
(7/7/13 12:25:00.00)	63	69.1	61.5	62.2
(7/7/13 12:30:00.00)	62.7	65.8	61.7	62.2
(7/7/13 12:35:00.00)	63.5	72.7	61.5	62.3
(7/7/13 12:40:00.00)	62.6	63.7	61.5	62.2
(7/7/13 12:45:00.00)	62.6	64.6	61.4	62.1
(7/7/13 12:50:00.00)	62.4	64	61.2	61.9
(7/7/13 12:55:00.00)	62.4	63.9	61.3	61.9
(7/7/13 13:00:00.00)	62.4	64	61.3	62
(7/7/13 13:05:00.00)	62.5	64.1	61.5	62
(7/7/13 13:10:00.00)	62.4	68	61.2	61.9
(7/7/13 13:15:00.00)	62.4	64.1	61.1	62
(7/7/13 13:20:00.00)	62.4	64.7	61.2	61.9
(7/7/13 13:25:00.00)	62.4	63.7	61.4	61.9
(7/7/13 13:30:00.00)	62.4	64.5	61.3	62
(7/7/13 13:35:00.00)	62.5	64.2	61.4	62.1
(7/7/13 13:40:00.00)	62.4	63.7	61.3	62
(7/7/13 13:45:00.00)	62.4	63.9	61.5	62
(7/7/13 13:50:00.00)	62.4	63.7	61.4	62
(7/7/13 13:55:00.00)	62.2	64.7	61	61.7
(7/7/13 14:00:00.00)	61.9	63.3	60.6	61.5
(7/7/13 14:05:00.00)	62	63.6	60.8	61.5
(7/7/13 14:10:00.00)	62	63.4	60.9	61.5
(7/7/13 14:15:00.00)	62	65	60.8	61.5
(7/7/13 14:20:00.00)	61.9	66.4	60.8	61.4
(7/7/13 14:25:00.00)	61.8	66.2	60.8	61.4
(7/7/13 14:30:00.00)	61.9	64.4	60.7	61.4
(7/7/13 14:35:00.00)	62.1	68.3	60.8	61.4
(7/7/13 14:40:00.00)	61.9	64.2	60.8	61.5
(7/7/13 14:45:00.00)	62	66.6	60.8	61.4
(7/7/13 14:50:00.00)	62.6	71.9	60.8	61.5
(7/7/13 14:55:00.00)	62	63.8	60.9	61.5
(7/7/13 15:00:00.00)	62	63.7	60.8	61.5
(7/7/13 15:05:00.00)	61.8	64.3	60.6	61.4
(7/7/13 15:10:00.00)	61.9	69.4	60.7	61.4
(7/7/13 15:15:00.00)	63.1	80.1	60.8	61.5
(7/7/13 15:20:00.00)	61.9	68	60.5	61.3
(7/7/13 15:25:00.00)	61.9	65.1	60.6	61.4
(7/7/13 15:30:00.00)	61.8	63.3	60	61.4
(7/7/13 15:35:00.00)	61.9	64.7	60.8	61.4
(7/7/13 15:40:00.00)	61.9	63.7	60.8	61.5
(7/7/13 15:45:00.00)	61.9	63.4	60.8	61.4
(7/7/13 15:50:00.00)	61.8	63.3	60.8	61.4

Date	LAeq	LAF(max)	LAF(min)	LAF,90
(7/7/13 15:55:00.00)	60.8	63	59	60
(7/7/13 16:00:00.00)	60.9	67.7	59.1	59.9
(7/7/13 16:05:00.00)	60.6	65.5	59.3	59.9
(7/7/13 16:10:00.00)	60.4	62.1	59.2	59.8
(7/7/13 16:15:00.00)	60.2	62.8	53	59.6
(7/7/13 16:20:00.00)	53.7	55.9	51.8	52.7
(7/7/13 16:25:00.00)	53	55.2	51.3	52.4
(7/7/13 16:30:00.00)	54.1	64.1	51.7	52.5
(7/7/13 16:35:00.00)	56.2	61.5	51.5	52.5
(7/7/13 16:40:00.00)	56.2	64.6	52.3	53.2
(7/7/13 16:45:00.00)	53.7	59.5	52.1	53
(7/7/13 16:50:00.00)	59.8	77.5	52.2	53
(7/7/13 16:55:00.00)	53.8	57.2	52.3	53.2
(7/7/13 17:00:00.00)	53.5	56.5	52	52.9
(7/7/13 17:05:00.00)	53.8	61.4	52	52.9
(7/7/13 17:10:00.00)	53.3	55.6	51.9	52.7
(7/7/13 17:15:00.00)	53.4	58.6	51.9	52.7
(7/7/13 17:20:00.00)	53.5	60.1	51.8	52.8
(7/7/13 17:25:00.00)	53.6	57	52.2	53
(7/7/13 17:30:00.00)	55.6	57.6	52.3	54
(7/7/13 17:35:00.00)	56.1	63.1	54.8	55.6
(7/7/13 17:40:00.00)	56	57.5	54.8	55.6
(7/7/13 17:45:00.00)	58.3	72.1	54.9	55.6
(7/7/13 17:50:00.00)	56.2	61.1	54.8	55.6
(7/7/13 17:55:00.00)	56.4	64.4	54.8	55.5
(7/7/13 18:00:00.00)	56.2	66.2	54.7	55.5
(7/7/13 18:05:00.00)	57.3	71.1	54.7	55.4
(7/7/13 18:10:00.00)	56.1	59.1	55.1	55.7
(7/7/13 18:15:00.00)	56.2	62.4	55	55.6
(7/7/13 18:20:00.00)	56.2	60.4	55	55.7
(7/7/13 18:25:00.00)	56.1	62.5	54.7	55.5
(7/7/13 18:30:00.00)	56	61	54.5	55.4
(7/7/13 18:35:00.00)	56	59.8	54.9	55.6
(7/7/13 18:40:00.00)	56.6	63.5	55	55.7
(7/7/13 18:45:00.00)	56.1	59.3	54.9	55.6
(7/7/13 18:50:00.00)	56.2	57.9	55.2	55.7
(7/7/13 18:55:00.00)	56.2	58.9	55	55.7
(7/7/13 19:00:00.00)	60.2	75.9	55	55.9
(7/7/13 19:05:00.00)	56.2	62.2	54.8	55.6
(7/7/13 19:10:00.00)	56.2	61.8	54.9	55.6
(7/7/13 19:15:00.00)	57	64.3	54.9	55.6
(7/7/13 19:20:00.00)	56	58.9	54.6	55.6
(7/7/13 19:25:00.00)	56.3	60.6	55.1	55.7
(7/7/13 19:30:00.00)	56.3	59.8	55.1	55.8
(7/7/13 19:35:00.00)	56.5	61.2	55.1	55.9
(7/7/13 19:40:00.00)	56.8	66.4	55.1	55.8
(7/7/13 19:45:00.00)	56.1	58.7	54.6	55.6

Date	LAeq	LAF(max)	LAF(min)	LAF,90
(7/7/13 19:50:00.00)	56	60.4	54.8	55.5
(7/7/13 19:55:00.00)	56	60.4	54.9	55.5
(7/7/13 20:00:00.00)	56	59	54.9	55.6
(7/7/13 20:05:00.00)	56.3	60	55.1	55.8
(7/7/13 20:10:00.00)	56.4	63.8	54.8	55.7
(7/7/13 20:15:00.00)	56.1	59	55	55.6
(7/7/13 20:20:00.00)	56.2	58.3	54.9	55.7
(7/7/13 20:25:00.00)	56.1	58	55	55.7
(7/7/13 20:30:00.00)	57.8	77	55	55.8
(7/7/13 20:35:00.00)	56.3	59.4	55.1	55.9
(7/7/13 20:40:00.00)	57.6	70.3	55.1	55.9
(7/7/13 20:45:00.00)	61.5	78.9	55.1	55.8
(7/7/13 20:50:00.00)	56.3	62.3	55.1	55.8
(7/7/13 20:55:00.00)	56.3	64.3	54.9	55.7
(7/7/13 21:00:00.00)	56.2	59.2	55	55.8
(7/7/13 21:05:00.00)	56.2	60.3	55.1	55.8
(7/7/13 21:10:00.00)	56.3	59.9	55.1	55.8
(7/7/13 21:15:00.00)	56.4	61.5	55	55.7
(7/7/13 21:20:00.00)	56.1	61.6	54.9	55.6
(7/7/13 21:25:00.00)	56.3	61.7	54.7	55.6
(7/7/13 21:30:00.00)	56.4	65	54.9	55.8
(7/7/13 21:35:00.00)	57.1	73.9	55	55.7
(7/7/13 21:40:00.00)	56.8	72.4	54.9	55.7
(7/7/13 21:45:00.00)	56.2	60.9	54.6	55.5
(7/7/13 21:50:00.00)	56.3	62.5	54.9	55.5
(7/7/13 21:55:00.00)	56	60.6	54.7	55.5
(7/7/13 22:00:00.00)	56	60	54.9	55.5
(7/7/13 22:05:00.00)	56.1	62.1	54.6	55.5
(7/7/13 22:10:00.00)	56.1	61.5	54.9	55.6
(7/7/13 22:15:00.00)	56.3	64.6	54.9	55.6
(7/7/13 22:20:00.00)	55.9	59.4	54.7	55.5
(7/7/13 22:25:00.00)	56	58.4	54.7	55.5
(8/7/13 09:00:00.00)	74.2	86.9	57.3	58.4
(8/7/13 09:05:00.00)	73.1	84.6	57.7	58.8
(8/7/13 09:10:00.00)	70.3	82	57.5	58.4
(8/7/13 09:15:00.00)	66.2	82.1	57.2	58.3
(8/7/13 09:20:00.00)	69.2	86.1	57.7	59
(8/7/13 09:25:00.00)	61.4	78.3	57.3	58.2
(8/7/13 09:30:00.00)	76.3	98.7	57.3	59.1
(8/7/13 09:35:00.00)	74.2	84.3	57.1	58.6
(8/7/13 09:40:00.00)	72.2	80.6	57.3	58.8
(8/7/13 09:45:00.00)	70.6	85.5	57.8	58.7
(8/7/13 09:50:00.00)	63	83.6	57.1	58.1
(8/7/13 09:55:00.00)	62.3	79.4	57.1	58.1
(8/7/13 10:00:00.00)	66.4	93	57.9	59.4
(8/7/13 10:05:00.00)	61	83.2	58.2	59
(8/7/13 10:10:00.00)	61.3	70.8	58.3	59.1

Date	LAeq	LAF(max)	LAF(min)	LAF,90
(8/7/13 10:15:00.00)	59.4	78.7	57.1	57.9
(8/7/13 10:20:00.00)	67.6	81.5	56.8	57.8
(8/7/13 10:25:00.00)	74.6	80.5	57.2	58.7
(8/7/13 10:30:00.00)	67.1	85	57.3	58.1
(8/7/13 10:35:00.00)	65.8	92.2	57.2	58.3
(8/7/13 10:40:00.00)	69.6	97	57.3	58.1
(8/7/13 10:45:00.00)	67.8	91.6	57.6	58.4
(8/7/13 10:50:00.00)	63.1	88.5	57.4	58.5
(8/7/13 10:55:00.00)	72.1	82.1	57.4	58.6
(8/7/13 11:00:00.00)	66.3	78.8	57.2	58.2
(8/7/13 11:05:00.00)	61.5	76.3	57.4	58.3
(8/7/13 11:10:00.00)	60.3	75.1	57	58.1
(8/7/13 11:15:00.00)	61	81.2	57.2	58.1
(8/7/13 11:20:00.00)	67.6	80	57.3	58.4
(8/7/13 11:25:00.00)	69.5	86.3	57.2	58.3
(8/7/13 11:30:00.00)	62.6	73.4	57.2	58.3
(8/7/13 11:35:00.00)	68.2	86.9	57.3	58.2
(8/7/13 11:40:00.00)	69.3	85.9	57.3	58.2
(8/7/13 11:45:00.00)	68.3	84.9	57.4	58.8
(8/7/13 11:50:00.00)	62.3	79.7	58.5	59.4

Appendix D: Calculations

D1: Calculation for 2nd Floor of 35 Great Queen Street

Calculation of the cumulative noise level 1 metre external to 2nd floor of 35 Great Queen Street

2nd Floor of 35 Great Queen Street	dBA
Lp due to Cowl leading from Kitchen Hood Fan	29
Lp due to Air Conditioning Unit	41
Lp due to Kitchen Extract	45
Lp due to Kitchen Supply	31
Lp at 1 metre external to noise sensitive façade	**47**

Calculation of the noise level due to the air conditioning unit

2nd Floor of 35 Great Queen Street	dBA
Lw of Mitsubishi SUZ-KA60VA3 air conditioning unit	65
-20logr, where r = 9 metres	-19
-8 assuming hemispherical radiation	-8
Façade + 3 at receptor	3
Lp at 1 metre external to noise sensitive façade	**41**

Calculation of the noise level due to the kitchen extract fan

2nd Floor of 35 Great Queen Street	dBA
Lw of Vent-Axia ACP10012 kitchen extract fan	73
Attenuator providing a minimum overall insertion loss of 5 dBA	-5
-20logr, where r = 8 metres	-18
-8 assuming hemispherical radiation	-8
Façade + 3 at receptor	3
Lp at 1 metre external to noise sensitive façade	**45**

Calculation of the noise level due to the kitchen supply fan

2nd Floor of 35 Great Queen Street	dBA
Lp of Vent-Axia W162110 kitchen supply window fan @ 3 m	37
+20log(r1/r2), where r2 = 8 metres	-9
Façade + 3 at receptor	3
Lp at 1 metre external to noise sensitive façade	**31**

Calculation of the noise level due to the kitchen Hood Fan

	ATMOSPHERIC SIDE ASSESSMENT		**Title >**	**2nd Floor of 35 Great Queen Street**										**Help**	
	Type	Size	Length(m) / Number	63	125	250	500	1k	2k	4k	8k	Fan I.D:	LCA251245		
	r/d/e/25l/50l	mm	Lw(in-duct) >	74	75	83	76	74	71	68	65	Atten. I.D:			
In-duct losses	d	400	20.27	12.2	12.2	9.12	6.08	4.05	4.05	4.05		Duty:	0.56	m3/s	
	e	400	6	0	0	0	36	48	24	18	18	Total St. Pressure:	100	Pa	
				0	0	0	0	0	0	0	0				
				0	0	0	0	0	0	0	0				
			☐ Mylar/Melinex												
			Additional Attenuation ->												
			Sum of attenuation	12	12	9	42	52	28	22	18	Outlet width:	40	cm	
			Lw (induct) - attenuation	62	63	74	34	22	43	46	47	Outlet length:	40	cm	
			Outlet correction	10	6	2	0	0	0	0	0	*Outlet area >*	*1600*	*cm2*	
			Lw (at outlet)	**51.8**	**56.8**	**71.9**	**33.9**	**21.9**	**42.9**	**45.9**	**47**				
Distance, barrier loss & façade correction	*Enter Directivity ?*		Percentage leaving outlet (%)	0	0	0	0	0	0	0	0	Percentage:	100	%	
	Manually >	y	Directivity (Automatic [n])												
			Directivity (Manual [y])	3	1.5	0	-1.5	-2	-2	-2	-2				
			Distance from outlet (m)	-23	-23	-23	-23	-23	-23	-23	-23	Distance:	3.8	m	
				-20	-21	-23	-24	-25	-25	-25	-25				
	Enter Barrier ?														
	Manually >	y	Barrier (Automatic [n])									Overall Barrier Loss:		dB	
	Source ht:		Barrier (Manual [y])	0	0	0	0	0	0	0	0				
	Receiver ht:		Lp (linear)	32	36	49	10	-3	18	21	22				
	Barrier ht:														
	S->B distance:		Lp (A-weighted)	6	20	40	7	-3	19	22	21				
	B->R distance:														
			Façade Correction: Typ +3 dB	3	3	3	3	3	3	3	3	Enter façade Corr>	3	dB	
			LpA - Façade Corrected	**9**	**23**	**43**	**10**	**0**	**22**	**25**	**24**	Pre-atten >	43	dBA	
Solution	33 %	600 mm	**Proposed Attenuator I.L.**	**7**	**10**	**15**	**22**	**38**	**30**	**23**	**16**	Rectangular			
	% Free Area	Length	**Resultant Lp (A-weighted)**	**2**	**13**	**28**	**-12**	**-38**	**-8**	**2**	**8**	*Select Att >*	28.5	dBA	
												Duct:			
	Area	0.16	m2	Chart LpA Result								*width:*	0.4	m	
	Face Vel >	3.50	m/s									*depth:*	0.4	m	
	P.D.>	36.75	Pa	Chart I.L. Result								*K factor:*	5		

D2: Calculation for 3rd Floor of 34 Great Queen Street

Calculation of the cumulative noise level 1 metre external to 3rd floor of 34 Great Queen Street

3rd Floor of 34 Great Queen Street	dBA
Lp due to Cowl leading from Kitchen Hood Fan	40
Lp due to Air Conditioning Unit	38
Lp due to Kitchen Extract	42
Lp due to Kitchen Supply	29
Lp at 1 metre external to noise sensitive façade	**45**

Calculation of the noise level due to the air conditioning unit

3rd Floor of 34 Great Queen Street	dBA
Lw of Mitsubishi SUZ-KA60VA3 air conditioning unit	65
-20logr, where r = 12 metres	-22
-8 assuming hemispherical radiation	-8
Façade + 3 at receptor	3
Lp at 1 metre external to noise sensitive façade	**38**

Calculation of the noise level due to the kitchen extract fan

3rd Floor of 34 Great Queen Street	dBA
Lw of Vent-Axia ACP10012 kitchen extract fan	73
Attenuator providing a minimum overall insertion loss of 5 dBA	-5
-20logr, where r = 11 metres	-21
-8 assuming hemispherical radiation	-8
Façade + 3 at receptor	3
Lp at 1 metre external to noise sensitive façade	**42**

Calculation of the noise level due to the kitchen supply fan

3rd Floor of 34 Great Queen Street	dBA
Lp of Vent-Axia W162110 kitchen supply window fan @ 3 m	37
+20log(r1/r2), where r2 = 11 metres	-11
Façade + 3 at receptor	3
Lp at 1 metre external to noise sensitive façade	**29**

Calculation of the noise level due to the kitchen Hood Fan

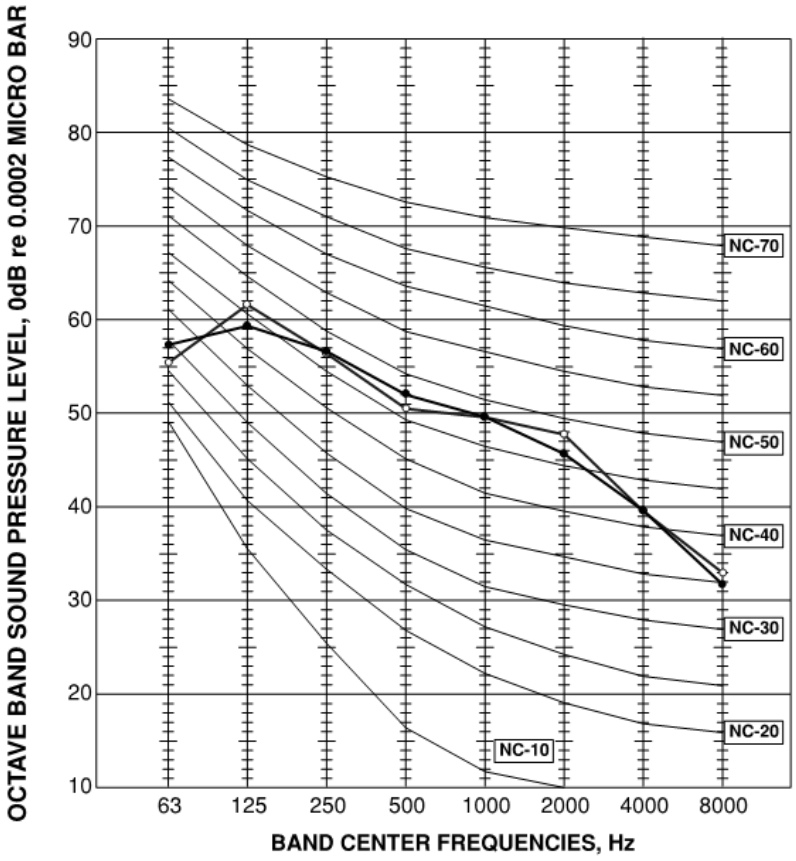
	ATMOSPHERIC SIDE ASSESSMENT		Title >	3rd Floor of 34 Great Queen Street											Help
	Type	Size	Length(m) / Number	63	125	250	500	1k	2k	4k	8k		Fan I.D:	LCA251245	
	r/d/e/25l/50l	mm	Lw(in-duct) >	74	75	83	76	74	71	68	65		Atten. I.D:		
In-duct losses	d	400	20.27	12.2	12.2	9.12	6.08	4.05	4.05	4.05			Duty:	0.56	m3/s
	e	400	6	0	0	0	36	48	24	18	18		Total St. Pressure:	100	Pa
				0	0	0	0	0	0	0	0				
			Mylar/Melinex	0	0	0	0	0	0	0	0				
	Additional Attenuation ->														
			Sum of attenuation	12	12	9	42	52	28	22	18		Outlet width:	40	cm
			Lw (induct) - attenuation	62	63	74	34	22	43	46	47		Outlet length:	40	cm
			Outlet correction	10	6	2	0	0	0	0	0		*Outlet area >*	*1600*	*cm2*
			Lw (at outlet)	**51.8**	**56.8**	**71.9**	**33.9**	**21.9**	**42.9**	**45.9**	**47**				
Distance, barrier loss & façade correction	*Enter Directivity ?*		Percentage leaving outlet (%)	0	0	0	0	0	0	0	0		Percentage:	100	%
	Manually >	y	Directivity (Automatic [n])												
			Directivity (Manual [y])	3	1.5	0	-1.5	-2	-2	-2	-2				
			Distance from outlet (m)	-11	-11	-11	-11	-11	-11	-11	-11		Distance:	1	m
				-8	-9	-11	-12	-13	-13	-13	-13				
	Enter Barrier ?														
	Manually >	y	Barrier (Automatic [n])										Overall Barrier Loss:		dB
	Source ht:		Barrier (Manual [y])	0	0	0	0	0	0	0	0				
	Receiver ht:		Lp (linear)	44	47	61	21	9	30	33	34				
	Barrier ht:														
	S->B distance:		Lp (A-weighted)	18	31	52	18	9	31	34	33				
	B->R distance:														
			Façade Correction: Typ +3 dB	3	3	3	3	3	3	3	3		Enter façade Corr>	3	dB
			LpA - Façade Corrected	**21**	**34**	**55**	**21**	**12**	**34**	**37**	**36**		Pre-atten >	55	dBA
Solution	33 %	600 mm	**Proposed Attenuator I.L.**	**7**	**10**	**15**	**22**	**38**	**30**	**23**	**16**		Rectangular		
	% Free Area	Length	**Resultant Lp (A-weighted)**	**14**	**24**	**40**	**-1**	**-26**	**4**	**14**	**20**		*Select Att >*	40.1	dBA
													Duct:		
	Area	0.16	m2	Chart LpA Result									*width:*	0.4	m
	Face Vel >	3.50	m/s										*depth:*	0.4	m
	P.D.>	36.75	Pa	Chart I.L. Result									*K factor:*	5	

Appendix E: Spectrum Data for Proposed Plant

E1: Air Conditioning Unit

SUZ-KA60VA3.TH SUZ-KA71VA3.TH

FAN SPEED	FUNCTION	SPL(dB(A))	LINE
High	COOLING	55	●——●
	HEATING	55	○——○



E2: Kitchen Extract Fan

Acoustic Sound Power Level

Stock Ref.		63	125	250	500	1K	2K	4K	8K	dBA @3m
ACP10012B	INLET	81	84	75	68	61	52	46	40	51
ACP10012B	OUTLET	82	84	77	68	61	52	49	43	52

E3: Kitchen Hood Fan

Acoustic Information

	63	125	250	500	1k	2k	4k	8k	Total	dBA@3m
Inlet	74	75	83	76	74	71	68	65	85	59
Outlet	74	75	83	76	74	71	68	65	85	59
Breakout	-	-	-	-	-	-	-	-	-	-

Sound Power Level Spectra dB (re 10^{-12} Watts) shown @ free air.