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Ref: M2356-v3

ASSESSMENT OF ENVIRONMENTAL NOISE
40 CHESTER TERRACE, LONDON, NW1

19 April 2012

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CONTENTS

1. SUMMARY

1. An assessment of noise has been carried out at 40 Chester Terrace, London, NW1, where items of new mechanical services plant are to be installed.

2. Ambient noise levels at the rear of the building have been measured, and this exercise indicates that the background noise level, L_{A90}, falls regularly to a level of 38 dB(A) in the middle of each night. For non-tonal noise sources this defines a design target of 33 dB(A) due to the new plant, at the windows of any residential accommodation overlooking the site. If the noise emitted from the plant is tonal in nature, the aforementioned limit should be reduced by a further 5 dB(A).

3. Section 5 of the report details the proposed plant for the project - a Daikin air condensing to be located in the existing basement vaults and an air handling unit positioned in the new pool-side plant room. The report also details means of attenuating the equipment to achieve the targets mentioned above.

4. The Appendices provide detailed calculations of noise emanating from the equipment, and these confirm that the recommended targets will be met.

2. INTRODUCTION

An assessment has been undertaken by Ian Sharland Ltd on behalf of John Stone Associates at 40 Chester Terrace, NW1, to determine the impact of potential mechanical services plant noise on the existing ambient noise climate.

40 Chester Terrace is situated at the northern end of Chester Terrace (see Figure 1: see architects drawing no: K-1023-100). The building is approximately 500m east from the centre of Regents Park and 750m west of Euston Station.

Presently, the accommodation is spread over four floors, plus a basement level. It is proposed to refurbish some of the existing upper floors, as well as extending the basement level to accommodate a lap pool, home cinema and gymnasium. Within the basement level, it is noted that there will also be a plant room (see Figure 2: architects drawing no: K-1023-11)

The objectives of the present exercise may be summarised as follows:

(a) To determine the existing ambient noise levels in the area;

(b) To propose a design criterion for limiting noise emission from the proposed units;

(c) To predict noise levels emanating from the proposed plant and, where appropriate, to recommend forms of noise control which will limit emissions to an acceptable level.

This report describes the work carried out on each of those objectives and summarises the conclusions that can be drawn from the results.

3. SURVEY OF AMBIENT NOISE LEVELS

To assess the ambient background noise levels, a Rion NL-31 type 1 sound level meter was set up on a tripod at a height of 1.5m and placed within the garden of No 40 Chester Terrace.

The sound level meter was set up 1.5m from the facade of the building in a free field position, and was calibrated before and after the measurements were taken, and showed no significant variation.

The survey ran from 14.00pm on the 14th February 2012 until 11.00am on the 16th February 2012. The variation of noise throughout this period is shown graphically in Figure 3. During the measurement period the weather conditions were cold but dry with the occasional light breeze.

The meter was configured to measure 15min samples of the following acoustic parameters:

L_{Aeq} The A-weighted equivalent continuous sound pressure level which, over the sample period, contains the same acoustic energy as the time-varying signal being recorded.

L_{Amax} The A-weighted maximum sound pressure level recorded during each sample period (as measured on fast response).

L_{A90} A statistical parameter, representing the A-weighted noise level exceeded for 90% of each sample period. This gives a measure of the underlying noise, and is commonly used to describe the ambient background noise.

The results of the survey are shown graphically in Figure 3.

The key measurement for this exercise is the minimum value of the background noise recorded during the day time and night time periods. This was found to be a level of 38 dB(A) L_{A90} during the night and approximately 48 dB(A) L_{A90} during the day (taken here as the period 0700 – 1900).

4. CRITERIA FOR NOISE AFFECTING ADJACENT PROPERTIES

Any formal assessment of commercial noise affecting residential properties would in all likelihood be based upon the recommendations of British Standard 4142:1997 "Method for rating industrial noise affecting mixed residential and industrial areas".

In brief, this rating method determines "specific noise level" generated by the new plant, assessed immediately outside the residential properties most likely to be affected. For twenty-four operation of the new plant, this would be the equivalent continuous noise level of the new noise, evaluated over a five-minute sampling period, its $L_{Aeq(5\ min)}$. A correction of + 5 dB (A) is then made to this measured level if the new noise is noticeably tonal in content or intermittent, to give the "Rating Noise Level".

If the rating noise level exceeds the ambient background noise level[1] by more than 10 dB (A), complaints are to be expected. An excess of 5 dB (A) is said to be "of marginal significance". If the rating level is more than 10 dB below the measured background noise level then this is a positive indication that complaints are unlikely.

The following table is taken from Appendix 1 of the Camden Borough Council Unitary Development Plan. This sets out noise limits for limiting noise from

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 facade	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 $_{LAeq}$

It is therefore recommended that noise levels at 1m from the nearest noise sensitive window should be limited 33 dB(A), or 28 dB(A) if the noise content is tonal or intermittent.

[1] That is the noise level which would prevail at that time and place, in the absence of any noise from the new plant under consideration. The background noise is normally measured and described as the L_{A90} parameter

5. PREDICTION OF PLANT NOISE

There will be two principle items of building services plant installed as part of the development.

5.1 Daikin RXYQ10P Air Conditioning Unit

The Daikin unit will be located in the basement vaults at the front of the building (see Figure 2).

Fresh air will be provided to the plant room vault via an adjacent vault (a 2000W x 300mm slot being cut into the connecting wall) and a plain weather louvre in the wall to the open stairwell. In addition, there will be a 1500mm wide x 500mm high x 1500mm long silencer located in the second vault, through which the supply air will pass.

Discharge air from the unit will be ducted through an acoustically lined bend section, out of the plant room vault and into the adjacent vault. Here, the air will pass through a 900mm wide x 2000mm high x 1500mm long silencer before entering a plenum chamber. This chamber is linked to the aforementioned stairwell by a 270mm deep acoustic louvre.

Appendix 1 details a calculation of noise passing from the plant room via both inlet and discharge paths into the stairwell and then up to the nearest noise sensitive neighbouring window.

The predicted level at the window is **31 dB(A)**, with no strong tonal element. This will therefore comply with the target noise levels.

5.2 Heatstar Phoenix EX 500 Air Handling Unit

The air handling unit will be located in the plant room adjacent to the pool hall, in the basement level of the new extension. Fresh air will be drawn from the existing courtyard, ducted through a louvre on the east elevation of the plant room.

Exhaust air will similarly be ducted out of the plant room through a grill on the east elevation of the plant room. This grill will be set back from the fresh air inlet, to avoid recirculation.

It is recommended that each system is fitted with a 1200mm long silencer (or, if Melinex lining is required to protect the internal elements of the silencer from the moist air of the pool, an equal acoustic performance to that quoted in Appendix 2). The section of the silencer is to be determined, but will have a face are of nom. 0.2m2.

Appendix 2 details a calculation of noise transmission from the fresh air inlet grill and the exhaust grill to the windows of the nearest neighbouring property.

The predicted level at this window is **28 dB(A)**, with no tonal concentration. Again, this is comfortably within the target noise level.

6. CONCLUSIONS

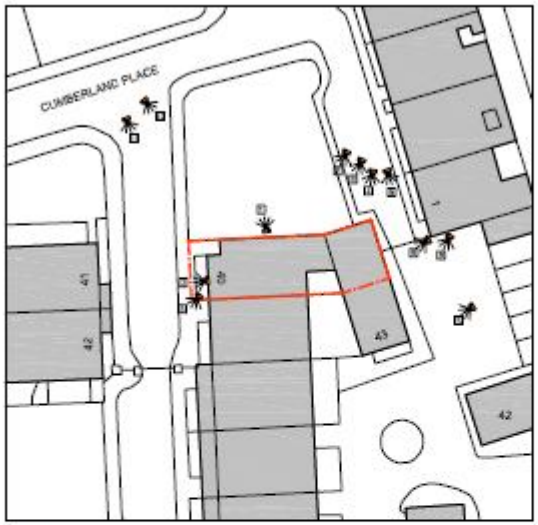
An assessment of new plant noise has been carried out to determine the impact on ambient noise levels in the vicinity of nearby residential dwellings.

An assessment of the noise levels taken on site have been assessed under the format specified in BS 4142:1997 – Method for Rating industrial noise affecting mixed residential and industrial areas.

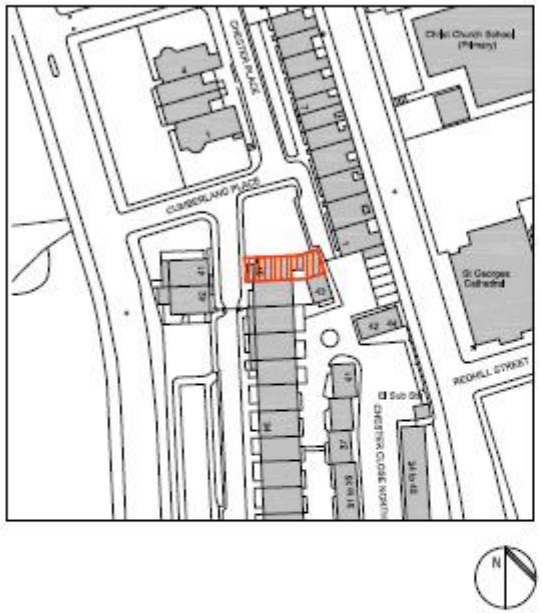
To meet the requirements of the Local Authority, it has been shown that the noise emanating from any new plant will need to be limited to 33 dB(A), or 28 dB(A) if of a tonal content, at 1m from the nearest noise sensitive window

Detailed analysis of the proposed units, and the proposed forms of attenuation, have been carried out and it has been demonstrated that the aforementioned targets will be met.

Figure 1: Site Plan and Location



1	SITE PLAN
100	1:500 (A3)



2	LOCATION PLAN
100	1:1250 (A3)

Rev. A 00/00/00 Planning Application

PLANNING

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CONTRACT
40 CHESTER TERRACE
LONDON NW1

DRAWING
SITE PLAN / LOCATION PLAN

SCALE	1:500; 1:1250	DATE	Nov 11
DRAWN	IHA	CHECKED	NP

DRAWING NO. K-1023-100 REV. A

Figure 2: Proposed new layout of basement level

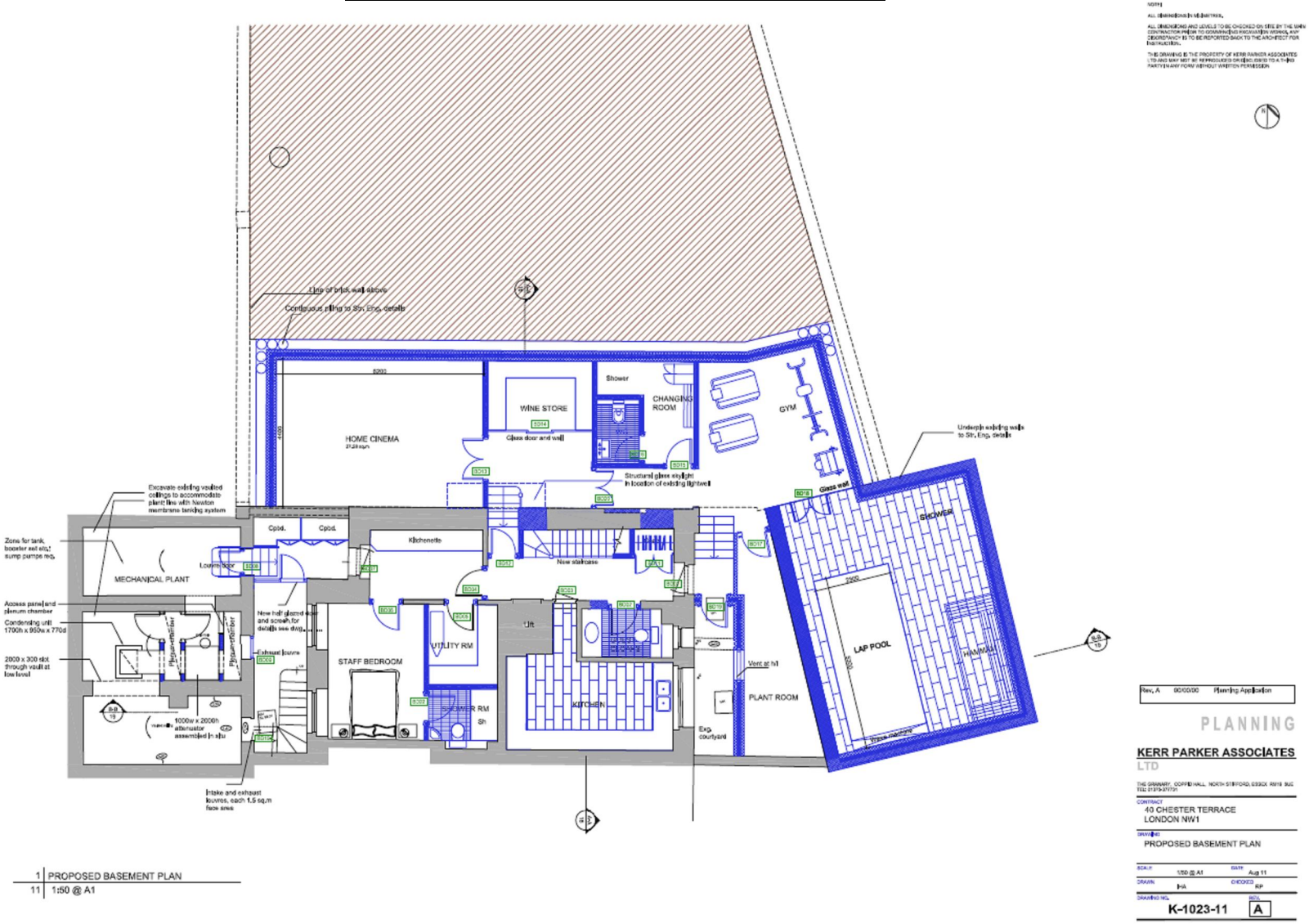
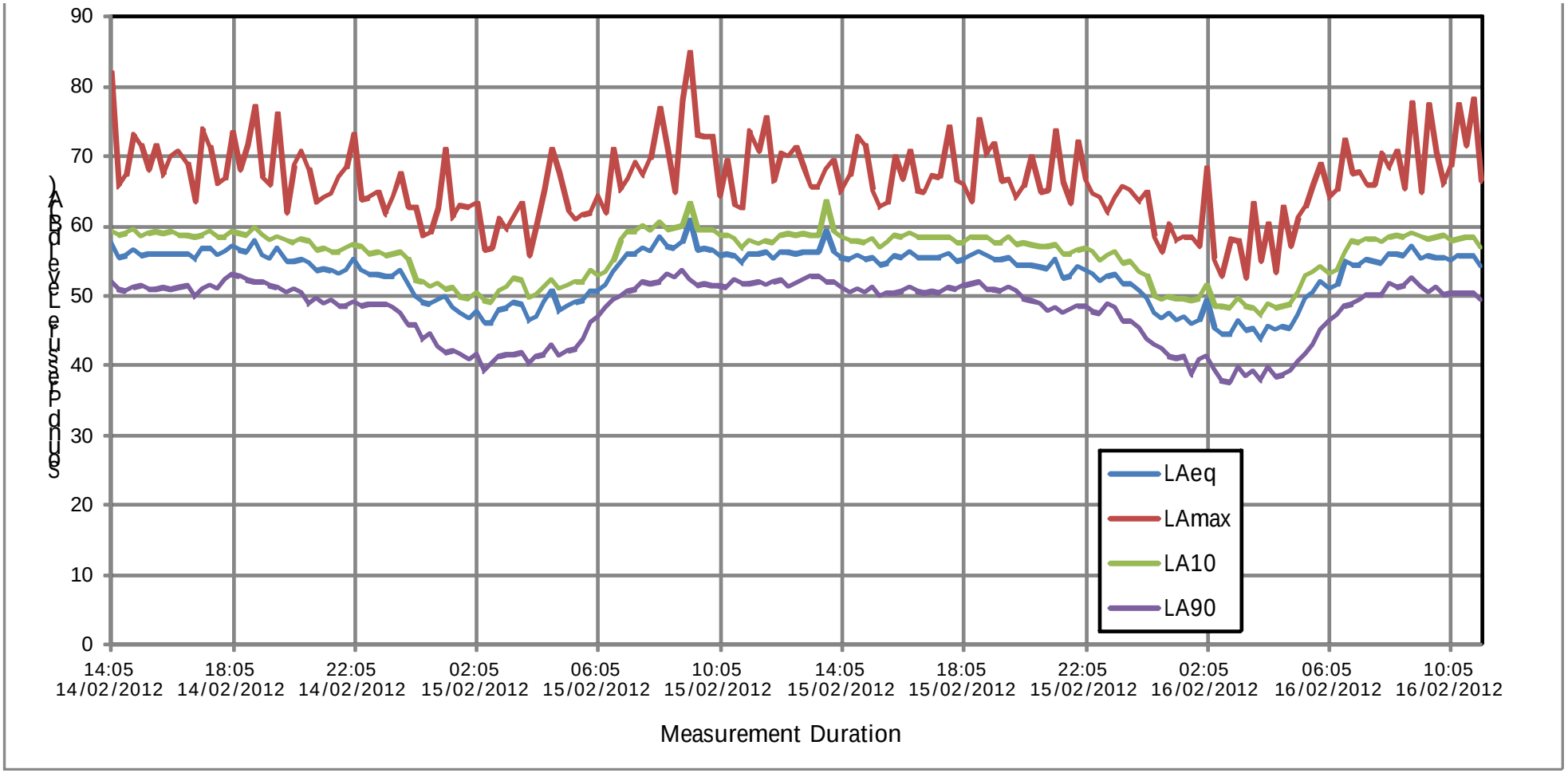


Figure 3: Variation of noise levels throughout the survey period



Appendix 1 - Calculation of Daikin A/C Atmospheric Side Emissions

Frequency	Hz	63	125	250	500	1K	2K	4K	8K	dB(A)
Ducted Discharge Noise										
Daikin RXY10P	SWL	88	84	79	77	73	76	59	53	**81**
Lined Duct Bend@750mm	dB	0	-5	-10	-10	-10	-10	-10	-10	
Silencer Loss, 1m x 2m x 1.5mL (100aw)	dB	-8	-15	-26	-43	-53	-53	-45	-32	
Plenum Chamber Loss										
alpha=30, d=0.5m, Rc=1.4	dB	-2	-2	-2	-2	-2	-2	-2	-2	
SWL entering Stairwell	dB	78	62	41	22	8	11	2	9	**53**
Staiwell Plenum Loss:										
alpha=18, d=3m, Rc=20	dB	-4	-4	-4	-4	-4	-4	-4	-4	
SWL at top of lightwell	dB	74	58	37	18	4	7	-2	5	
SRI 270mm louvre	dB	-6	-8	-12	-13	-14	-12	-10	-8	
Directivitiy	dB	-8	-8	-8	-8	-8	-8	-8	-8	
Distance to nearest window, 3m	dB	-10	-10	-10	-10	-10	-10	-10	-10	
Facade Correction	dB	3	3	3	3	3	3	3	3	
NET SPL at Window		53	35	10	-10	-25	-20	-27	-18	**28**
Inlet Noise										
Daikin RXY10P	SWL	88	84	79	77	73	76	59	53	**81**
Room Correction	dB	-3	-3	-3	-3	-3	-3	-3	-3	
SPL in room	dB	85	81	76	74	70	73	56	50	**78**
SWL coming thro' 2000 x 300H vent	dB	83	79	74	72	68	71	54	48	**75**
Vault Plenum Loss										
alpha=45, d=1.5, Rc = 2	dB	-4	-4	-4	-4	-4	-4	-4	-4	
Silencer Loss, 1.5m x 0.5m x 1.5mL (100a	dB	-8	-15	-26	-43	-53	-53	-45	-32	
SWL entering stairwell	dB	71	60	44	25	11	14	5	12	
Staiwell Plenum Loss:										
alpha=18, d=3m, Rc=20	dB	-4	-4	-4	-4	-4	-4	-4	-4	
SWL at top of lightwell	dB	67	56	40	21	7	10	1	8	
Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
Distance to nearest window, 3m	dB	-10	-10	-10	-10	-10	-10	-10	-10	
Facade Correction	dB	3	3	3	3	3	3	3	3	
NET SPL at Window	dB	52	41	25	6	-8	-5	-14	-7	**29**
Combined SWL at Window	**dB**	**55**	**42**	**25**	**6**	**-8**	**-5**	**-14**	**-7**	**31**

Appendix 2 - Calculation of AHU Atmospheric Side Emissions

Frequency	**Hz**	**63**	**125**	**250**	**500**	**1K**	**2K**	**4K**	**8K**	**dB(A)**
Fresh Air Intake										
Heatstar SWL	dB	66	66	64	65	62	63	61	52	**69**
Silencer, 100/1200	dB	-6	-12	-23	-40	-51	-51	-41	-29	
Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
Distance to 3m	dB	-10	-10	-10	-10	-10	-10	-10	-10	
Facade Correction	dB	3	3	3	3	3	3	3	3	
Net SPL at Window	dB	**45**	**39**	**26**	**10**	**-4**	**-3**	**5**	**8**	**25**
Extract Air Exhaust										
Heatstar SWL	dB	68	70	68	69	66	68	65	56	**73**
Silencer, 100/1200	dB	-6	-12	-23	-40	-51	-51	-41	-29	
Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
Distance to 5m	dB	-14	-14	-14	-14	-14	-14	-14	-14	
Facade Correction	dB	3	3	3	3	3	3	3	3	
Net SPL at Window	dB	**42.7206**	**38.5206**	**25.7206**	**10.1206**	**-3.6794**	**-1.8794**	**5.3206**	**8.0206**	**25**
Combined Level	**dB**	**46.8**	**41.9**	**28.8**	**12.8**	**-1.0**	**0.8**	**8.1**	**11.2**	**28**