

Acoustic assessment of proposed new mechanical services equipment and operational noise breakout

Big Mamma, No.1 St Michaels, Manchester



Client: Big Mamma Group

Report Reference: 241024-R002C

Date: 19th May 2025

Revision:	Date:	Author:	Checked:
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0. SUMMARY

- 0.1. ACA Acoustics Limited has been commissioned to assess the acoustic impact of proposed new mechanical services equipment associated with a new restaurant to be installed at No.1 St Michaels, Manchester.
- 0.2. The assessment is required to provide evidence that noise emissions from the equipment will not be detrimental to the amenity of nearby noise-sensitive properties and complies with the Local Authority's requirements.
- 0.3. Hoare Lea have previously undertaken a background sound level survey in the vicinity at the Radisson Edwardian Hotel and the Old Nag's Head. Results of the sound level survey are included in their acoustic report reference REP-1013972-5A-AP-20220311. Results of the survey indicate representative background sound levels of LA90 (day) 55dB and LA90 (night) 53dB at position L1, overlooking the Old Nag's Head, and LA90 (day) 55dB and LA90 (night) 54dB at position L2 overlooking the Radisson Edwardian Hotel. Background sound levels are reported by Hoare Lea in octave band frequencies. In accordance with the requirements of Manchester City Council, the rating sound levels from the plant should be at least 5dB below the background sound levels in each octave band.
- 0.4. Calculations using manufacturers' sound level data for the new equipment, allowing for the recommendations as set out in this report, confirm that the sound level from the new equipment at the receptor will be at least 5dB below the measured background sound level in each octave band.
- 0.5. Noise from the proposed equipment will not be disturbing or detrimental to the amenity of any nearby residential or other noise-sensitive receptors and complies with the planning requirements of Manchester City Council.
- 0.6. ACA Acoustics have also undertaken an acoustic assessment of operational noise breakout from the front façade. This assessment demonstrates that noise breakout from the external façade will be very low and will not cause loss of amenity to nearby residential properties.
- 0.7. The results of the assessment indicate that Manchester City Council's noise related planning conditions 32, 34, and 35, for the development may be discharged and the amenity of nearby occupants will be preserved.

1. INTRODUCTION

New mechanical services equipment associated with a new restaurant is to be installed at No.1 St Michaels, Manchester.

ACA Acoustics Limited has been commissioned by Big Mamma Group to carry out an assessment of noise emissions from the proposed mechanical plant and, where necessary, to make recommendations for a mitigation scheme to ensure that the amenity of nearby noise-sensitive properties is not compromised.

This report presents results of the sound level survey, computer modelling, and assessment.

2. ACOUSTIC CRITERIA

2.1. Mechanical Services Plant

Mainer Associates' report reference 63068-MAI-ZZ-XX-RP-Y-0100 provides confirmation of Manchester City council's requirements for mechanical plant noise emissions.

"34. Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a noise level of 5dB below the existing background (LA90) in each octave band at the nearest noise sensitive location.

The scheme should be submitted to and approved in writing by the City Council as local planning authority prior to the first occupation of each part of the development, in order to secure a reduction in the level of noise emanating from the site."

In accordance with this planning condition the proposed mechanical plant associated with the new restaurant will be designed such that mechanical plant does not exceed a sound level 5dB below the measured background sound levels.

2.2. Operational Noise Breakout of the front façade

In addition, Condition 35 is referred to in Section 7.1.2 of the Mainer Associates Report referenced above. This provides requirements for operational noise breakout sound transmission from the Level 10 bar to be achieved at the nearest residential properties. It is considered likely that these will also apply to operational noise breakout transmission from the ground floor venue too.

"Where entertainment noise is proposed the LAeq (entertainment noise) should be controlled to 10dB below the LA90 (without entertainment noise) at the facade of the nearest noise sensitive location []"

Based on this requirement, the Mainer Associates report provides the following sound levels to be achieved at the most affected property, upper floor windows of The Old Nags Head Pub. Acoustic criteria of the worst-case nighttime requirements are shown in Table 1 below.

Receptor	Description	Octave Band sound level data L90 (dB)							
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Old Nags Head	10dB below measured nighttime L90 sound levels	47	44	43	40	38	32	24	12

Table 1: Operational noise breakout criteria

2.3. External Music and Amplified Noise

Condition 32 states:

“32. No amplified sound or any music shall be produced or played in any part of external areas in the development, other than in accordance with a scheme detailing the levels at which any music shall be played and the hours during which it shall be played which has been submitted to and approved in writing by the City Council as local planning authority.

Reason - In interests of residential amenity in order to reduce noise and general disturbance in accordance with saved policy DC26.1 of the Unitary Development Plan for the City of Manchester and policies SP1 and DM1 of the Core Strategy”

The restaurant will not have any external music or amplified noise and as such this condition may be discharged.

3. REVIEW OF SITE LOCATION

New mechanical equipment serving the Ground and first floor retail unit, comprising of multiple fans and catering and A/C condensing units are being installed at No.1 St Michaels, Manchester. The plant is to be installed in 3 key locations, including the roof plant space, the ground and first floor plant spaces to the East, and to louvres to the West façade.

The restaurant will have a glazed façade with door lobbies to all entrances. No external music or amplified sound is proposed.

The most noise-sensitive residential receptors (NSR) have been assessed as The Old Nag’s Head to the North, and the Radisson Edwardian Hotel to the south.

A marked-up aerial image is included in Figure 1, identifying the location of the development site and sound level survey measurement position.

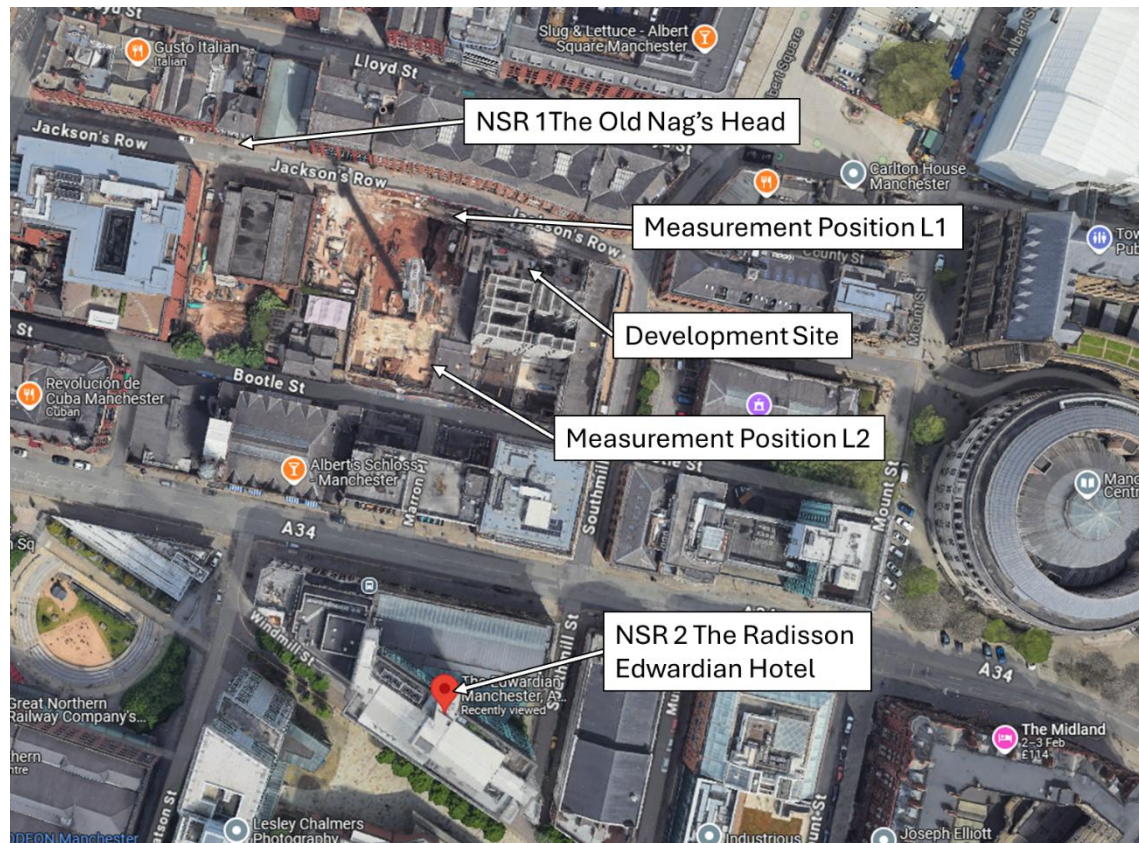


Figure 1: Equipment location, measurement position, and closest receptor (available at [google.com/maps](https://www.google.com/maps))

The restaurant is proposed to open until 23:00 hours. The catering condensing units will operate over potentially a full 24-hour period.

4. SOUND LEVEL SURVEY

To assess sound levels from the new mechanical equipment, it is necessary to establish representative background sound levels in the vicinity during the proposed plant operating times.

A sound level survey has previously been undertaken by Hoare Lea, with the results reported within their report reference REP-1013972-5A-AP-20220311.

The survey was conducted at the positions marked in Figure 1 above.

Results of the survey are reported within the Hoare Lea report, and included in Table 2 below for convenience.

Receptor	Period	Octave Band sound level data L90 (dB)								LA90 dB
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
L1	Daytime	60	56	54	52	51	45	36	24	55
	Night time	57	54	53	50	48	42	34	22	53
L2	Daytime	58	58	55	52	50	45	38	32	55
	Night time	58	58	54	51	49	43	36	30	54

Table 2: Summary sound level survey results

5. ACOUSTIC ASSESSMENT OF MECHANICAL SERVICES EQUIPMENT

The development includes the installation of new extract and supply fans, as well as a condensing unit. Confirmation of the equipment models used in the assessment is provided in Table 3 below.

Description	Equipment Model	Airflow (m3/s)	Sound Level (LwA)	Quantity
EF1	Flakt woods 7.5Kw Verner Box	4	88 dB	1
EF2	Systemair K315L EC	0.285	82 dB	1
EF4	Systemair Prio 315 EC	0.475	83 dB	1
SF1	Flakt Woods epowerbox	3	72 dB	1
SF2	Flakt Woods epowerbox	4	79 dB	1
CU1-1	REYQ12U	N/A	84 dB	1
CU2-1	REYQ22U	N/A	85 dB	1
CU3-1	REYQ14U	N/A	81 dB	1
Kitchen Chiller Catering Condenser	MPTM026DSP00E 2.14kW Chiller	0.92	67 dB	1

Description	Equipment Model	Airflow (m3/s)	Sound Level (LwA)	Quantity
Kitchen Chiller Catering Condenser	MPTM022DSP00G 2.52kW Chiller	0.92	67 dB	1
Kitchen Chiller Catering Condenser	MPTM026DSP00E 2.59kW Chiller	0.92	67 dB	1
Kitchen Freezer Catering Condenser	LSVM034DSW05G 1kW Freezer	0.92	67 dB	1

Table 3: Proposed new mechanical equipment used in the assessment

A computer model has been used to calculate the noise contribution from the proposed plant to outside nearest noise-sensitive windows, using manufacturer's published sound data for the proposed new plant. Ductwork system losses have been calculated in accordance with CIBSE Guide B4 *Noise and vibration control for HVAC*. Environmental corrections have been calculated in accordance with ISO 9613-2.

The assessment has been undertaken using drawing reference '001-1204-01 D', '001-1204-02 D' & '001-1204-03', as provided by the client. And includes both roof-top plant, along with internally housed plant to louvres in the external façade.

The cumulative calculated specific sound level to outside the most sensitive receptors with all equipment operating is shown in Table 4 below. Summary printouts from the calculation models are included in Appendix A.

Receptor	Description	Octave Band sound level data L90 (dB)								LA90 dB
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
L1 Restaurant operating period	Calculated sound level	47	41	38	34	30	31	26	18	38
	Acoustic Criteria (5dB below measured levels)	55	51	49	47	46	40	31	19	50
L1 Overnight	Calculated sound level	28	31	30	24	18	14	7	0	26
	Acoustic Criteria (5dB below measured levels)	52	49	48	45	43	37	29	17	48
L2 Restaurant operating period	Calculated sound level	46	33	32	31	24	15	10	0	31
	Acoustic Criteria (5dB below measured levels)	53	53	50	47	45	40	33	27	50
L2 Overnight	Calculated sound level	5	8	7	1	0	0	0	0	3
	Acoustic Criteria (5dB below measured levels)	53	53	49	46	44	38	31	25	49

Table 4: Calculated cumulative equipment sound levels at 1m outside noise-sensitive windows

Table 4 above shows that, with benefit of acoustic mitigation treatments detailed in Section 6 below, the calculated sound levels will meet the requirements of the local authority.

6. MECHANICAL SERVICES EQUIPMENT ACOUSTIC MITIGATION TREATMENTS

No noise control treatments are required to achieve the project criteria, however vibration control treatments are recommended. These are detailed below.

6.1. Vibration Isolators

To control the potential for structure-borne noise and vibration from the mechanical equipment affecting adjoining residential and commercial occupants, it is recommended that the plant is installed on vibration isolators.

Vibration isolators for the fans would typically be steel spring type mounts providing minimum 25mm deflection. The isolator supplier would be able to select a suitable model to provide minimum 98% isolation efficiency at the working load and operating speed. Flexible connections should be fitted between the fans and adjoining ductwork on both sides.

Suitable vibration isolators for the condensers are typically rubber or neoprene turret type mounts or pads, providing minimum 8mm deflection at the working load. The isolator supplier should ensure their selection is suitable allowing for the condenser operating speed, point load, and installation location.

7. ASSESSMENT OF OPERATIONAL NOISE TO NEARBY PROPERTIES

7.1. Source Sound Levels

To calculate the potential impact of the proposed development it is necessary to establish typical sound levels within the new restaurant once it is trading; this is the source sound level data.

Sound levels have been recorded in a number of similar venues for previous projects. Spectra used in the assessment equates to an overall sound level of LAeq 81dB. This is representative of the internal sound level within a similar restaurant on a busy weekend evening. The measurement includes the venue at full capacity with patrons talking and laughing simultaneously and background music.

Confirmation of the source sound level data used in the assessment is shown in Table 5 below.

Description	Metric	Octave Band Frequency (Hz) – LAeq (dB)								dBA
		63	125	250	500	1k	2k	4k	8k	
Measured sound levels within equivalent restaurant	Leq	85	79	71	78	76	73	67	72	81

Table 5: Typical source sound levels

7.2. Acoustic Assessment of Operational Noise Transmission Through the External Façade

A computer model has been used to calculate sound transmission via the shopfront to within the nearby residential properties. The model uses the methodology of BS EN 12354-4:2000 to predict the transmission of indoor sound to outside and then the environmental corrections of ISO 9613-

2:1996 to account for the distance from the shopfront to the residential windows, acoustic reflections, and acoustic screening.

The assessment includes the façade sound insulation based on the glazing specification within the Mainer Acoustics report, reference 63068-MAI-ZZ-XX-RP-Y-0100 Stage 4 Acoustic Report: St Michael's. The development has door lobbies to the entrance, which will provide additional security against noise breakout when patrons are entering and leaving.

The nearest residential windows are upper floor windows of The Nags Head, around 60 meters away from the development unit.

Summary of calculated sound emissions via the shopfront to outside the residential windows are shown in the table below. The development will have door lobbies, and as such assessment has been undertaken with one door closed and one open. The doors will be on automatic closers, and periods of both doors being open at the same time will be rare.

ACA Acoustics calculations use the BS 12354-4 standard to calculate sound levels radiating from the external façade, and then the environmental corrections within ISO 9613-2 to calculate sound levels at the receptor location, accounting for distance and angle of noise propagation, acoustic reflections and screening, and atmospheric absorption.

Description	Octave Band sound level data L90 (dB)							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Source Level	85	79	71	78	76	73	67	72
Diffusivity - Cd	-5	-5	-5	-5	-5	-5	-5	-5
Composite R' (Doors Closed)	-19	-24	-27	-37	-45	-49	-64	-69
Composite R' (Doors Open)	-18	-21	-22	-23	-23	-23	-23	-24
Façade Area Correction (70x5 meters)	25	25	25	25	25	25	25	25
ISO 9613 noise propagation correction	-49	-49	-49	-49	-49	-50	-51	-56
Calculated sound level at Old nags Head overnight (Doors Open)	39	30	20	26	24	20	13	12
Calculated sound level at Old nags Head overnight (Doors Closed)	37	26	15	12	<5	<5	<5	<5
Acoustic Criteria (10dB below measured levels)	47	44	43	40	38	32	24	12

Table 6: Summary of calculated sound emissions via the openable shopfront to outside noise-sensitive properties

Calculated sound levels from the restaurant unit with doors closed and open are comfortably below the acoustic criteria.

The venue will have a large door lobby with doors on automatic closers, and as such both sets of doors will only be open together infrequently, for short periods of time only, and only during the evening period when the restaurant is more busy and the external sound levels are higher, further reducing the impact. In addition, allowing a 15dB partial open window reduction, as specified in BS 8233:2014, sound levels within nearby habitable rooms with windows open will be significantly below guideline night time sound level criteria in bedrooms.

The assessment includes façade elements as shown in Table 7 below.

Description	Construction	Sound Insulation Performance
External façade	Glazed Façade with door lobbies. Glazing comprising 10.76-16-10.76 glazing, as	Rw (+C'tr) 40(-6)dB

	detailed within Section 4.2.6 of Mainer Associates Report reference 63068-MAI-ZZ-XX-RP-Y-0100 Stage 4 Acoustic Report: St Michael's	
Doors	Door lobbies comprising external façade glazing and acoustic door seals to all doors	Rw (+C'tr) 40(-6)dB

Table 7: Facade elements included within the assessment

As shown in Table 7 above, calculated sound levels will comfortably achieve the required criteria outside the nearest residential properties.

7.3. External Amplified Noise and Music

No external amplified noise or music will be played as part of the restaurant. This will meet the requirements of Condition 32, which may be discharged.

8. CONCLUSION

A planning application has been approved with conditions for a development at No.1 St Michaels, Manchester.

Planning conditions have been issued relating to mechanical plant and operational noise emissions from the proposed ground floor retail unit.

ACA Acoustics have undertaken an assessment of noise from the proposed mechanical equipment using manufacturer's published acoustic data. Calculated sound levels for the plant is at least 5dB below the background sound level in each octave band during proposed operating times of the equipment when assessed at 1m from the closest noise-sensitive windows of residential receptors.

The author considers that allowing for the proposed mitigation scheme in this report, the proposed equipment achieve the Local Authority's planning requirements for this development and will not be detrimental to the amenity of nearby noise-sensitive occupants.

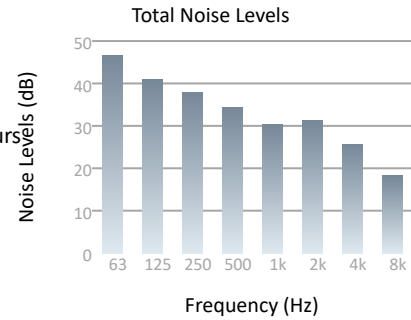
In addition, an assessment of operational noise breakout of the external façade has also been undertaken. This shows that operational sound levels from operational use of the unit will be low, and comfortably achieve the project criteria. In addition the restaurant will have no external music or amplified noise as part of the development.

As a result, the noise related planning conditions 32, 34, and 35, for this development may be discharged.

Appendix A

Mechanical Equipment Acoustic Calculations

Project Name	No.1 St Michaels, Manchester
Project Reference	241024
Reference	L1 The Old Nags Head Restaurant operating hours
Description	
Noise Limit	-
dBA	37.7



Calculated Lp at Receptor

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Ground Floor Plant space	1	21.1	22.1	18.1	12.2	7.3	4.2	-3.4	-17.2
2.14kW Chiller	1	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4
Freezer Condenser	1	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4
SF1 Inlet	1	23.4	30.6	26.0	21.5	17.6	13.3	7.2	0.6
SF2 Inlet	1	36.4	38.6	34.0	26.5	21.6	18.3	12.2	11.6
EF2 Discharge	1	26.6	27.7	28.5	28.5	27.5	30.7	25.2	17.0
EF1 Breakout	1	3.3	13.3	3.7	-6.3	-6.1	-11.4	-22.2	-35.9
CU 1-1	1	41.5	28.3	26.2	24.7	14.9	6.6	1.3	-9.4
CU 2-1	1	42.5	29.3	27.2	25.7	15.9	7.6	2.3	-8.4
EF1 Discharge	1	15.6	22.5	25.6	25.7	22.5	12.7	7.4	-5.4
CU 3-1	1	38.5	25.3	23.2	21.7	11.9	3.6	-1.7	-12.4
2.52kW Chiller	1	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4
2.59kW Chiller	1	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4

241024-ER-1-R002C

Project Name No.1 St Michaels, Manchester

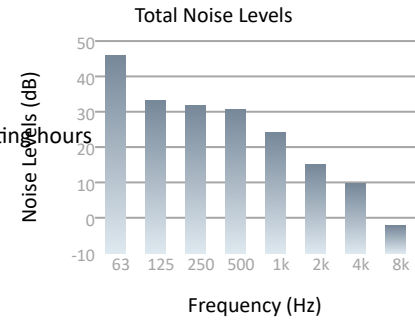
Project Reference 241024

Reference L2 Edwardian Radisson Hotel Restaurant operating hours

Description

Noise Limit -

dBA 30.9

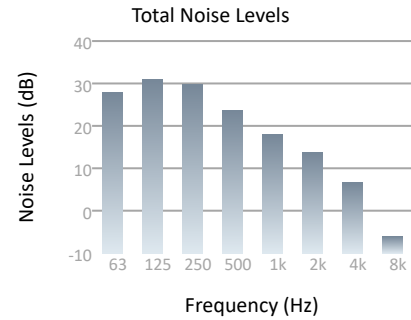


Calculated Lp at Receptor

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
EF1 Discharge	1	15.6	22.5	25.6	25.7	22.5	12.7	7.4	-5.4
CU 1-1	1	41.5	28.3	26.2	24.7	14.9	6.6	1.3	-9.4
CU 2-1	1	42.5	29.3	27.2	25.7	15.9	7.6	2.3	-8.4
CU 3-1	1	38.5	25.3	23.2	21.7	11.9	3.6	-1.7	-12.4
EF1 Breakout	1	3.3	13.3	3.7	-6.3	-6.1	-11.4	-22.2	-35.9

241024-ER-2-R002C

Project Name	No.1 St Michaels, Manchester
Project Reference	241024
Reference	L1 The Old Nags Head Overnight
Description	
Noise Limit	-
dBA	25.7



Calculated Lp at Receptor

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
2.14kW Chiller	1	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4
Ground Floor Plant space	1	21.1	22.1	18.1	12.2	7.3	4.2	-3.4	-17.2
Freezer Condenser	1	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4
2.52kW Chiller	1	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4
2.59kW Chiller	1	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4

241024-ER-3-R002C

Project Name No.1 St Michaels, Manchester

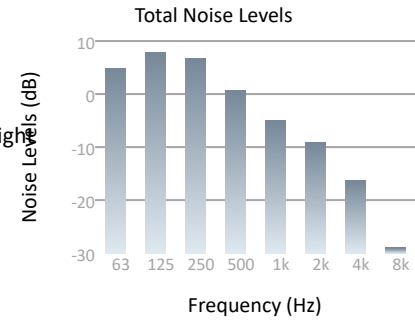
Project Reference 241024

Reference L2 Edwardian Radisson Hotel Restaurant Overnight

Description

Noise Limit -

dBA 2.7



Calculated Lp at Receptor

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Ground Floor Plant space	1	-1.9	-0.9	-4.9	-10.8	-15.7	-18.8	-26.4	-40.2
2.14kW Chiller	1	-2.1	1.2	0.3	-5.7	-11.5	-15.7	-22.8	-35.4
Freezer Condenser	1	-2.1	1.2	0.3	-5.7	-11.5	-15.7	-22.8	-35.4
2.52kW Chiller	1	-2.1	1.2	0.3	-5.7	-11.5	-15.7	-22.8	-35.4
2.59kW Chiller	1	-2.1	1.2	0.3	-5.7	-11.5	-15.7	-22.8	-35.4

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Calculation Sheet

EF1 Discharge to L2 Edwardian Radisson Hotel Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - EF1 Discharge								
Noise Levels	76.0	80.0	83.0	85.0	85.0	79.0	76.0	70.0
Rect Duct Losses								
	-0.5	-0.4	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-9.0	-6.3	-6.2	-8.2	-11.2	-14.5	-15.0	-15.0
Dc - Reflections & Directivity								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Adiv - Geometrical Divergence								
	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.8	-2.6	-9.4
Agr - Ground Attenuation								
	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Abar - Barrier Attenuation								
	-7.8	-6.3	-6.3	-6.3	-6.3	-6.3	-6.3	-6.4
External Receiver								
External Receiver - L2 Edwardian Radisson Hotel Restaurant operating hours								
Sound Pressure, Lp:	15.6	22.5	25.6	25.7	22.5	12.7	7.4	-5.4

Calculation Sheet

2.14kW Chiller to L1 The Old Nags Head Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - 2.14kW Chiller								
Sound Power Levels	69.0	70.0	69.0	64.0	60.0	58.0	53.0	48.0
Rect Duct Losses								
	-0.6	-0.4	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-6.5	-4.2	-4.2	-5.3	-7.0	-8.7	-8.7	-8.6
Dc - Reflections & Directivity								
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence								
	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver								
External Receiver - L1 The Old Nags Head Restaurant operating hours								
Sound Pressure, Lp:	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4

Calculation Sheet

Freezer Condenser to L1 The Old Nags Head Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Freezer Condenser								
Sound Power Levels	69.0	70.0	69.0	64.0	60.0	58.0	53.0	48.0
Rect Duct Losses								
	-0.6	-0.4	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-6.5	-4.2	-4.2	-5.3	-7.0	-8.7	-8.7	-8.6
Dc - Reflections & Directivity								
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence								
	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver								
External Receiver - L1 The Old Nags Head Restaurant operating hours								
Sound Pressure, Lp:	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4

Calculation Sheet

SF1 Inlet to L1 The Old Nags Head Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - SF1 Inlet								
Noise Levels	70.0	76.0	72.0	69.0	67.0	64.0	60.0	61.0
Rect Duct Losses								
	-0.5	-0.3	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-5.0	-4.0	-4.7	-6.1	-7.9	-8.7	-8.6	-8.6
Dc - Reflections & Directivity								
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence								
	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver								
External Receiver - L1 The Old Nags Head Restaurant operating hours Sound Pressure, Lp:	23.4	30.6	26.0	21.5	17.6	13.3	7.2	0.6

Calculation Sheet

SF2 Inlet to L1 The Old Nags Head Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - SF2 Inlet								
Noise Levels	83.0	84.0	80.0	74.0	71.0	69.0	65.0	72.0
Rect Duct Losses								
	-0.5	-0.3	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-5.0	-4.0	-4.7	-6.1	-7.9	-8.7	-8.6	-8.6
Dc - Reflections & Directivity								
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence								
	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver								
External Receiver - L1 The Old Nags Head Restaurant operating hours								
Sound Pressure, Lp:	36.4	38.6	34.0	26.5	21.6	18.3	12.2	11.6

Calculation Sheet

EF2 Discharge to L1 The Old Nags Head Restaurant operating hours

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Noise Source									
Noise Source - EF2 Discharge									
Noise Levels		89.0	84.0	81.0	76.0	74.0	77.0	73.0	71.0
Rect Duct Losses									
		-3.0	-2.0	-1.5	-0.5	-0.5	-0.5	-0.5	-0.5
Bend Loss									
Width (m)	0.8								
Height (m)	0.8								
Face Velocity (m/s)	0.5								
Bend Type - Radius									
Type - Unlined Radius Bend									
		-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0
Rect Duct Losses									
Width (m)	0.8								
Height (m)	0.8								
Length (m)	3.0								
Face Velocity (m/s)	0.5								
		-1.8	-1.2	-0.9	-0.3	-0.3	-0.3	-0.3	-0.3
Bend Loss									
Width (m)	0.8								
Height (m)	0.8								
Face Velocity (m/s)	0.5								
Bend Type - Radius									
Type - Unlined Radius Bend									
		-1.0	-2.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0
Rect Duct Losses									
Width (m)	0.8								
Height (m)	0.8								
Length (m)	5.0								
Face Velocity (m/s)	0.5								
		-3.0	-2.0	-1.5	-0.5	-0.5	-0.5	-0.5	-0.5

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
End Reflection & Directional Directivity	-13.1	-7.6	-3.1	-0.5	0.6	1.2	1.5	1.6
Dc - Reflections & Directivity	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence	-48.5	-48.5	-48.5	-48.5	-48.5	-48.5	-48.5	-48.5
Aatm - Atmospheric Absorption	0.0	0.0	-0.1	-0.1	-0.3	-0.7	-2.5	-8.8
Agr - Ground Attenuation	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver								
External Receiver - L1 The Old Nags Head Restaurant operating hours Sound Pressure, Lp:	26.6	27.7	28.5	28.5	27.5	30.7	25.2	17.0

Calculation Sheet

EF1 Discharge to L1 The Old Nags Head Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - EF1 Discharge								
Noise Levels	76.0	80.0	83.0	85.0	85.0	79.0	76.0	70.0
Rect Duct Losses								
	-0.5	-0.4	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-9.0	-6.3	-6.2	-8.2	-11.2	-14.5	-15.0	-15.0
Dc - Reflections & Directivity								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Adiv - Geometrical Divergence								
	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.8	-2.6	-9.4
Agr - Ground Attenuation								
	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Abar - Barrier Attenuation								
	-7.8	-6.3	-6.3	-6.3	-6.3	-6.3	-6.3	-6.4
External Receiver								
External Receiver - L1 The Old Nags Head Restaurant operating hours								
Sound Pressure, Lp:	15.6	22.5	25.6	25.7	22.5	12.7	7.4	-5.4

Calculation Sheet

2.14kW Chiller to L1 The Old Nags Head Overnight

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - 2.14kW Chiller								
Sound Power Levels	69.0	70.0	69.0	64.0	60.0	58.0	53.0	48.0
Rect Duct Losses								
	-0.6	-0.4	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-6.5	-4.2	-4.2	-5.3	-7.0	-8.7	-8.7	-8.6
Dc - Reflections & Directivity								
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence								
	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver								
External Receiver - L1 The Old Nags Head Overnight								
Sound Pressure, Lp:	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4

Calculation Sheet

Freezer Condenser to L1 The Old Nags Head Overnight

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Freezer Condenser								
Sound Power Levels	69.0	70.0	69.0	64.0	60.0	58.0	53.0	48.0
Rect Duct Losses								
	-0.6	-0.4	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-6.5	-4.2	-4.2	-5.3	-7.0	-8.7	-8.7	-8.6
Dc - Reflections & Directivity								
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence								
	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver								
External Receiver - L1 The Old Nags Head Overnight								
Sound Pressure, Lp:	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4

Calculation Sheet

2.14kW Chiller to L2 Edwardian Radisson Hotel Restaurant Overnight

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - 2.14kW Chiller								
Sound Power Levels	69.0	70.0	69.0	64.0	60.0	58.0	53.0	48.0
Rect Duct Losses								
	-0.6	-0.4	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-6.5	-4.2	-4.2	-5.3	-7.0	-8.7	-8.7	-8.6
Dc - Reflections & Directivity								
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence								
	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	-23.0	-23.0	-23.0	-23.0	-23.0	-23.0	-23.0	-23.0
External Receiver								
External Receiver - L2 Edwardian Radisson Hotel Restaurant Overnight Sound Pressure, Lp:	-2.1	1.2	0.3	-5.7	-11.5	-15.7	-22.8	-35.4

Calculation Sheet

Freezer Condenser to L2 Edwardian Radisson Hotel Restaurant Overnight

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Freezer Condenser								
Sound Power Levels	69.0	70.0	69.0	64.0	60.0	58.0	53.0	48.0
Rect Duct Losses								
	-0.6	-0.4	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-6.5	-4.2	-4.2	-5.3	-7.0	-8.7	-8.7	-8.6
Dc - Reflections & Directivity								
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence								
	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	-23.0	-23.0	-23.0	-23.0	-23.0	-23.0	-23.0	-23.0
External Receiver								
External Receiver - L2 Edwardian Radisson Hotel Restaurant Overnight Sound Pressure, Lp:	-2.1	1.2	0.3	-5.7	-11.5	-15.7	-22.8	-35.4

Calculation Sheet

2.52kW Chiller to L1 The Old Nags Head Overnight

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - 2.52kW Chiller								
Sound Power Levels	69.0	70.0	69.0	64.0	60.0	58.0	53.0	48.0
Rect Duct Losses								
	-0.6	-0.4	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-6.5	-4.2	-4.2	-5.3	-7.0	-8.7	-8.7	-8.6
Dc - Reflections & Directivity								
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence								
	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver								
External Receiver - L1 The Old Nags Head Overnight								
Sound Pressure, Lp:	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4

Calculation Sheet

2.59kW Chiller to L1 The Old Nags Head Overnight

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - 2.59kW Chiller								
Sound Power Levels	69.0	70.0	69.0	64.0	60.0	58.0	53.0	48.0
Rect Duct Losses								
	-0.6	-0.4	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-6.5	-4.2	-4.2	-5.3	-7.0	-8.7	-8.7	-8.6
Dc - Reflections & Directivity								
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence								
	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver								
External Receiver - L1 The Old Nags Head Overnight								
Sound Pressure, Lp:	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4

Calculation Sheet

2.52kW Chiller to L2 Edwardian Radisson Hotel Restaurant Overnight

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - 2.52kW Chiller								
Sound Power Levels	69.0	70.0	69.0	64.0	60.0	58.0	53.0	48.0
Rect Duct Losses								
	-0.6	-0.4	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-6.5	-4.2	-4.2	-5.3	-7.0	-8.7	-8.7	-8.6
Dc - Reflections & Directivity								
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence								
	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	-23.0	-23.0	-23.0	-23.0	-23.0	-23.0	-23.0	-23.0
External Receiver								
External Receiver - L2 Edwardian Radisson Hotel Restaurant Overnight Sound Pressure, Lp:	-2.1	1.2	0.3	-5.7	-11.5	-15.7	-22.8	-35.4

Calculation Sheet

2.59kW Chiller to L2 Edwardian Radisson Hotel Restaurant Overnight

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - 2.59kW Chiller								
Sound Power Levels	69.0	70.0	69.0	64.0	60.0	58.0	53.0	48.0
Rect Duct Losses								
	-0.6	-0.4	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-6.5	-4.2	-4.2	-5.3	-7.0	-8.7	-8.7	-8.6
Dc - Reflections & Directivity								
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence								
	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	-23.0	-23.0	-23.0	-23.0	-23.0	-23.0	-23.0	-23.0
External Receiver								
External Receiver - L2 Edwardian Radisson Hotel Restaurant Overnight Sound Pressure, Lp:	-2.1	1.2	0.3	-5.7	-11.5	-15.7	-22.8	-35.4

Calculation Sheet

2.52kW Chiller to L1 The Old Nags Head Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - 2.52kW Chiller								
Sound Power Levels	69.0	70.0	69.0	64.0	60.0	58.0	53.0	48.0
Rect Duct Losses								
	-0.6	-0.4	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-6.5	-4.2	-4.2	-5.3	-7.0	-8.7	-8.7	-8.6
Dc - Reflections & Directivity								
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence								
	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver								
External Receiver - L1 The Old Nags Head Restaurant operating hours								
Sound Pressure, Lp:	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4

Calculation Sheet

2.59kW Chiller to L1 The Old Nags Head Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - 2.59kW Chiller								
Sound Power Levels	69.0	70.0	69.0	64.0	60.0	58.0	53.0	48.0
Rect Duct Losses								
	-0.6	-0.4	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1
End Reflection & Directional Directivity								
	-6.5	-4.2	-4.2	-5.3	-7.0	-8.7	-8.7	-8.6
Dc - Reflections & Directivity								
	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Adiv - Geometrical Divergence								
	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver								
External Receiver - L1 The Old Nags Head Restaurant operating hours								
Sound Pressure, Lp:	20.9	24.2	23.3	17.3	11.5	7.3	0.2	-12.4

Calculation Sheet

CU 1-1 to L2 Edwardian Radisson Hotel Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - CU 1-1								
Noise Levels	92.0	83.0	83.0	84.0	77.0	72.0	70.0	66.0
Dc - Condenser Directivity								
	5.8	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Adiv - Geometrical Divergence								
	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.8	-2.6	-9.4
Agr - Ground Attenuation								
	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Abar - Barrier Attenuation								
	-10.1	-10.2	-12.2	-14.6	-17.3	-20.1	-21.5	-21.5
External Receiver								
External Receiver - L2 Edwardian Radisson Hotel Restaurant operating hours								
Sound Pressure, Lp:	41.5	28.3	26.2	24.7	14.9	6.6	1.3	-9.4

Calculation Sheet

CU 2-1 to L2 Edwardian Radisson Hotel Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - CU 2-1								
Noise Levels	93.0	84.0	84.0	85.0	78.0	73.0	71.0	67.0
Dc - Condenser Directivity								
	5.8	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Adiv - Geometrical Divergence								
	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.8	-2.6	-9.4
Agr - Ground Attenuation								
	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Abar - Barrier Attenuation								
	-10.1	-10.2	-12.2	-14.6	-17.3	-20.1	-21.5	-21.5
External Receiver								
External Receiver - L2 Edwardian Radisson Hotel Restaurant operating hours								
Sound Pressure, Lp:	42.5	29.3	27.2	25.7	15.9	7.6	2.3	-8.4

Calculation Sheet

CU 3-1 to L2 Edwardian Radisson Hotel Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - CU 3-1								
Noise Levels	89.0	80.0	80.0	81.0	74.0	69.0	67.0	63.0
Dc - Condenser Directivity								
	5.8	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Adiv - Geometrical Divergence								
	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.8	-2.6	-9.4
Agr - Ground Attenuation								
	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Abar - Barrier Attenuation								
	-10.1	-10.2	-12.2	-14.6	-17.3	-20.1	-21.5	-21.5
External Receiver								
External Receiver - L2 Edwardian Radisson Hotel Restaurant operating hours								
Sound Pressure, Lp:	38.5	25.3	23.2	21.7	11.9	3.6	-1.7	-12.4

Calculation Sheet

EF1 Breakout to L2 Edwardian Radisson Hotel Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - EF1 Breakout								
Noise Levels	50.5	62.0	54.5	47.0	50.0	48.0	40.5	33.5
Dc - Directivity								
DI Index - 9dB								
	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Adiv - Geometrical Divergence								
	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.8	-2.6	-9.4
Agr - Ground Attenuation								
	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Abar - Barrier Attenuation								
	-10.1	-10.2	-12.2	-14.6	-17.3	-20.1	-21.5	-21.5
External Receiver								
External Receiver - L2 Edwardian Radisson Hotel Restaurant operating hours	3.3	13.3	3.7	-6.3	-6.1	-11.4	-22.2	-35.9

Calculation Sheet

CU 1-1 to L1 The Old Nags Head Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - CU 1-1								
Noise Levels	92.0	83.0	83.0	84.0	77.0	72.0	70.0	66.0
Dc - Condenser Directivity								
	5.8	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Adiv - Geometrical Divergence								
	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.8	-2.6	-9.4
Agr - Ground Attenuation								
	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Abar - Barrier Attenuation								
	-10.1	-10.2	-12.2	-14.6	-17.3	-20.1	-21.5	-21.5
External Receiver								
External Receiver - L1 The Old Nags Head Restaurant operating hours Sound Pressure, Lp:	41.5	28.3	26.2	24.7	14.9	6.6	1.3	-9.4

Calculation Sheet

CU 2-1 to L1 The Old Nags Head Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - CU 2-1								
Noise Levels	93.0	84.0	84.0	85.0	78.0	73.0	71.0	67.0
Dc - Condenser Directivity								
	5.8	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Adiv - Geometrical Divergence								
	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.8	-2.6	-9.4
Agr - Ground Attenuation								
	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Abar - Barrier Attenuation								
	-10.1	-10.2	-12.2	-14.6	-17.3	-20.1	-21.5	-21.5
External Receiver								
External Receiver - L1 The Old Nags Head Restaurant operating hours Sound Pressure, Lp:	42.5	29.3	27.2	25.7	15.9	7.6	2.3	-8.4

Calculation Sheet

CU 3-1 to L1 The Old Nags Head Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - CU 3-1								
Noise Levels	89.0	80.0	80.0	81.0	74.0	69.0	67.0	63.0
Dc - Condenser Directivity								
	5.8	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Adiv - Geometrical Divergence								
	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.8	-2.6	-9.4
Agr - Ground Attenuation								
	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Abar - Barrier Attenuation								
	-10.1	-10.2	-12.2	-14.6	-17.3	-20.1	-21.5	-21.5
External Receiver								
External Receiver - L1 The Old Nags Head Restaurant operating hours								
Sound Pressure, Lp:	38.5	25.3	23.2	21.7	11.9	3.6	-1.7	-12.4

Calculation Sheet

EF1 Breakout to L1 The Old Nags Head Restaurant operating hours

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - EF1 Breakout								
Noise Levels	50.5	62.0	54.5	47.0	50.0	48.0	40.5	33.5
Dc - Directivity								
DI Index - 9dB								
	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Adiv - Geometrical Divergence								
	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1	-49.1
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.2	-0.3	-0.8	-2.6	-9.4
Agr - Ground Attenuation								
	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Abar - Barrier Attenuation								
	-10.1	-10.2	-12.2	-14.6	-17.3	-20.1	-21.5	-21.5
External Receiver								
External Receiver - L1 The Old Nags Head Restaurant operating hours Sound Pressure, Lp:	3.3	13.3	3.7	-6.3	-6.1	-11.4	-22.2	-35.9

Calculation Sheet

Ground Floor Plant space to L1 The Old Nags Head Restaurant operating hours

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Internal Receiver Noise									
Internal Receiver Noise - Ground Floor									
Plant space									
Total Sound Pressure Level (dB)		80.2	81.2	77.3	71.5	66.8	64.2	58.7	52.4
Diffusivity - Cd									
Composite R' of structural elements									
Facade Wall - Louvre									
Element Area (m2)	1.5								
Facade Area		1.5							
Glazing -									
Element Area (m2)	0.0								
Door -									
Element Area (m2)	0.0								
Roof/Ceiling -									
Area of Roof (m2)	0.0								
Radiating Lw		74.2	75.2	71.3	65.5	60.8	58.2	52.7	46.4
10 log (S)									
		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Directivity Correction - Dc									
		-7.8	-7.8	-7.8	-7.8	-7.8	-7.8	-7.8	-7.8
Adiv - Geometrical Divergence									
		-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption									
		0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation									
		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation									
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver									
External Receiver - L1 The Old Nags									
Head Restaurant operating hours									
Sound Pressure, Lp:		21.1	22.1	18.1	12.2	7.3	4.2	-3.4	-17.2

Calculation Sheet

Ground Floor Plant space to L1 The Old Nags Head Overnight

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Internal Receiver Noise									
Internal Receiver Noise - Ground Floor									
Plant space									
Total Sound Pressure Level (dB)		80.2	81.2	77.3	71.5	66.8	64.2	58.7	52.4
Diffusivity - Cd									
Composite R' of structural elements									
Facade Wall - Louvre									
Element Area (m2)	1.5								
Facade Area		1.5							
Glazing -									
Element Area (m2)	0.0								
Door -									
Element Area (m2)	0.0								
Roof/Ceiling -									
Area of Roof (m2)	0.0								
Radiating Lw		74.2	75.2	71.3	65.5	60.8	58.2	52.7	46.4
10 log (S)									
		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Directivity Correction - Dc									
		-7.8	-7.8	-7.8	-7.8	-7.8	-7.8	-7.8	-7.8
Adiv - Geometrical Divergence									
		-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption									
		0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation									
		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation									
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver									
External Receiver - L1 The Old Nags									
Head Overnight									
Sound Pressure, Lp:		21.1	22.1	18.1	12.2	7.3	4.2	-3.4	-17.2

Calculation Sheet

Ground Floor Plant space to L2 Edwardian Radisson Hotel Restaurant Overnight

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Internal Receiver Noise									
Internal Receiver Noise - Ground Floor									
Plant space									
Total Sound Pressure Level (dB)		80.2	81.2	77.3	71.5	66.8	64.2	58.7	52.4
Diffusivity - Cd									
Composite R' of structural elements									
Facade Wall - Louvre									
Element Area (m2)	1.5								
Facade Area	1.5								
Glazing -									
Element Area (m2)	0.0								
Door -									
Element Area (m2)	0.0								
Roof/Ceiling -									
Area of Roof (m2)	0.0								
Radiating Lw		74.2	75.2	71.3	65.5	60.8	58.2	52.7	46.4
10 log (S)									
		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Directivity Correction - Dc									
		-7.8	-7.8	-7.8	-7.8	-7.8	-7.8	-7.8	-7.8
Adiv - Geometrical Divergence									
		-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1	-50.1
Aatm - Atmospheric Absorption									
		0.0	0.0	-0.1	-0.2	-0.3	-0.9	-3.0	-10.5
Agr - Ground Attenuation									
		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation									
		-23.0	-23.0	-23.0	-23.0	-23.0	-23.0	-23.0	-23.0
External Receiver									
External Receiver - L2 Edwardian									
Radisson Hotel Restaurant Overnight									
Sound Pressure, Lp:		-1.9	-0.9	-4.9	-10.8	-15.7	-18.8	-26.4	-40.2