Appendix E.4

Soho House, Brighton (Application No: BH2015/02443)

Plant Noise Assessment (Units 2-5)

Report 16/0276/R2

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Plant Noise Assessment (Units 2-5)

Report 16/0276/R2

Brighton Seafront Regeneration Ltd

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Revision	Description	Date	Prepared	Approved
0	1st Issue	16 May 2017	Josh Palmer	Philip Hankin

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1 Introduction

1.1 It is proposed to open three new restaurants and a shop with café counter in units 2-5 of the Soho House development on Brighton's seafront. Planning permission for the redevelopment has been granted (application no: BH2015/02443) subject to conditions, one of which relates to plant noise emissions.

1.2 Cole Jarman has previously undertaken a noise survey in order to determine limits for noise emissions from all proposed plant items. The background noise levels recorded during the survey have now been used to derive separate limits applicable to plant serving each area.

1.3 This report presents the methodology and results of the noise survey, and defines appropriate criteria in accordance with the requirements stipulated by the relevant planning condition (no. 8). A subsequent plant noise assessment is detailed along with mitigation measures required to achieve compliance.

2 Site Description

2.1 Units no. 2 to 5 occupy the western half of the wider Soho House redevelopment site. There will be cooling plant installed externally at low level beside the wall along the east edge of unit 5 and ventilation plant ducted to grilles along the top of the north and south elevations.

Figure 1. Aerial view of site showing nearest receptors and measurement position

2.2 We understand that the new plant may be required to run between 0600 and 0100 hours.

2.3 The site is shown within the context of the surrounding area in Figure 1 above. Marine Parade lies to the north and Madeira Drive to the south. The nearest noise sensitive receptors to the site are hotels and apartments on the north side of Marine Parade. These are shaded blue.

2.4 Beyond Madeira drive is Brighton Beach and, to the west, Brighton Pier. There are no other noise sensitive locations to consider south of the site.

3 Environmental Noise Survey

3.1 **Methodology**

3.1.1 An unattended noise survey was undertaken at one position for a period of 48 hours, commencing at approximately 1400 hours on Tuesday 7th June.

3.1.2 Measurements were made at a single free-field position at the north boundary of the site, approximately 8m from the kerb of Marine Parade. This position is labelled MP1 on Figure 1 above.

3.1.3 Measurements of the L_{Aeq}, L_{Amax} and L_{A90} indices were recorded over consecutive 15 minute periods (see attached Glossary of Acoustic Terms for an explanation of the noise units used).

3.1 Noise measurements were made using the equipment listed in table T1.

Item	Manufacturer	Type
Sound Level Analyser	Norsonic	140
Acoustic Calibrator	Norsonic	1251
Weatherproof windshield	Norsonic	1212

T1 Equipment used during unattended noise survey

3.1.4 The sound level analyser was calibrated before and after the noise survey to ensure a consistent and acceptable level of accuracy was maintained throughout. No significant drift was noted to have occurred.

3.1.5 The weather conditions while setting up and collecting the survey equipment were warm and dry with a gentle breeze; suitable for the measurements. Based on online weather history data, these conditions are not believed to have varied significantly during the survey.

3.2 Results

3.2.1 The results of the noise measurements at MP1 are presented in the attached time history figure 16/0276/TH1.

3.2.2 While on site, the noise climate was dominated by traffic on Madeira Drive.

3.2.3 The lowest background noise level measured during the hours during which the plant may run (0600-0100) was $L_{A90,15min}$ 46 dB.

4 Noise Emission Criteria

4.1 Planning Condition 8

4.1.1 The site location falls in the area of Brighton & Hove City Council. They have granted permission for the redevelopment (application no: BH2015/02443), subject to conditions. Planning condition 8 relates to noise emissions from new mechanical services plant and reads as follows:

Prior to the installation of plant into the development, an acoustic report shall be submitted for approval to the Local Planning Authority. This must show that the cumulative 'A' weighted sound pressure level from the plant and machinery (including non-emergency auxiliary plant and generators), that will be incorporated into the development, when operating at its noisiest, shall not at any time exceed a value of 10 dB below the minimum external background noise, at a point 1 metre outside any window of the nearest residential or other noise sensitive property, unless and until a fixed maximum noise level is approved by the City Council. The background level should be expressed in terms of the lowest $L_{A90,15mins}$ during the proposed hours of operation. The plant-specific noise level should be expressed as $L_{Aeq,T}$, and shall be representative of the plant operating at its maximum.

Reason: To safeguard the amenities of the occupiers of neighbouring properties and to comply with policies SU10 and QD27 of the Brighton & Hove Local Plan.

4.1.2 It should be noted that the requirements stipulated by this condition differ in certain ways from the guidance in BS 4142:2014, which is typically referenced when assessing noise emissions from mechanical services plant.

4.1.3 The requirement to restrict plant noise to a level no greater than 10 dB below the minimum background level during the operating period goes beyond the intent of BS 4142:2014. The standard states that *"where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact"*.

4.1.4 Conversely, however, BS4142:2014 requires that plant noise is assessed on the basis of a rating level, which may include penalties for various acoustic features, whereas Planning Condition 8 refers to the combined A-weighted sound pressure level of all plant operating at a given time. Therefore, in this case there is no need to add corrections for the character of the plant noise.

4.1.5 Plant serving the east side of the development may also run between 0600 and 0100 hours, so noise emissions from plant serving units 2-5 should be restricted to a level no greater than 13 dB below the minimum background level for this period. This is because equal apportionment of the maximum total permissible noise emissions from all new plant between the east and west sides of the development is achieved by setting the limit for each side at 3 dB below the overall limit, while remaining within it when all plant operates together.

4.2 Plant Noise Limit

4.2.1 Based on the approach detailed in the previous section, the noise limit for the proposed mechanical services plant when allowed to run between 0600 and 0100 hours is **33 dB(A)**.

5 Plant Noise Assessment

5.1 Proposed Installation

Cooling Plant

5.1.1 It is proposed to install four VRF air source heat pumps (VRF1, 2, 3 & 4) beside the east wall to unit 5 (the easternmost unit of the four considered here). This will be at low level and therefore at least partially screened from nearby receptors by surrounding buildings, a walkway through the middle of the site and Marine Parade to the north.

Ventilation Plant

5.1.2 A pair of extract fans (EF1 & 5) are proposed to draw air from toilets in units 2 and 5 out through high level grilles along Marine Parade, at approximately street level.

5.1.3 A further four extract fans (EF2, 3, 4 & 6) are proposed to draw air from kitchen / food serving areas, one in each unit, also to grilles along Marine Parade.

5.1.4 Four supply fans (SF1, 2, 3 & 4), one per unit, are also to be ducted to grilles along Marine Parade.

5.1.5 Six heat recovery units (HRU1, 2, 3, 4, 5 & 6) are proposed, one each in units 2 and 4, and two in both unit 3 and unit 5. The extract and supply air handled by these units will be ducted to and from grilles in the southern elevation, facing Brighton Beach.

5.1.6 All ventilation plant is to be mounted internally and it is therefore only duct borne noise that may contribute significantly to the atmospheric emissions requiring assessment under planning condition 8.

5.2 Assessment

5.2.1 An assessment has been conducted on the basis of the layout drawing by CD International Building Services Engineers (CDBSE), dated 19th April 2017, and accompanying schedules of

plant equipment. The reference codes used in this report to identify each unit and the location of any mitigation requirements correspond to those shown on the drawings and schedules by CDBSE. The drawing is attached as Appendix A.

5.2.2 For our assessment we have used manufacturers' octave band noise data for each plant item, as shown in the attached schedule 16/0276/SCH1.

5.2.3 The assessment has considered two residential receptors that will be exposed to noise from the new plant. These are labelled on Figure 2 below and described as follows:

AP1 – New Madeira Hotel, similarly exposed to noise from the eastern side of the overall site and considered in our other assessment, also most exposed to new cooling plant.

AP3 – Marine House, opposite the approximate midpoint of the site and therefore exposed to the greatest number of ventilation terminals, representing the worst case.

Figure 2. Aerial view of site showing assessment positions ad site boundary

5.2.4 Our assessment has taken into account reverberant sound radiated from the VRF air source heat pumps and from grilles after being transmitted along ducts to the atmosphere via grilles.

5.2.5 The specific noise levels generated by the equipment at each location have been calculated by correcting plant noise levels for distance and radiation losses, façade reflections and screening where appropriate.

5.2.6 Duct and grille dimensions are not currently available, due to the outline stage of the design. Conservative estimates, proportional to the size of each plant item, have therefore been made in calculating losses for bends, end reflections and grille directivities where appropriate.

5.2.7 A sample of calculations detailing the assessment are attached as Appendix B. A full set of calculation sheets detailing the assessment for each of the plant items can be provided on request.

5.3 Required Mitigation Measures

5.3.1 Atmospheric side silencers are required for the intakes of all supply fans and the exhausts of all extract fans ducted to the north side of the site. The silencers must meet the insertion losses shown in the attached schedule 16/0276/SCH2.

5.3.2 Typical lengths and percentage free areas of silencer that would achieve these values are provided for guidance only. The insertion losses should be taken as the design criteria, and not the silencer length. Any proposed silencer should be confirmed to achieve the stated insertion losses as a minimum.

5.3.3 Rectangular splitter silencers will be required to achieve the high insertion losses required to sufficiently attenuate noise from the exhaust side of each of the louder, in line single fan extract units (EF2, 4 & 6). These fans extract air from kitchen hoods and the silencers should therefore be Melinex faced to facilitate cleaning.

5.3.4 We understand from the manufacturer's data sheets that all other fans are likely to have circular ductwork and that cylindrical silencers may be preferable.

5.3.5 All silencers should be supplied and installed in accordance with the requirements of the attached specification 16/0276/SPC1. Silencer pressure drops should be limited to no more than 40 Pascals.

5.4 Results

5.4.1 With the mitigation measures described in the previous section in place, the assessed plant noise levels are as follows:

Location	**Plant Noise Emission Level, dB(A)** ***(Limit)***
	(0600-0100)
AP1 - New Madeira Hotel	30 *(33)*
AP3 – Amsterdam Hotel	33 *(33)*

T2 Calculated plant noise levels at assessment positions

5.4.2 It can be seen that the predicted plant noise levels at the assessment positions satisfy the plant noise emission criteria required by Planning Condition 8.

5.4.3 A summary of the total octave band noise levels predicted at each assessment position, as well as the relative contributions from each assessed plant item are included here as Appendix C.

5.4.4 As explained in paragraph 4.1.5 above, by designing to the limits specified here allowance has also been made for equal levels of noise generated by plant serving the eastern area of the redevelopment, ensuring compliance with the overall limit by all plant taken as a whole.

5.4.5 Suitable isolation measures will need to be incorporated into the detailed plant design to prevent excessive levels of structure-borne noise from being transmitted to other parts of the building.

6 Conclusions

6.1 It is proposed to open three new restaurants and a shop with café counter in units 2-5 of the Soho House development on Brighton's seafront. New mechanical services plant is proposed to serve these units as well as another three units of the wider redevelopment site.

6.2 An unattended noise survey has been undertaken at the site to quantify the existing noise climate and plant noise emissions limits proposed to meet the requirements stipulated by a planning condition imposed by Brighton & Hove City Council.

6.3 An assessment of the noise from the proposed plant items has been undertaken at the nearest noise sensitive windows. The assessment has shown that the proposed emission limits can be met and silencers specified to achieve this.

6.4 Headroom has been allowed for noise emissions from the plant equipment serving the other half of the redevelopment, which is covered by the same planning condition.

End of Section

Glossary of Acoustic Terms

L_{Aeq}:

The notional steady sound level (in dB) which over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measurement over that period. Values are sometimes written using the alternative expression dB(A) L_{eq}.

L_{Amax}:

The maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise when occasional loud noises occur, which may have little effect on the L_{Aeq} noise level. Unless described otherwise, L_{Amax} is measured using the "fast" sound level meter response.

L_{A10} & L_{A90}:

If non-steady noise is to be described, it is necessary to know both its level and degree of fluctuation. The L_{An} indices are used for this purpose. The term refers to the A-weighted level (in dB) exceeded for n% of the time specified. L_{A10} is the level exceeded for 10% of the time and as such gives an indication of the upper limit of fluctuating noise. Similarly, L_{A90} gives an indication of the lower levels of fluctuating noise. It is often used to define the background noise.

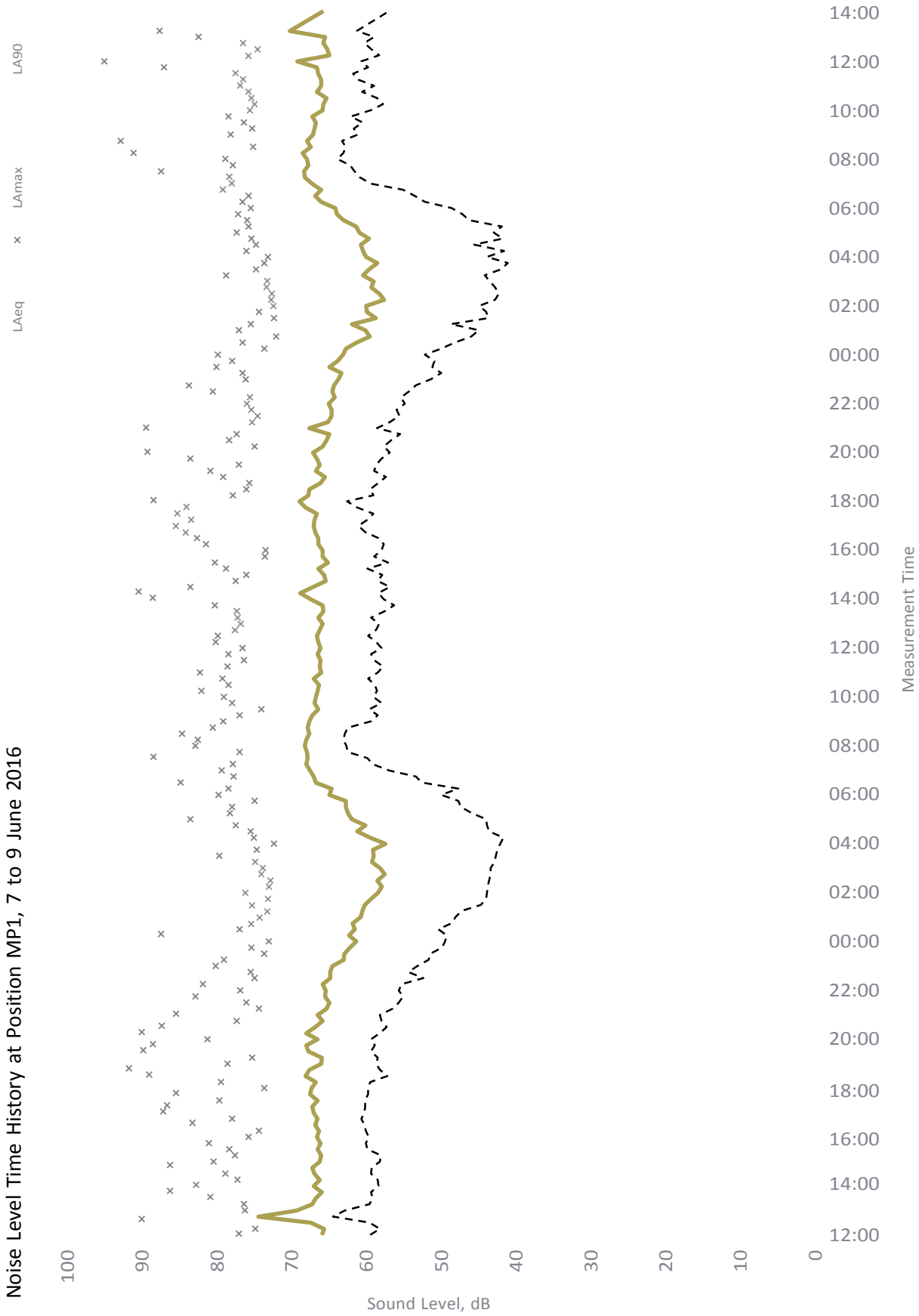
L_{A10} is commonly used to describe traffic noise. Values of dB L_{An} are sometimes written using the alternative expression dB(A) L_n.

L_{AX}, L_{AE} or SEL

The single event noise exposure level which, when maintained for 1 second, contains the same quantity of sound energy as the actual time varying level of one noise event. L_{AX} values for contributing noise sources can be considered as individual building blocks in the construction of a calculated value of L_{Aeq} for the total noise. The L_{AX} term can sometimes be referred to as Exposure Level (L_{AE}) or Single Event Level (SEL).

End of Section

Figure 16/0276/TH01



Schedule of Plant and Air Handling Equipment Sound Levels, dB

Reference	Description	Data[1] Source	Noise Level Type	Noise Levels (dB)								
				63	125	250	500	1k	2k	4k	8k	dB(A)
VRF 1	VRF Unit 2	Man	Sound Power, Lw	72	63	60	55	48	44	38	33	
VRF 2	VRF Unit 3	Man	Sound Power, Lw	72	63	60	55	48	44	38	33	
VRF 3	VRF Unit 4	Man	Sound Power, Lw	72	63	60	55	48	44	38	33	
VRF 4	VRF Unit 5	Man	Sound Power, Lw	72	63	60	55	48	44	38	33	
HRU1-in	Heat Recovery Fan Intake	Man	Sound Power, Lw	79	71	71	60	60	58	50	41	
HRU1-out	Heat Recovery Fan Discharge	Man	Sound Power, Lw	84	77	81	67	68	68	62	60	
HRU2 & 3-in	Heat Recovery Fan Intake	Man	Sound Power, Lw	70	64	62	64	59	55	47	46	
HRU2 & 3-out	Heat Recovery Fan Discharge	Man	Sound Power, Lw	76	77	71	74	65	65	63	64	
HRU4-in	Heat Recovery Fan Intake	Man	Sound Power, Lw	79	71	71	60	60	58	50	41	
HRU4-out	Heat Recovery Fan Discharge	Man	Sound Power, Lw	84	77	81	67	68	68	62	60	
HRU5 & 6-in	Heat Recovery Fan Intake	Man	Sound Power, Lw	79	71	71	60	60	58	50	41	
HRU5 & 6-out	Heat Recovery Fan Discharge	Man	Sound Power, Lw	84	77	81	67	68	68	62	60	
EF1-out	Internal Duct Mounted Twinfan Outlet	Man	Sound Power, Lw	79	75	75	70	63	62	52	52	
EF2-out	In Line Single Fan Outlet	Man	Sound Power, Lw	85	95	78	75	80	81	77	71	

Reference	Description	Data Source	Noise Level Type	Noise Levels (dB)								dB(A)
				63	125	250	500	1k	2k	4k	8k	
EF3-out	Internal Duct Mounted Twinfan Outlet	Man	Sound Power, Lw	73	69	65	65	60	55	51	45	
EF4-out	In Line Single Fan Outlet	Man	Sound Power, Lw	85	95	78	75	80	81	77	71	
EF5-out	Internal Duct Mounted Twinfan Outlet	Man	Sound Power, Lw	79	75	75	70	63	62	52	52	
EF6-out	In Line Single Fan Outlet	Man	Sound Power, Lw	85	95	78	75	80	81	77	71	
SF1-in	Supply Air Handling Unit Inlet	Man	Sound Power, Lw	76	70	63	52	52	52	47	38	
SF2-in	Supply Air Handling Unit Inlet	Man	Sound Power, Lw	76	70	63	51	51	51	46	37	
SF3-in	Supply Air Handling Unit Inlet	Man	Sound Power, Lw	76	70	63	52	52	52	47	38	
SF4-in	Supply Air Handling Unit Inlet	Man	Sound Power, Lw	76	70	63	52	52	52	47	38	

Notes

1 - Man refers to data supplied by the equipment manufacturer or supplier, Emp refers to data calculated using empirical formulae, and Meas refers to data measured by Cole Jarman

Schedule of silencers and required insertion loss, dB [1]

Reference	Location	Silencer Type	Insertion Losses (dB)							
			63	125	250	500	1k	2k	4k	8k
AS1	EF2, 4 & 6-out	33% - 2400 (Melinex)	11	23	45	50	50	48	34	24
AS2	EF1, 3 & 5-out	2 Diameter 300mm (Podded)	3	8	14	22	31	28	20	19
AS3	SF1, 2, 3 & 4	1 Diameter 300mm (Podded)	1	5	7	14	19	16	13	12

Notes

1 - To be read in conjunction with silencer specification

Specification 16/0276/SPC1

Project: **Soho House, Brighton (Units 2-5)**
Subject: **Acoustic specification of in-duct silencers**
Date: **16 May 2017**

1 General

1.1 Description

1.1.1 Furnish and install duct silencers of the types and sizes shown on the schedule.

1.1.2 Transitions and support or suspension systems are not included.

1.2 Quality Assurance

1.2.1 The dynamic insertion loss shall meet or exceed the values given in the schedules.

1.2.2 The static pressure drop shall not exceed 40 Pascals.

1.2.3 The levels of airflow noise generated by the silencers themselves at the operating conditions shall be provided by the supplier, if requested.

1.2.4 Performance data relating to dynamic insertion loss, static pressure drop and self-noise shall be obtained in accordance with BS 4718:1971 or BS EN ISO 7235 : 1996.

1.3 Submittals

1.3.1 Data sheets on the specific silencers utilised.

1.3.2 An itemised list showing the specific silencer utilised, its size, pressure drop at the required airflow volume, certified test data on dynamic insertion loss and self-noise power levels.

2 Materials and Construction

2.1 Outer casings and interior construction

2.1.1 Outer casings of rectangular silencers shall be made of 18 gauge galvanized steel or thicker in accordance with the HVCA recommended construction for high pressure rectangular ductwork. Seams shall be lock formed and mastic sealed.

2.1.2 Interior partitions for rectangular silencer splitters shall be made of not less than 26 gauge galvanized perforated steel.

2.1.3 Interior construction of tubular silencers shall be compatible with the outside casings.

2.1.4 Splitters in rectangular silencers of length not less than 900mm shall have aerodynamically shaped leading and trailing edges. Square or blunt ends are not acceptable.

2.1.5 Silencers shall be fitted with drilled angle flange connections unless other forms of connection are specified by the Mechanical Services Consultant or Contractor.

2.2 Configuration

2.2.1 Splitters within the silencer should generally be aligned with half width splitters affixed to each side wall of the casing. Splitters shall preferably be aligned vertically, and there shall be a regular splitter/airway dimension across the full width of the silencer. Horizontal splitters, where this orientation is required, shall be suitably supported and stiffened to prevent sagging and restriction of the airways. It is of particular importance that the supplier ensures that parallel splitter elements are orientated to suit the aerodynamic conditions arising from the adjacent duct geometry, particularly in the vicinity of bends and other transitions.

2.2.2 For silencers manufactured in modules, this specification shall apply to the unit as a whole.

2.2.3 The supplier shall comply with the cross-sectional sizes as shown in the schedule, unless alternative dimensions are agreed and approved by the Mechanical Services Contractor and the Acoustic Consultant. Silencers which are constructed to alternative cross-sectional dimensions must achieve the dynamic insertion loss and pressure drop requirements as set out in the schedule.

2.3 Standard silencers

2.3.1 Filler material shall be of inorganic mineral or glass fibre of a density sufficient to obtain the specified acoustic performance and be packed under not less than 5% compression to eliminate voids due to vibration and settling. Material shall be inert; rot, vermin and moisture proof; non-combustible and non-hygroscopic.

2.3.2 The filler material shall be retained in the splitters in such a manner that there is no egress of the fibres into the air stream at the prevailing flow conditions. Splitters will normally be faced with perforated galvanised sheet steel: any other facing material must be approved by the Acoustic Consultant.

2.4 Silencers with non-porous fibre protection membrane

2.4.1 Filler material shall be of inorganic mineral or glass fibre of a density sufficient to obtain the specified acoustic performance and be packed under not less than 5% compression to eliminate voids due to vibration and settling. Material shall be inert; rot, vermin and moisture

proof; non-combustible and non hygroscopic. Filler material shall be totally encapsulated and sealed with Melinex film of a thickness no less than 0.03mm.

2.5 **Special silencers with no acoustical fill**

2.5.1 No acoustic fill material: glass fibre, mineral wool, foam, etc., are not permitted.

2.5.2 Insertion loss provided by broadly tuned resonators and impedance membranes.

2.6 **Special Operating Conditions**

2.6.1 Where corrosive or toxic gases are contained in the air stream, special constructions and materials may be specified as an addendum to this specification.

2.6.2 Silencers which are expected to operate at high temperatures (e.g. turbine exhausts, boiler flues etc.) shall be constructed of a suitable gauge material, with precautions taken to allow for thermal expansion and shock. The filler material inside the splitters shall generally comply with the provisions outlined in Paragraph 2.1.C, with modifications as required to accommodate the high operating temperature. For very high temperatures, steel wool or equivalent approved may be used as the filler material.

3 Execution

3.1 Silencer units shall be delivered to site with blocked ends to prevent the ingress of rubble prior to installation and to reduce the risk of damage. The silencer identification shall be clearly marked on the casing, as shall the direction of airflow.

3.2 The silencers shall be installed in accordance with the manufacturer's recommendations to obtain the published acoustic and air flow performance.

3.3 The silencers shall be located as shown in the drawings.

3.4 Orientate the internal silencer splitters as follows for rectangular silencers:

- Silencer splitters be oriented so as to be parallel to the plane of the turn if the silencer is located in a position less than 3 duct diameters in distance from the elbow. The duct diameter shall be based upon the maximum duct cross sectional dimension of the silencer.
- If the silencer is located greater than 3 duct diameters away from an elbow, the orientation is not critical.

3.5 Locate no rectangular or circular silencers within one duct diameter from elbows, fan suction or discharge openings takeoffs, etc., unless indicated on the drawings and/or approved by the Acoustic Consultant.

4 Potential Product Suppliers

4.1 Allaway Acoustics

- Contact: Jim Grieve
- Telephone: 01992 550825
- enquiries@allawayacoustics.co.uk
- Address
  Old Police Station
  1 Queens Road, Hertford,
  Hertfordshire, SG14 1EN
- www.allawayacoustics.co.uk

4.2 Caice Acoustic Air Movement Ltd

- Telephone: 0118 9186470
- enquiries@caice.co.uk
- Head Office Address
  Riverside House
  3 Winnersh Fields
  Gazelle Close, Winnersh
  Wokingham, RG41 5QS
- www.caice.co.uk

4.3 Environmental Equipment Corporation

- Contact: Tim Meed
- Telephone: 01932 230940
- info@eecnoisecontrol.co.uk
- Address
  Richmond House
  Churchfield Road
  Walton-on-Thames,
  Surrey, WV13 3RS
- www.eecnoisecontrol.co.uk

4.4 IAC Ltd

- Contact: Mike Jackson
- Telephone: 01962 873000
- info@iacl.co.uk
- Head Office Address
  IAC House
  Moorside Road, Winchester
  Hampshire, SO23 7US
- www.industrialacoustics.com/uk

4.5 Noico Ltd

- Telephone: 01256 766207
- sales@noico.co.uk
- Address
  Patrick House
  Station Road, Hook
  Hampshire, RG27 9HU
- www.noico.co.uk

4.6 TEK Limited

- Contact: Paul Virgo
- Telephone: 0121 766 5005
- sales@tek.ltd.uk
- Address
  Seeleys Road, Greet
  Birmingham B11 2LQ
- www.tek-ltd.com

End of Section

A1

Notes

1. Refer to Architects and Structural Engineers drawings for building details.

2. Dimensions to be checked on site before any works is put in hand or prefabricated.

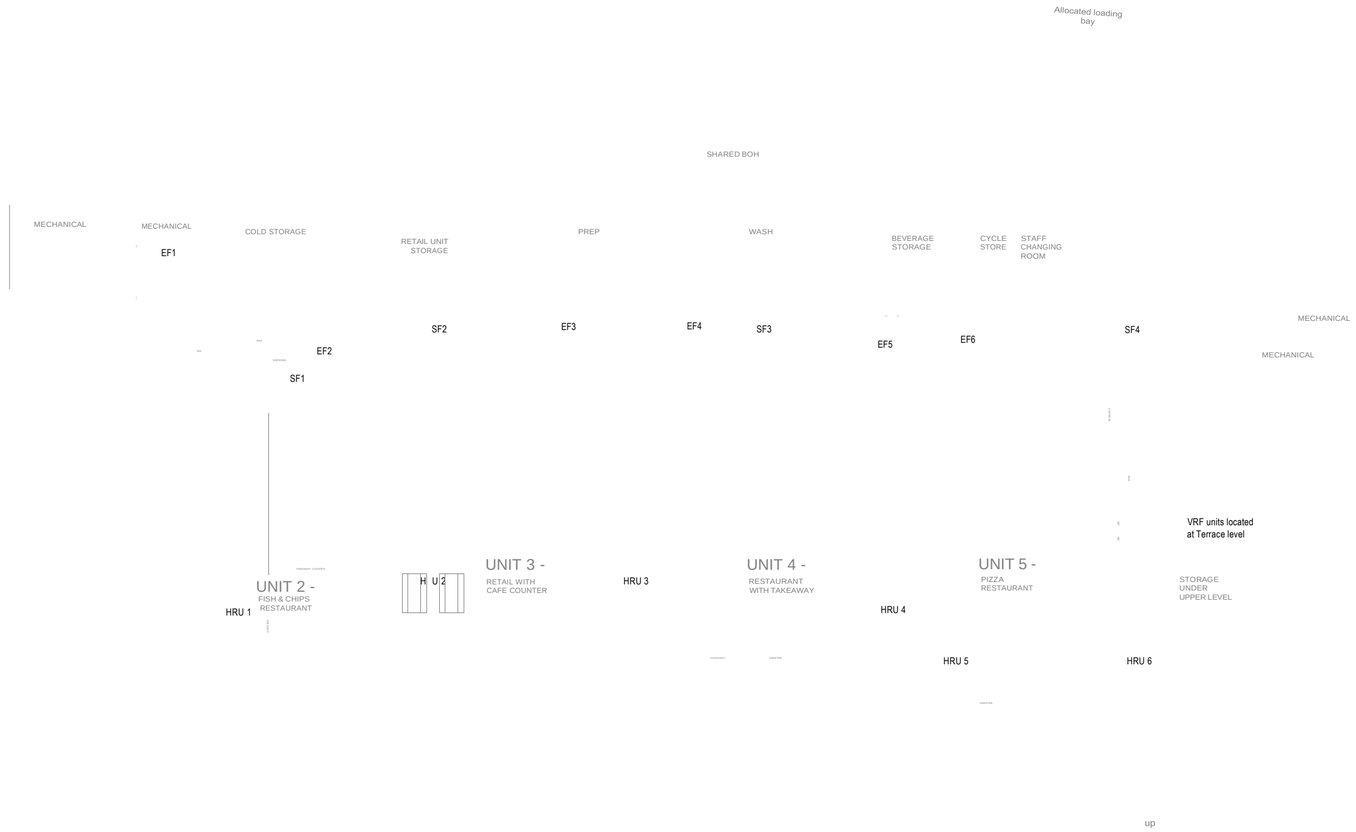
3. Figured dimensions where shown are in millimeters.

4. This drawing is to be read in conjunction with the relevant Technical Specification and the Contractors working drawings.

5. For purpose of construction, this drawing must not be scaled. Only written or calculated dimensions should be used.

6. The position of all equipment is approximate as shown. The precise positions shall be agreed on site with other trades and Architects scaled layouts.

Location Key Plan (Not to Scale)



Legend:

- Heat Recovery Unit
- Extract / Supply Fan
- Fan Coil Unit
- Supply Ductwork
- Extract Ductwork
- Extract Grille
- Supply Grille
- VRF Unit

#	Issued for Information	05.05.2017
Rev	Description / By / Chk'd / App'd	Date

Purpose of Issue

Information

London

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Registered office: 16 Crucifix Lane, London, SE1 3JW. Registered in England and Wales No.7343303 cdbse@cdbse.net

Client

Robin Mallin

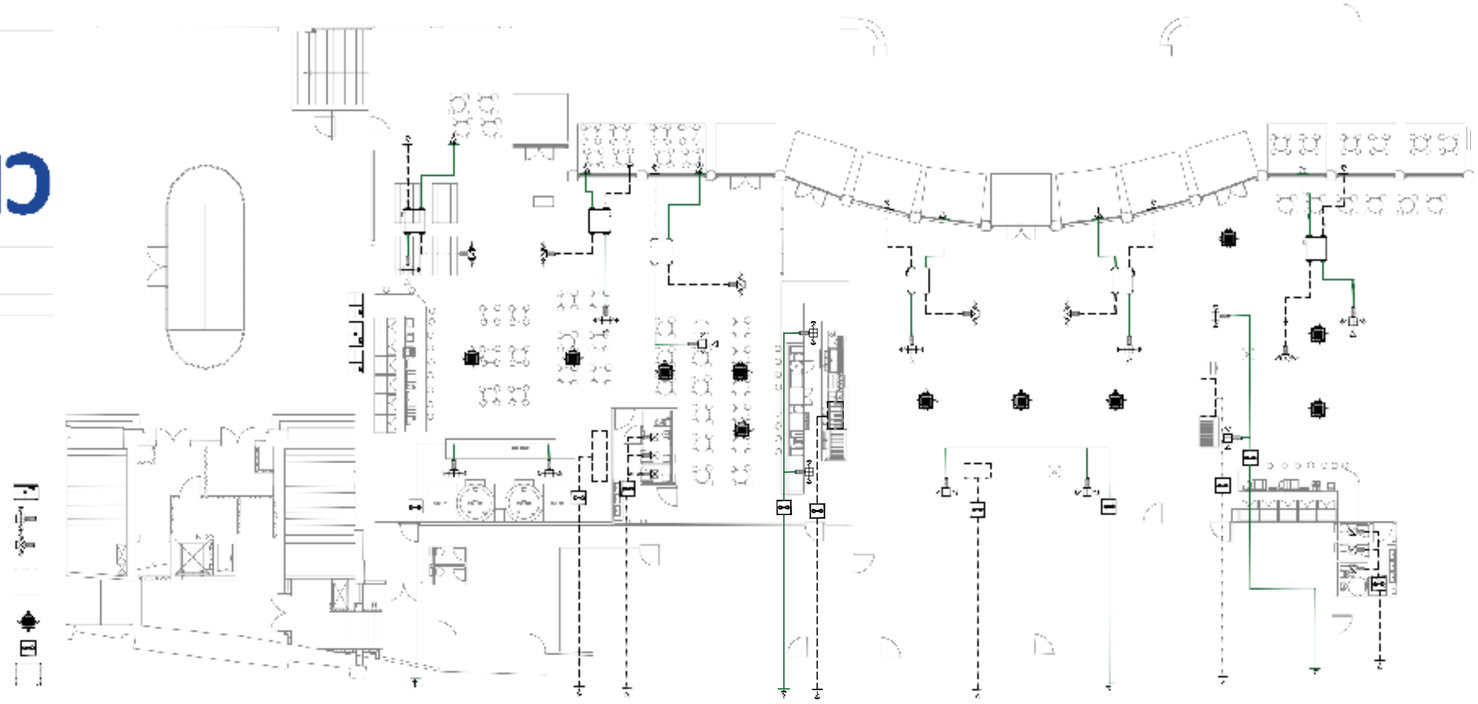
Project

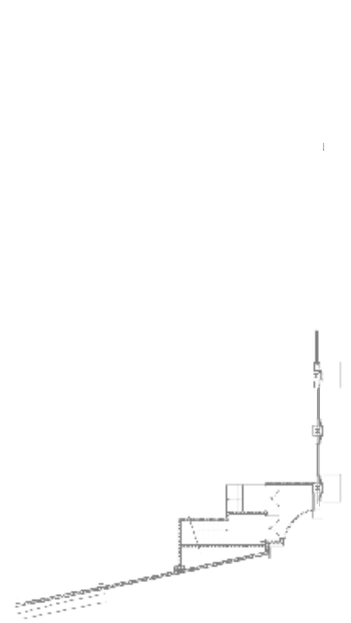
Soho House Brighton

Drawing

Mechanical Services
Units 2-5
Ventilation Layout

Date	19.04.2017
Scale @ A1	1:150
Drawn	JL
Checked	JR
Approved	JR
Project No.	1534





VRF 1 to AP1

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Noise Source									
Noise Source - VRF 1									
Sound Power Levels		**72.0**	**63.0**	**60.0**	**55.0**	**48.5**	**44.0**	**38.5**	**33.0**
Point Source Radiation Loss									
Radiation - Quarterspherical									
		-5.0	*-5.0*	*-5.0*	*-5.0*	*-5.0*	*-5.0*	*-5.0*	*-5.0*
Point Source Distance Loss									
End Distance (m)	50.0								
		-34.0	*-34.0*	*-34.0*	*-34.0*	*-34.0*	*-34.0*	*-34.0*	*-34.0*
Facade Reflection									
Reflection (dB)	3.0								
		3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
External Receiver									
External Receiver - AP1									
Sound Pressure, Lp		**36.0**	**27.0**	**24.0**	**19.0**	**12.5**	**8.0**	**2.5**	**-3.0**

HRU1-in to AP1

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Noise Source									
Noise Source - HRU1-in									
Sound Power Levels		**79.0**	**71.0**	**71.0**	**60.0**	**60.0**	**58.0**	**50.0**	**41.0**
Rect Unlined Duct Losses CJ									
Width (mm)	270.0								
Height (mm)	360.0								
Length (m)	3.0								
		-1.3	*-1.8*	*-1.3*	*-0.9*	*-0.6*	*-0.6*	*-0.6*	*-0.5*
End Reflection									
Width/Diameter	0.3								
Length	0.4								
Rec or Circ - Rectangular									
Free or Flush - Flush									
		-11.6	*-7.1*	*-2.6*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
External Grille Directivity									
Width (m)	0.3								
Height (m)	0.4								
Vertical (°)	10.0								
Horizontal (°)	125.0								
		-0.5	*-0.5*	*-1.5*	*-4.0*	*-8.5*	*-8.0*	*-8.0*	*-8.0*
Point Source Radiation Loss									
Radiation - Hemispherical									
		-8.0	*-8.0*	*-8.0*	*-8.0*	*-8.0*	*-8.0*	*-8.0*	*-8.0*

		Octave Band Centre Frequency (Hz)							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Point Source Distance Loss									
Start Distance (m)	1.0								
End Distance (m)	82.0								
		-38.3	*-38.3*	*-38.3*	*-38.3*	*-38.3*	*-38.3*	*-38.3*	*-38.3*
Maekawa Screening Loss									
Path Difference (m)	1.0								
		-10.1	*-12.4*	*-15.1*	*-17.9*	*-20.0*	*-20.0*	*-20.0*	*-20.0*
Facade Reflection									
Reflection (dB)	3.0								
		3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
External Receiver									
External Receiver - AP1									
Sound Pressure, Lp		**12.1**	**5.9**	**7.2**	**-6.0**	**-12.4**	**-13.9**	**-21.9**	**-30.7**

HRU1-out to AP1

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Noise Source									
Noise Source - HRU1-out									
Sound Power Levels		**84.0**	**77.0**	**81.0**	**67.0**	**68.0**	**68.0**	**62.0**	**60.0**
Rect Unlined Duct Losses CJ									
Width (mm)	530.0								
Height (mm)	360.0								
Length (m)	3.0								
		-2.2	*-1.8*	*-0.9*	*-0.5*	*-0.5*	*-0.5*	*-0.5*	*-0.5*
End Reflection									
Width/Diameter	0.5								
Length	0.4								
Rec or Circ - Rectangular									
Free or Flush - Flush									
		-9.4	*-4.9*	*-0.4*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
External Grille Directivity									
Width (m)	0.5								
Height (m)	0.4								
Vertical (°)	10.0								
Horizontal (°)	125.0								
		-0.5	*-0.5*	*-1.5*	*-4.0*	*-8.5*	*-8.0*	*-8.0*	*-8.0*
Point Source Radiation Loss									
Radiation - Hemispherical									
		-8.0	*-8.0*	*-8.0*	*-8.0*	*-8.0*	*-8.0*	*-8.0*	*-8.0*

		Octave Band Centre Frequency (Hz)							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Point Source Distance Loss									
Start Distance (m)	1.0								
End Distance (m)	82.0								
		-38.3	*-38.3*	*-38.3*	*-38.3*	*-38.3*	*-38.3*	*-38.3*	*-38.3*
Maekawa Screening Loss									
Path Difference (m)	1.0								
		-10.1	*-12.4*	*-15.1*	*-17.9*	*-20.0*	*-20.0*	*-20.0*	*-20.0*
Facade Reflection									
Reflection (dB)	3.0								
		3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
External Receiver									
External Receiver - AP1									
Sound Pressure, Lp		**18.4**	**14.1**	**19.8**	**1.4**	**-4.2**	**-3.7**	**-9.7**	**-11.7**

EF1-out to AP1

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Noise Source									
Noise Source - EF1-out									
Sound Power Levels		**79.0**	**75.0**	**75.0**	**70.0**	**63.0**	**62.0**	**52.0**	**52.0**
Silencer									
Silencer - AS2									
		-3.0	*-8.0*	*-14.0*	*-22.0*	*-31.0*	*-28.0*	*-20.0*	*-19.0*
Circular Unlined Duct Losses CJ									
Diameter (mm)	250.0								
Length (m)	2.0								
		-0.1	*-0.2*	*-0.2*	*-0.3*	*-0.4*	*-0.4*	*-0.4*	*-0.4*
End Reflection									
Width/Diameter	0.2								
Length	0.2								
Rec or Circ - Circular									
Free or Flush - Flush									
		-13.7	*-9.3*	*-4.7*	*-0.2*	*0.0*	*0.0*	*0.0*	*0.0*
External Grille Directivity									
Width (m)	0.2								
Height (m)	0.2								
Vertical (°)	10.0								
Horizontal (°)	70.0								
		0.5	*1.0*	*1.5*	*1.5*	*2.0*	*1.5*	*1.5*	*1.5*
Point Source Radiation Loss									
Radiation - Quarterspherical									
		-5.0	*-5.0*	*-5.0*	*-5.0*	*-5.0*	*-5.0*	*-5.0*	*-5.0*

		Octave Band Centre Frequency (Hz)							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Point Source Distance Loss									
Start Distance (m)	1.0								
End Distance (m)	78.0								
		-37.8	*-37.8*	*-37.8*	*-37.8*	*-37.8*	*-37.8*	*-37.8*	*-37.8*
Facade Reflection									
Reflection (dB)	3.0								
		3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
External Receiver									
External Receiver - AP1									
Sound Pressure, Lp		**22.8**	**18.7**	**17.7**	**9.2**	**-6.2**	**-4.7**	**-6.7**	**-5.7**

EF2-out to AP1

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Noise Source									
Noise Source - EF2-out									
Sound Power Levels		**85.0**	**95.0**	**78.0**	**75.0**	**80.0**	**81.0**	**77.0**	**71.0**
Silencer									
Silencer - AS1									
		-11.0	*-23.0*	*-45.0*	*-50.0*	*-50.0*	*-48.0*	*-34.0*	*-24.0*
Rect Unlined Duct Losses CJ									
Width (mm)	750.0								
Height (mm)	650.0								
Length (m)	7.0								
		-5.2	*-4.2*	*-2.1*	*-1.1*	*-1.1*	*-1.1*	*-1.0*	*-1.0*
End Reflection									
Width/Diameter	0.8								
Length	0.6								
Rec or Circ - Rectangular									
Free or Flush - Flush									
		-6.4	*-1.9*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
External Grille Directivity									
Width (m)	0.8								
Height (m)	0.6								
Vertical (°)	10.0								
Horizontal (°)	70.0								
		0.5	*1.0*	*1.5*	*1.5*	*2.0*	*1.5*	*1.5*	*1.5*

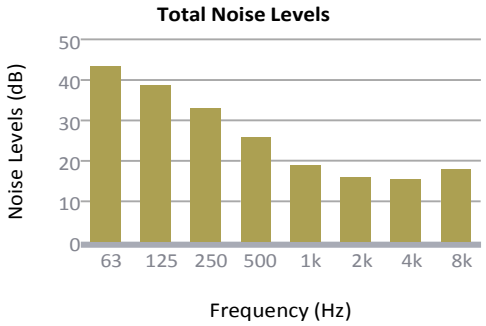
		Octave Band Centre Frequency (Hz)							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Point Source Radiation Loss									
Radiation - Quarterspherical									
		-5.0	*-5.0*	*-5.0*	*-5.0*	*-5.0*	*-5.0*	*-5.0*	*-5.0*
Point Source Distance Loss									
Start Distance (m)	1.0								
End Distance (m)	70.0								
		-36.9	*-36.9*	*-36.9*	*-36.9*	*-36.9*	*-36.9*	*-36.9*	*-36.9*
Facade Reflection									
Reflection (dB)	3.0								
		3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
External Receiver									
External Receiver - AP1									
Sound Pressure, Lp		**24.0**	**28.0**	**-6.5**	**-13.4**	**-7.9**	**-5.4**	**4.6**	**8.6**

SF1-in to AP1

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Noise Source									
Noise Source - SF1-in									
Sound Power Levels		**76.0**	**70.0**	**63.0**	**52.0**	**52.0**	**52.0**	**47.0**	**38.0**
Silencer									
Silencer - AS3									
		-1.0	*-5.0*	*-7.0*	*-14.0*	*-19.0*	*-16.0*	*-13.0*	*-12.0*
Circular Unlined Duct Losses CJ									
Diameter (mm)	400.0								
Length (m)	9.0								
		-0.5	*-0.5*	*-0.5*	*-0.9*	*-1.4*	*-1.4*	*-1.4*	*-1.4*
End Reflection									
Width/Diameter	0.4								
Length	0.4								
Rec or Circ - Circular									
Free or Flush - Flush									
		-10.7	*-6.2*	*-1.7*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
External Grille Directivity									
Width (m)	0.4								
Height (m)	0.4								
Vertical (°)	10.0								
Horizontal (°)	70.0								
		0.5	*1.0*	*1.5*	*1.5*	*2.0*	*1.5*	*1.5*	*1.5*
Point Source Radiation Loss									
Radiation - Quarterspherical									
		-5.0	*-5.0*	*-5.0*	*-5.0*	*-5.0*	*-5.0*	*-5.0*	*-5.0*

		Octave Band Centre Frequency (Hz)							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Point Source Distance Loss									
Start Distance (m)	1.0								
End Distance (m)	75.0								
		-37.5	*-37.5*	*-37.5*	*-37.5*	*-37.5*	*-37.5*	*-37.5*	*-37.5*
Facade Reflection									
Reflection (dB)	3.0								
		3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
External Receiver									
External Receiver - AP1									
Sound Pressure, Lp		**24.8**	**19.8**	**15.8**	**-0.9**	**-5.8**	**-3.3**	**-5.3**	**-13.3**

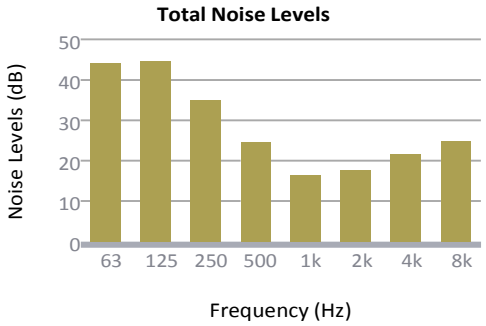
Project Name	Soho House, Brighton
Project Reference	16/0276
Receiver Reference	AP1
Description	New Madeira Hotel
Noise Limit	33
dBA	30



Reference	Noise Levels (dB)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
VRF 1	36	27	24	19	13	8	3	-3	
VRF 2	36	27	24	19	13	8	3	-3	
VRF 3	36	27	24	19	13	8	3	-3	
VRF 4	36	27	24	19	13	8	3	-3	
HRU1-in	12	6	7	-6	-12	-14	-22	-31	
HRU2 & 3-in	6	2	1	2	-9	-13	-21	-22	
HRU2 & 3-out	14	17	12	12	-3	-3	-5	-4	
HRU4-in	14	7	8	-7	-10	-12	-20	-28	
HRU5 & 6-in	18	12	12	-3	-6	-8	-16	-25	
HRU5 & 6-out	21	16	21	1	-1	-1	-7	-9	
HRU4-out	20	15	21	1	-2	-1	-7	-9	
HRU1-out	18	14	20	1	-4	-4	-10	-12	
EF1-out	23	19	18	9	-6	-5	-7	-6	
EF2-out	24	28	-6	-13	-8	-5	5	9	
EF3-out	21	16	11	6	-8	-10	-6	-11	
EF4-out	28	31	-3	-11	-5	-3	7	11	

Reference	Noise Levels (dB)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
EF5-out	27	24	23	14	-1	2	0	1	
EF6-out	28	33	-2	-8	-2	2	12	16	
SF1-in	25	20	16	-1	-6	-3	-5	-13	
SF2-in	26	21	17	0	-5	-3	-5	-13	
SF3-in	28	23	19	3	-2	0	-2	-10	
SF4-in	32	27	23	7	2	6	4	-4	

Project Name	Soho House, Brighton
Project Reference	16/0276
Receiver Reference	AP3
Description	Marine House
Noise Limit	33
dBA	33



Reference	Noise Levels (dB)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
VRF 1	30	21	18	13	7	2	-3	-9	
VRF 2	30	21	18	13	7	2	-3	-9	
VRF 3	30	21	18	13	7	2	-3	-9	
VRF 4	30	21	18	13	7	2	-3	-9	
HRU1-in	16	9	10	-5	-8	-10	-18	-27	
HRU2 & 3-in	10	5	4	3	-6	-9	-17	-18	
HRU2 & 3-out	18	20	15	13	0	1	-1	0	
HRU4-in	15	9	9	-5	-9	-10	-18	-27	
HRU5 & 6-in	19	12	13	-2	-6	-7	-15	-24	
HRU5 & 6-out	21	16	22	2	-1	0	-6	-8	
HRU4-out	22	17	22	2	0	0	-6	-8	
HRU1-out	22	17	22	3	0	0	-6	-8	
EF1-out	31	28	27	18	3	6	4	5	
EF2-out	33	37	3	-4	2	6	16	20	
EF3-out	28	24	20	15	2	1	5	0	
EF4-out	38	42	6	-3	3	7	17	21	

Reference	Noise Levels (dB)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
EF5-out	30	26	25	17	1	4	2	3	
EF6-out	31	35	1	-6	-1	3	13	17	
SF1-in	34	29	26	9	4	8	6	-2	
SF2-in	35	30	27	10	6	10	8	0	
SF3-in	34	30	26	10	5	9	7	-1	
SF4-in	30	26	22	6	1	5	3	-5	

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