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ACOUSTICS PLUS

Proposed Climate Control System

9 Templewood Avenue London, NW3

Environmental Noise Assessment

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Principal Consultant

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VAT Registration Number: 788 2610 94

Environmental Noise Assessment **Proposed Climate Control System**	
Project Address:	9 Templewood Avenue London NW3
Project Reference:	102285

Issue/Revision Record			
Issue:	**Date:**	**Remarks:**	**Author:**
1	03/09/2012	First Issue	Phil Huffer
2	13/12/2012	Revised basement plan	Phil Huffer

	Signature:	**Print:**	**Title:**	**Date:**
Author:		**Phil Huffer**	**Principal Consultant**	**03/09/2012**
Reviewer:		**Andy Dodd**	**Consultant**	**03/09/2012**

1. INTRODUCTION

1.1 Acoustics Plus Ltd (APL) is an independent firm of multi-disciplinary acoustic engineers. APL is a registered member of The Association of Noise Consultants (ANC) and the author is a corporate member of The Institute of Acoustics (IOA).

1.2 APL has been instructed by the Applicant's architect, XUL Architecture, to consider and advise upon the noise implications of a proposed installation of a climate control system.

1.3 The proposed climate control system will consist of one outdoor air condenser unit that will be contained in a proprietary acoustic enclosure within the rear garden.

1.4 It is understood the Local Planning Authority (LPA) require further information on noise levels from the proposed installation in order to fully assess the potential noise impact upon the surrounding neighbourhood.

1.5 This report provides the response to the LPA, on behalf of the Applicant.

2. BASELINE SITUATION

2.1 The Application Site (the "site") is situated at 9 Templewood Avenue, London, NW3.

2.2 The site is a self contained flat arranged over basement and ground floor level. It is understood the site is being developed and as part of this it is proposed to extend the basement and install a mechanical climate control system. It is proposed to locate the outdoor condenser unit within a proprietary acoustic enclosure within the rear garden. The position of the proposed air condenser unit is shown in Figures 4 and 11. The site and its surroundings can be seen in Figures 1 to 12.

2.3 To minimise noise, the condenser unit will be located within an Environ acoustic enclosure.

2.4 The nearest noise sensitive façade belongs to the first floor flat of No.9 Templewood Avenue (as indicated on Figure 2). The distance from the location of the nearest noise sensitive façade to the proposed location of the plant was determined from scaled drawings to be 5m.

2.5 Information in regard of the noise level from the air condenser unit has been provided by Mitsubishi HVAC (copy of the data sheet is provided in Appendix A). The unit is itemised below:

(a) 1No. Mitsubishi PUMY-P140

3. NOISE OUTLINE

3.1 In order to produce an environmental noise assessment, consideration must be given to the locality of the installation.

3.2 Measurements of background noise were obtained over a 24 hour period at a location deemed representative of background noise levels experienced at the nearest noise sensitive façade. Measurements were obtained in the rear garden adjacent to the noise sensitive façade.

3.3 The particulars of the measurement exercise are recorded below:

Date:	20th – 21st August 2012
Start Time:	12:27 hrs.
Location:	Rear garden at 9 Templewood Avenue
Weather:	No wind, no precipitation.

3.4 The measurements carried out during the exercise are recorded below:

L_{90} percentile level (dB re 20μPa) at 15 minute intervals

3.5 The measurements obtained during the exercise are presented in Appendix B.

3.6 For the sake of clarity, the lowest measured background noise over the anticipated operational hours of the condenser unit is highlighted. As the unit will be utilised for climate control of residential accommodation, it is anticipated that the operational hours will be on a demand basis during any given 24hr period.

3.7 Information regarding the noise levels not to be exceeded by the installation was extracted from the LPA (London Borough of Camden) Local Development Framework 2010-2025 Section DP28 Noise and Vibration:

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	55dBL_{Aeq}

3.8 The noise level of the condenser unit was established from the data sheet provided (Appendix A) as detailed.

(a) 1No. Mitsubishi PUMY-P140 @ 53dBA @ 1m

3.9 The sound reduction offered by the Environ acoustic enclosure was obtained from Environ and is detailed in an information sheet contained in Appendix A.

4. EQUIPMENT

4.1 All measurements were obtained using the following equipment:

- Svantek Svan Type 948 Class 1 Serial No. 6988
- Rion Calibrator Type NC-74 Class 1 Serial No. 00410215

4.2 The relevant equipment carries full and current traceable calibration. The equipment, where necessary, was calibrated prior to and after the measurements were carried out.

5. CALCULATIONS

5.1 Given the proposed location of the condensing units, the egress of noise from the condensing unit through the Environ acoustic enclosure to the adjacent noise sensitive façade has been considered. The distance from the enclosure to the nearest noise sensitive façade was determined as 5m.

5.2 In considering the propagation of noise from the condenser, consideration was given to the following equation.

$L_{p2} = L_{p1} – R – 6$

Where L_{p1} is the sound pressure level on the source side of the enclosure
L_{p2} is the sound pressure level close to the enclosure on the outside
R is the sound reduction index of the enclosure

5.3 The sound reduction index of the Environ enclosure was assumed to be as follows (extracted from Environ literature – see Appendix A):

Louvre type	Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Environ Lite	12	13	20	29	36	37	39	39	

Table 1

5.4 The calculation exercise can be shown in Table 2 below. The distance attenuation is based on point source propagation. A further correction has been made given the enclosures proximity to reflecting planes.

	Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Mitsubishi PUMY-P140	61	55	52	51	48	43	37	40	61
Distance attenuation	-14	-14	-14	-14	-14	-14	-14	-14	
R_w Environ Lite	12	13	20	29	36	37	39	39	
Reflecting planes	+6	+6	+6	+6	+6	+6	+6	+6	
Level at noise sensitive façade @ 5m	35	28	18	8	0	0	0	0	16

Table 2

5.5 In order to comply with the requirements of the LPA, any noise from the proposed installation of one condensing unit should not exceed a level of 16 dBA (10dB below the lowest measured background noise over the operational hours of the unit).

5.6 The lowest measured background noise level was 26dB L_{A90} that occurred during the hours 02:12 – 05:12 hrs on 21st August 2011.

6. CONCLUSION

6.1 The foregoing assessment indicates that the proposed installation will meet the requirements imposed by the LPA. Further mitigation measures will not be required.

6.2 The existing condenser units on the site will be removed.

6.3 It is understood that the redevelopment works will also include the installation of a swimming pool. This pool will require circulating pumps which will be housed in a brick built plant room adjacent to the acoustic enclosure. The pool will not be heated. The plant room will be ventilated through acoustic attenuators which will be sized as necessary. The level of attenuation will be specified accordingly to ensure that noise egress meets the LPA requirements.

Figures

9 Templewood Avenue, London, NW3.

Figure 1

Figure 2

Nearest noise sensitive facade

Figure 3

Figure 4

Proposed location of plant

Figure 5

Figure 6

Figure 7

Figure 8

Existing condensers removed

Figure 9

Figure 10

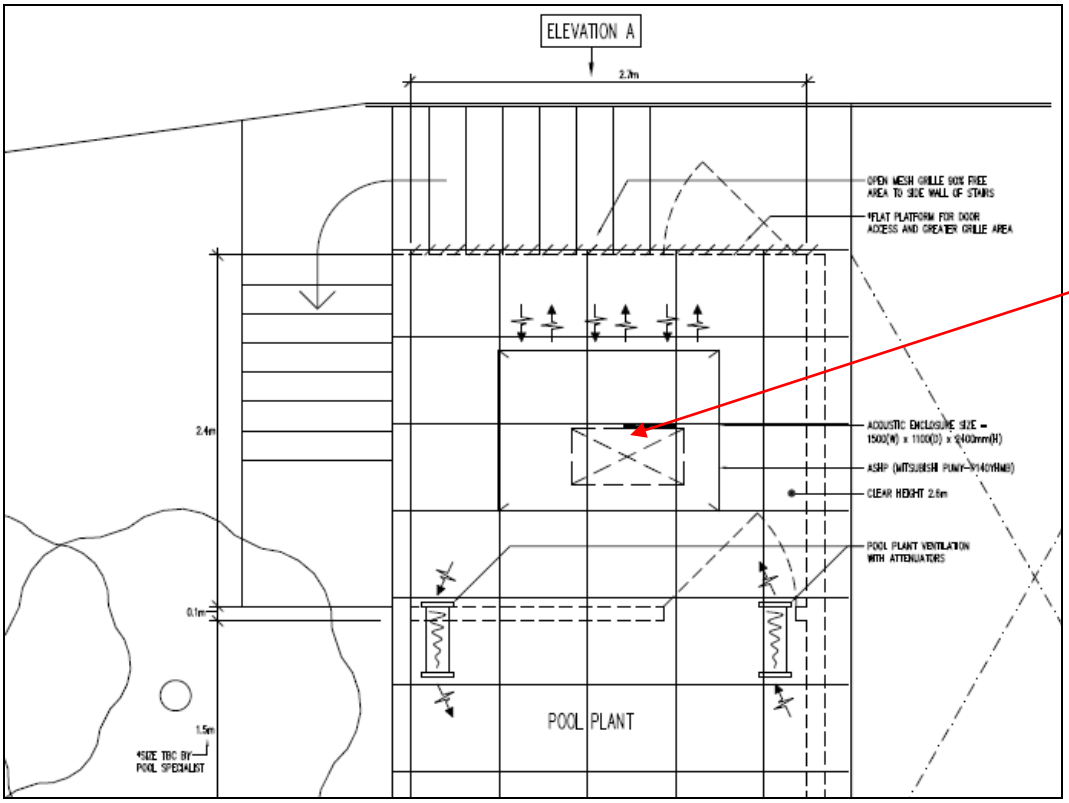


Figure 11

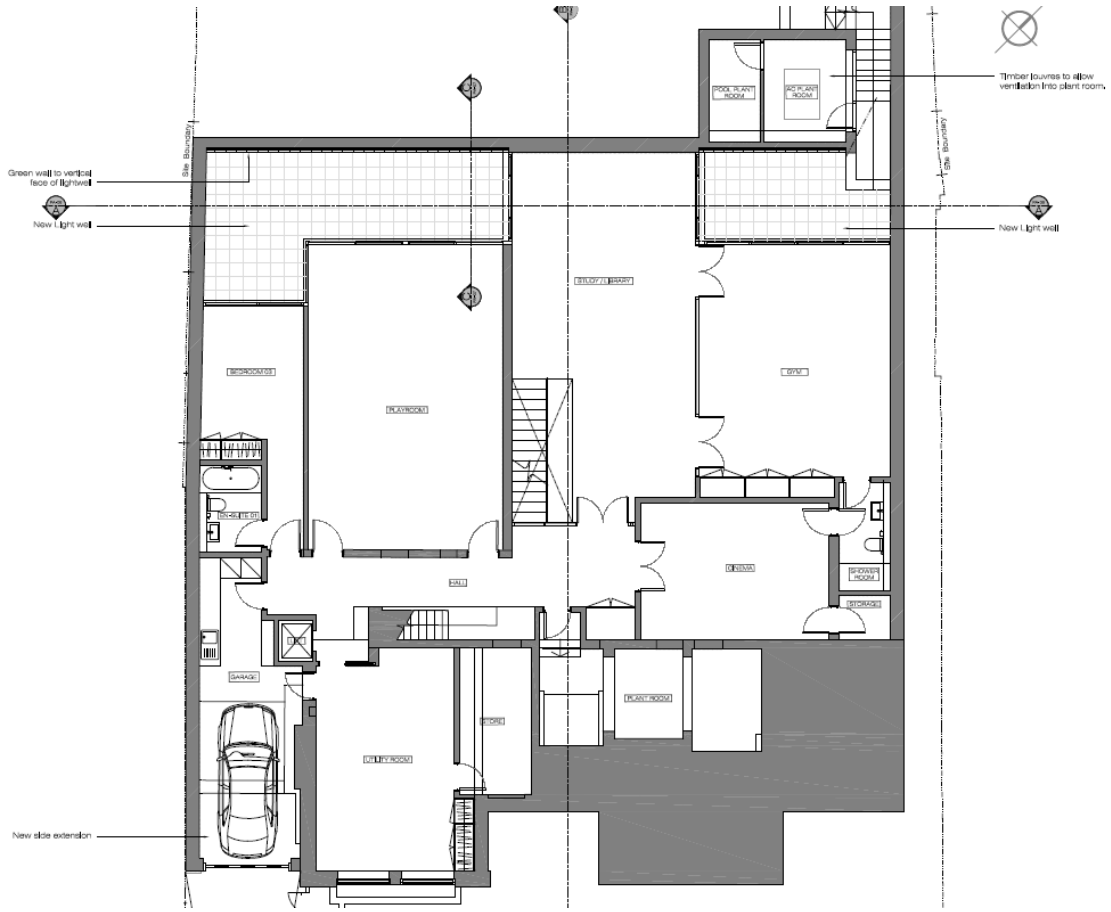
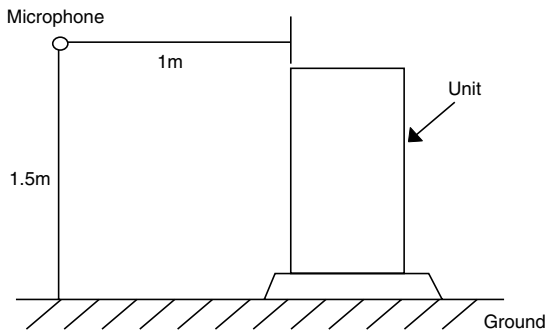

Timber louvres to allow ventilation into plant room.
Green wall to vertical face of lightwell
New Light well
New Light well
New side extension
Site Boundary
Site Boundary
POOL PLANT ROOM
AC PLANT ROOM
STUDY / LIBRARY
GYM
BEDROOM 05
PLAYROOM
ENSUITE 01
HALL
DINING
SHOWER ROOM
STORAGE
GARAGE
LAUNDRY ROOM
STORE
PLANT ROOM

Figure 12

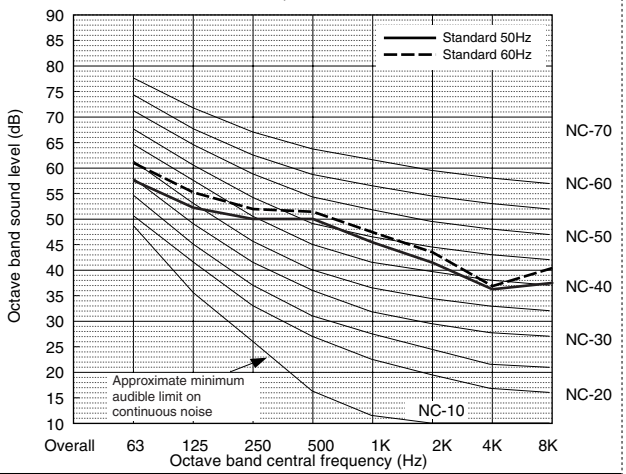
Appendix A

Measurement condition
PUMY-P100,125,140YHM
PUMY-P100,125,140VHM



Sound level of PUMY-P140YHM,VHM

Ref. : P140YHM,VHM-VBN-050093

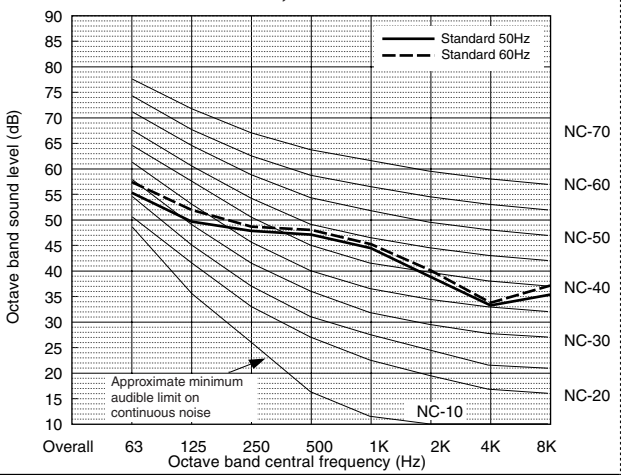


		63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	dB(A)
Standard	50Hz	57.2	51.7	49.9	49.8	45.5	41.1	35.9	37.1	51.0
	60Hz	60.9	55.4	52.1	51.4	47.5	43.2	37.1	40.3	53.0
Night mode	50/60Hz	-	-	-	-	-	-	-	-	-

* When Night Mode is set, the A/C system's capacity is limited. The system could return to normal operation from Night Mode automatically in the case that the operation condition is severe.

Sound level of PUMY-P100YHM,VHM

Ref. : P100YHM,VHM-VBN-050093

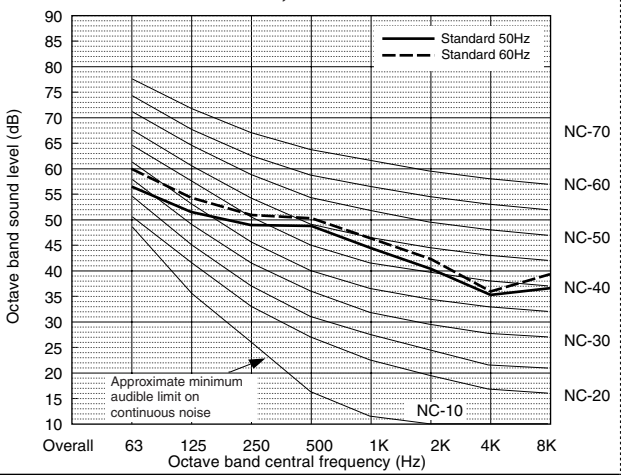


		63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	dB(A)
Standard	50Hz	55.2	49.7	47.9	47.8	43.5	39.1	33.9	35.1	49.0
	60Hz	58.9	53.4	50.1	49.4	45.5	41.2	35.1	38.3	51.0
Night mode	50/60Hz	-	-	-	-	-	-	-	-	-

* When Night Mode is set, the A/C system's capacity is limited. The system could return to normal operation from Night Mode automatically in the case that the operation condition is severe.

Sound level of PUMY-P125YHM,VHM

Ref. : P125YHM,VHM-VBN-050093



		63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	dB(A)
Standard	50Hz	56.2	50.7	48.9	48.8	44.5	40.1	34.9	36.1	50.0
	60Hz	59.9	54.4	51.1	50.4	46.5	42.2	36.1	39.3	52.0
Night mode	50/60Hz	-	-	-	-	-	-	-	-	-

* When Night Mode is set, the A/C system's capacity is limited. The system could return to normal operation from Night Mode automatically in the case that the operation condition is severe.

environ™
Dynamic Acoustic Technology

Acoustic Enclosure Systems for Air Conditioning and Refrigeration Plant

environlite 1.2.25AC SPLIT

Versatile yet cost effective noise control solutions for small and medium sized Split Air Conditioning and Heat Pump systems that have horizontal air flow characteristics.

This attractive range of units combines superior noise reduction characteristics and application versatility with a user friendly design for ease of assembly.

An introduction:

environlite is not only physically compact and discrete; its flexibility allows for a wide range of AC applications and is particularly suited to 'difficult to access' locations. Available as a new build or retro-fit solution, environlite is supplied to the user palletised as a simple on-site self build kit.

All Environ products are a proven solution for the elimination of noise where commercial establishments coexist with domestic neighbours and environlite is especially suited to the ever growing domestic AC market.

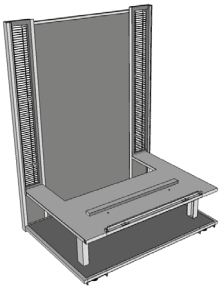
By design, environlite applies its patented noise control features to best advantage, ensuring maximum acoustic performance.

With advanced noise control technology underpinned by quality engineering and manufacturing standards, environlite solutions help alleviate local authority approval issues, whilst eliminating the air conditioning noise problem for the user.

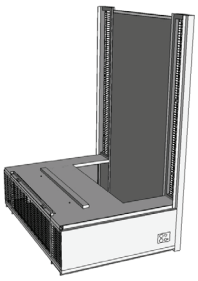
With almost infinite plant application compatibility and deriving its name from its design, environlite is matched to provide unparalleled acoustic performance to light commercial and domestic AC applications. The range is available in a variety of sizes, allowing it to by tailored to meet specific applications for new build or retro-fit noise abatement.

The integrated airways are sized to suit the requirements of the enclosed plant and full service and maintenance access is provided by the provision of removable and hinged access panels.

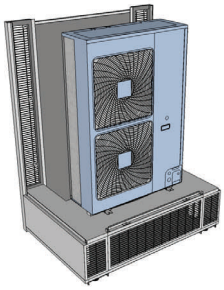
environlite is secure and gives greater flexibility regarding the positioning of plant and machinery, especially where space is at a premium. Being 'Visually Quiet', no moving parts are visible - so the enclosed plant remains out of sight and out of mind.....



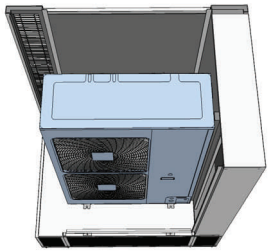
STEPS 1-4 - Structure



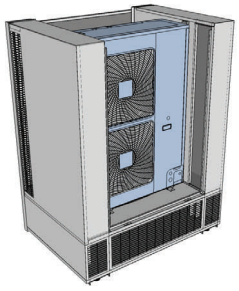
STEPS 5-6 - Air In Grilles



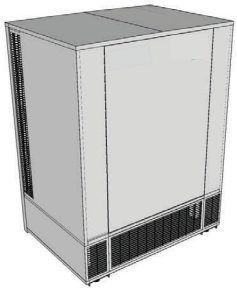
STEP 7 - Locate AC unit



STEP 8 - Fit RH Airway



STEP 9 - Fit LH Airway



STEPS 11-12 - Complete Assembly

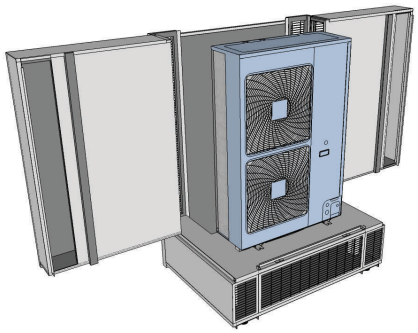
The Environ Integra, Modula and Lite acoustic designs are protected under patent

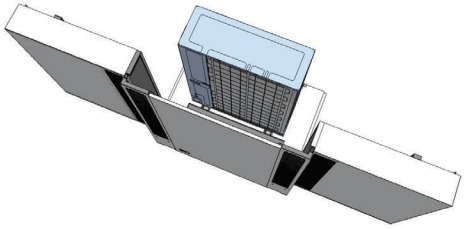
environ™
Dynamic Acoustic Technology

environlite 1.2.25AC SPLIT

Product features at a glance:

- Superior sound engineering characteristics with certified Transmission Loss performance
- Satisfies the most stringent local authority noise requirements as part of the planning or noise enforcement process
- Effective noise control solution for Air Conditioning plant with horizontal air flow requirements
- Optimised airways and grilles maximise airflow efficiencies
- Full enclosure design protects plant from the elements, virtually eliminates the effect of solar gain on the operating plant and reduces the need for condenser coil cleaning
- Ultra small footprint, quality build, strong and durable design
- A visually quiet, 'good neighbour' with a choice of external finishes to allow plant to blend into the surroundings





User Benefits:

- Effectively eliminates plant noise on New Build a Retro-fit projects
- Local authority endorsed 'Best Practical Means' solution for large Air Conditioning and Heat Pump units
- No noise nuisance enhances neighbour relations
- Secure, robust and vandal proof—no additional security required
- Reduces installation time and cost compared to other acoustic solutions

Installer Benefits:

- Supplied as a 'Flat Pack' accessory for on-site assembly
- Quick and Easy to assemble - No specialised tools necessary
- Modular sub-assemblies for ease of installation
- Floor or Wall Mount
- Integrated Services and Electrical access points.
- Commissioning, Service and Maintenance access through lockable access panels
- Noise attenuation under installation contractor control

The Environ Integra, Modula and Lite acoustic designs are protected under patent

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Dynamic Acoustic Technology

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environlite Technical Information (May 2006)

DYNAMIC ACOUSTIC TECHNOLOGY

Noise Measurement Information:

Test: Environ Lite Acoustic Enclosure—1470mm W x 1045mm D x 1755mm H

Test Standard:

ISO 717/1 Acoustics - Rating of Sound Insulation in Buildings and of Building Elements - Part 1: Airborne Sound Insulation

Sound Level Measuring Equipment:

CEL 593 C1R Precision Sound Analyser - Type 1
CEL 284/2 Acoustic Calibrator Type 1
JBL Loudspeaker driven by CEL White Noise Source

Transmission Loss Data:

Transmission Loss—Environ Lite							
Octave Frequency in Hertz (dB ref 2 x 10^{-5} Pascal's)							
63	125	250	500	1K	2K	4K	8K
12	13	20	29	36	37	39	39
Summary Transmission Loss Equates to an Overall Reduction of 25 dB(A)							

Support Information:

Monitoring was carried out using the BS3740 technique, insofar as measurements were taken in each quadrant and the results averaged. Internal Test Room: 6m W x 12m L x 4m H. Background noise in the semi-reverberant test room was such as not to interfere with the practical measurements

Appendix B

Background noise measurements obtained at rear of 9 Templewood Avenue, London

No	Date & time	Filename	[hh:mm:ss]	MAX [dB]	MIN [dB]	LEQ [dB]	L90
1	20/08/2012 12:27:46	@APL0001	00:15:00	68	51	59	54
2	20/08/2012 12:42:46	@APL0002	00:15:00	71	51	58	53
3	20/08/2012 12:57:46	@APL0003	00:15:00	68	49	57	52
4	20/08/2012 13:12:46	@APL0004	00:15:00	78	50	61	52
5	20/08/2012 13:27:46	@APL0005	00:15:00	71	51	58	54
6	20/08/2012 13:42:46	@APL0006	00:15:00	75	50	58	52
7	20/08/2012 13:57:46	@APL0007	00:15:00	71	49	57	51
8	20/08/2012 14:12:46	@APL0008	00:15:00	73	35	55	43
9	20/08/2012 14:27:46	@APL0009	00:15:00	65	34	44	40
10	20/08/2012 14:42:46	@APL0010	00:15:00	69	43	55	47
11	20/08/2012 14:57:46	@APL0011	00:15:00	72	48	57	51
12	20/08/2012 15:12:46	@APL0012	00:15:00	69	50	55	52
13	20/08/2012 15:27:46	@APL0013	00:15:00	69	51	56	53
14	20/08/2012 15:42:46	@APL0014	00:15:00	66	48	53	50
15	20/08/2012 15:57:46	@APL0015	00:15:00	68	46	52	47
16	20/08/2012 16:12:46	@APL0016	00:15:00	70	49	55	51
17	20/08/2012 16:27:46	@APL0017	00:15:00	67	49	55	51
18	20/08/2012 16:42:46	@APL0018	00:15:00	74	50	56	52
19	20/08/2012 16:57:46	@APL0019	00:15:00	71	43	53	50
20	20/08/2012 17:12:46	@APL0020	00:15:00	71	48	54	51
21	20/08/2012 17:27:46	@APL0021	00:15:00	70	50	54	51
22	20/08/2012 17:42:46	@APL0022	00:15:00	77	49	57	51
23	20/08/2012 17:57:46	@APL0023	00:15:00	68	48	55	52
24	20/08/2012 18:12:46	@APL0024	00:15:00	59	34	46	36
25	20/08/2012 18:27:46	@APL0025	00:15:00	55	33	40	35
26	20/08/2012 18:42:46	@APL0026	00:15:00	56	34	40	36
27	20/08/2012 18:57:46	@APL0027	00:15:00	62	33	45	36
28	20/08/2012 19:12:46	@APL0028	00:15:00	60	32	44	35
29	20/08/2012 19:27:46	@APL0029	00:15:00	56	31	40	34
30	20/08/2012 19:42:46	@APL0030	00:15:00	59	33	42	35
31	20/08/2012 19:57:46	@APL0031	00:15:00	52	31	39	33
32	20/08/2012 20:12:46	@APL0032	00:15:00	63	32	43	34
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38	20/08/2012 21:42:46	@APL0038	00:15:00	53	31	40	34
39	20/08/2012 21:57:46	@APL0039	00:15:00	52	32	37	34
40	20/08/2012 22:12:46	@APL0040	00:15:00	56	32	38	34
41	20/08/2012 22:27:46	@APL0041	00:15:00	54	32	39	34
42	20/08/2012 22:42:46	@APL0042	00:15:00	63	32	45	34
43	20/08/2012 22:57:46	@APL0043	00:15:00	47	31	36	33
44	20/08/2012 23:12:46	@APL0044	00:15:00	47	31	36	32
45	20/08/2012 23:27:46	@APL0045	00:15:00	49	31	36	33
46	20/08/2012 23:42:46	@APL0046	00:15:00	47	29	34	31
47	20/08/2012 23:57:46	@APL0047	00:15:00	44	28	31	29

Background noise measurements obtained at rear of 9 Templewood Avenue, London

No	Date & time	Filename	[hh:mm:ss]	MAX [dB]	MIN [dB]	LEQ [dB]	L90
48	21/08/2012 00:12:46	@APL0048	00:15:00	56	27	35	29
49	21/08/2012 00:27:46	@APL0049	00:15:00	52	29	33	30
50	21/08/2012 00:42:46	@APL0050	00:15:00	39	28	32	30
51	21/08/2012 00:57:46	@APL0051	00:15:00	43	28	31	29
52	21/08/2012 01:12:46	@APL0052	00:15:00	52	27	36	28
53	21/08/2012 01:27:46	@APL0053	00:15:00	47	28	33	29
54	21/08/2012 01:42:46	@APL0054	00:15:00	38	27	30	29
55	21/08/2012 01:57:46	@APL0055	00:15:00	41	26	28	27
56	21/08/2012 02:12:46	@APL0056	00:15:00	41	25	29	26
57	21/08/2012 02:27:46	@APL0057	00:15:00	59	25	38	26
58	21/08/2012 02:42:46	@APL0058	00:15:00	35	25	28	26
59	21/08/2012 02:57:46	@APL0059	00:15:00	39	26	29	27
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61	21/08/2012 03:27:46	@APL0061	00:15:00	42	25	28	26
62	21/08/2012 03:42:46	@APL0062	00:15:00	53	25	37	27
63	21/08/2012 03:57:46	@APL0063	00:15:00	34	25	28	27
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65	21/08/2012 04:27:46	@APL0065	00:15:00	43	26	29	27
66	21/08/2012 04:42:46	@APL0066	00:15:00	39	26	30	28
67	21/08/2012 04:57:46	@APL0067	00:15:00	42	25	29	26
68	21/08/2012 05:12:46	@APL0068	00:15:00	40	26	29	27
69	21/08/2012 05:27:46	@APL0069	00:15:00	60	26	38	27
70	21/08/2012 05:42:46	@APL0070	00:15:00	59	27	41	29
71	21/08/2012 05:57:46	@APL0071	00:15:00	60	27	43	29
72	21/08/2012 06:12:46	@APL0072	00:15:00	55	28	40	30
73	21/08/2012 06:27:46	@APL0073	00:15:00	61	29	44	31
74	21/08/2012 06:42:46	@APL0074	00:15:00	57	29	43	32
75	21/08/2012 06:57:46	@APL0075	00:15:00	51	30	39	33
76	21/08/2012 07:12:46	@APL0076	00:15:00	57	30	43	34
77	21/08/2012 07:27:46	@APL0077	00:15:00	63	29	44	32
78	21/08/2012 07:42:46	@APL0078	00:15:00	67	30	42	33
79	21/08/2012 07:57:46	@APL0079	00:15:00	58	31	44	35
80	21/08/2012 08:12:46	@APL0080	00:15:00	68	32	53	35
81	21/08/2012 08:27:46	@APL0081	00:15:00	72	50	55	52
82	21/08/2012 08:42:46	@APL0082	00:15:00	73	49	59	52
83	21/08/2012 08:57:46	@APL0083	00:15:00	73	50	60	54
84	21/08/2012 09:12:46	@APL0084	00:15:00	67	48	58	52
85	21/08/2012 09:27:46	@APL0085	00:15:00	77	49	61	53
86	21/08/2012 09:42:46	@APL0086	00:15:00	72	49	61	54
87	21/08/2012 09:57:46	@APL0087	00:15:00	79	52	61	55
88	21/08/2012 10:12:46	@APL0088	00:15:00	74	47	57	52
89	21/08/2012 10:27:46	@APL0089	00:15:00	61	38	46	42
90	21/08/2012 10:42:46	@APL0090	00:15:00	69	40	56	43
91	21/08/2012 10:57:46	@APL0091	00:15:00	73	51	62	56
92	21/08/2012 11:12:46	@APL0092	00:15:00	74	51	60	55
93	21/08/2012 11:14:29	@APL0093	00:01:43	69	53	60	54