Cole Jarman

73-75 Avenue Road, London

Generator Noise Assessment

Report 18/0635/R4

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CDMA LLP

Bishops Wharf House
51 Parkgate Road
London
SW11 4NA

Revision	Description	Date	Prepared	Approved
0	1st Issue	17 September 2020	Andy Emery	Lee Montague

Cole Jarman Limited Reg. in England and Wales No. 7102436
An RSK Company
Registered Office Spring Lodge, 172 Chester Road, Helsby WA6 0AR
www.colejarman.com info@colejarman.com

Head Office +44 (0)1932 829007
John Cree House, 24b High Street, Addlestone, Surrey, United Kingdom KT15 1TN
Manchester 0161 470 8888 | Fourways House, 57 Hilton Street, Manchester M1 2EJ
Bristol 0117 287 2633 | The Old School, Stillhouse Lane, Bristol BS3 4EB

Table of Contents

1 Introduction 4

2 Site Description 4

3 Background Noise Survey 4
3.1 **Methodology** 4
3.2 **Results** 5

4 Plant Noise Limits 6

5 Plant Noise Assessment 7
5.1 **Assessment Details** 7
5.2 **Assessment Results** 7

6 Conclusions 9

Attachments

Glossary of Acoustic Terms

18/0635/R4/F1
Site plan detailing noise measurement positions

18/0635/TH1 – 18/0635/TH2
Time history graphs illustrating unattended noise survey results

18/0635/R4/SCH1
Atmospheric side silencer schedule

18/0635/SPC3
Acoustic lining specification

18/0635/SPC4
Generator room access door specification

Appendix A
Plant noise assessment calculations

End of Section

Generator Noise Assessment

1 Introduction

1.1 A new single dwelling has been constructed at 73-75 Avenue Road, London NW8 6JD, replacing the previous dwelling on the site. It is now proposed to construct a separate building on the site to house a backup generator.

1.2 Cole Jarman have been instructed to undertake a noise survey at the site to quantify the existing noise climate, and an assessment of atmospheric noise emissions from the backup generator.

1.3 This report sets out the methodology and results of the noise survey and subsequent assessment work. Acoustic performance requirements are provided for noise mitigation measures as necessary.

2 Site Description

2.1 The site, located at 73-75 Avenue Road, London NW8 6JD, had previously been occupied by a single dwelling facing onto Avenue Road to the east of the site.

2.2 Avenue Road (B525) is a busy main road within St Johns Wood running north from Regents Park.

2.3 The surrounding area is made up of residential streets. Directly to the rear (west) of the proposed dwelling are residences facing onto Queen's Grove, to the north and east are further residences on Avenue Road.

2.4 To the south across Queens' Grove there are further residences on Avenue Road, beyond which is Primrose Hill and Regents Park.

2.5 The generator building is to be located in the southern part of the site adjacent to the boundary with Queen's Grove.

2.6 The site and surrounding area are shown on attached site plan 18/0635/R4/F1.

3 Background Noise Survey

3.1 **Methodology**

3.1.1 An unattended noise survey was undertaken at the site commencing at 11h30 on Tuesday 11th December 2018 and ending at 11h00 on Wednesday 12th December 2018.

3.1.2 Noise measurements were taken from two positions on the site, representative of the closest residences to the rear and to the front of the site. The measurement positions are described below, and are illustrated in attached site plan 18/0635/R4/F1:

- MP1 In the western corner of site near the boundaries shared with 38 Queen's Grove and 77 Avenue Road. The microphone was positioned at a height of 3m;
- MP2 Near the northern end of the north-western site boundary shared with 77 Avenue Road placed on an existing flat roof at first floor level.

3.1.3 These positions were selected to quantify background noise levels representative of those at the nearest noise sensitive receptors to the proposed mechanical services plant.

3.1.4 Measurements of the L_{Aeq}, L_{Amax} and L_{A90} indices were recorded over consecutive 15 minute periods for the duration of the survey using the equipment listed within Table T1 below (see attached Glossary of Acoustic Terms for an explanation of the noise units used).

Item	Manufacturer	Type
Sound Level Analyser (x2)	Rion	NL-52
Acoustic Calibrator (x2)	Rion	NC-74
Weatherproof windshield (x2)	Rion	WS-15

T1 Equipment used during unattended noise survey.

3.1.5 The microphones were fitted within weatherproof enclosures, and the sound level meter were calibrated before and after the survey in order to confirm an acceptable level of accuracy. No significant drift was noted to have occurred.

3.1.6 The weather conditions when setting up and collecting the noise monitoring equipment were overcast, cool and dry with no significant breeze. The weather stayed the same throughout the survey period.

3.2 Results

3.2.1 The results of the noise measurements at MP1 and MP2 are presented in attached time history figures 18/0635/TH1 – 18/0635/TH2 respectively.

3.2.2 The noise climate onsite throughout the daytime period was dominated by demolition works being undertaken at the site between 08h00 - 17h30. Outside of this period the noise climate comprises mostly of traffic noise emanating from Avenue Road, with some contributions from activity on Queens Grove.

3.2.3 The representative background noise levels recorded during the day and night time measurement hours during the survey duration are set out in Table T2 below:

Location	Representative Background Noise Level, dB(A)	
	Daytime (07h00-23h00)	Night Time (23h00-07h00)
MP1 – Rear north east corner of the property	47	36
MP2 – First floor level in line with east façade	54	36

T2 Representative background noise levels, L_{A90}.

4 Plant Noise Limits

4.1 The site falls within the jurisdiction of the London Borough of Camden. Appendix 3 of the Camden Local Plan 2017 provides the following guidance on noise limits for industrial and commercial noise sources:

"A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15 dB if tonal components are present) should be considered as the design criterion)."

4.2 Paragraph 6.100 of the Local Plan states the following with regards to noise limits for Emergency Plant:

"Emergency equipment such as generators which are only to be used for a short period of time will be required to meet the noise criteria of no more than 10dB above the background level (L90 15 minutes). During standby periods, emergency equipment will be required to meet the usual criteria for plant and machinery. Conditions to this effect may be imposed in instances where emergency equipment forms part of the application."

4.3 Based on the above, the following plant noise limits are to backup generator noise emissions:

Location	Emergency Plant Noise Emission Limit, dB (24-hours)
Nearest Residential Receivers	46

T3 Plant noise emission limits at the nearest residential properties.

4.4 The noise limits are to apply at 1m from the outside of nearby residential windows.

5 Plant Noise Assessment

5.1 Assessment Details

5.1.1 Our assessment has used manufacturer's noise data for the generator as set out in table T4 below.

Plant Item	Sound Pressure Level dB(A) at 7m at Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Power Technique Generator Enclosed Set – 67.7 dB(A)	48.2	59.0	62.2	60.9	60.5	58.5	53.9

T4 Generator manufacturer noise data

5.1.2 The locations of the generator building and its air intake and discharge louvres are marked indicatively on attached figure 18/0635/R4/F1.

5.1.3 Noise levels have been calculated to the noise sensitive receivers most exposed to the plant noise, indicated as AP2 and AP3 on the attached site plan 18/0635/R4/F1 and described below:

- AP2 – 71 Avenue Road;
- AP3 – 38 Queen's Grove.

5.1.4 The noise levels generated by the equipment at the assessment positions have been calculated by correcting the plant noise levels for internal duct losses, external radiation, distance and screening losses, façade reflections and any specified noise mitigation measures as applicable.

5.1.5 It is understood the generator building construction is to comprise cavity masonry external walls and a 200mm deep concrete roof.

5.2 Assessment Results

5.2.1 In order to mitigate atmospheric noise emissions to within the specified noise limits, the following measures are recommended:

- The air discharge ventilation louvres should have a splitter silencer fitted behind, meeting the specification in the attached silencer schedule 18/0635/R4/SCH1. Half the length of the silencer should be wrapped with acoustic lagging, as well as any plenum box required between the louvre and silencer for airflow. The lagging should comprise an inner layer facing the

ductwork of ≥25mm acoustic insulation and a 10kg/m^2 flexible mass barrier outer layer (E.g. Muftilag or similar).

- The air intake louvres should be ≥300mm deep acoustic louvres, meeting the specification in the attached silencer schedule 18/0635/R4/SCH1.
- The entrance doorsets to the facility should be steel items with full perimeter compression acoustic seals, manufactured to achieve an acoustic rating of ≥**40dB R'_w**. A specification 18/0635/SPC4 for the doorset is attached to this report.
- It has been assumed the exhaust gas discharge will penetrate the roof of the enclosure and point directly upward. An exhaust silencer should be selected by the generator supplier to meet a noise level of **65dB(A) at 1m** from the exhaust.
- In order to limit reverberant noise levels within the room (and so reduce noise breakout through the louvres), the underside of the roof should be lined internally with 100mm Rockwool slabs. A specification 18/0635/SPC3 for this material is attached to this report.

5.2.2 In order to minimise regenerative noise, silencers and louvres should be sized/selected to limit any pressure loss to no more than 40Pa.

5.2.3 All mechanical plant items should be installed on suitable anti-vibration mounts / hangers to minimise structure borne noise transmission.

5.2.4 The rating noise levels calculated with the mitigation measures specified above are shown in table T5. It can be seen that the plant noise limits are met.

Location	Calculated Plant Noise Level, dB(A)	Noise Emission Limit, dB(A)
AP2 – 71 Avenue Road	45	46
AP3 – 38 Queen's Grove	46	46

T5 Plant noise emission levels at the nearest noise sensitive properties.

5.2.5 Summary results of the plant noise assessment calculations can be found in the attached Appendix A.

6 Conclusions

6.1 A new single dwelling has been constructed at 73-75 Avenue Road, London NW8 6JD, replacing the previous dwelling on the site. It is now proposed to construct a separate building on the site to house a backup generator.

6.2 Cole Jarman have undertaken a survey at the site to quantify the existing noise levels. This report details the methodology and results of the survey.

6.3 Based on the results of the survey, suitable noise limits for the new mechanical services plant items have been defined taking account of guidance in the Camden Local Plan 2017.

6.4 An assessment of atmospheric noise emissions has been carried out, noise mitigation measures have been specified as necessary to enable the relevant noise limits to be met.

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

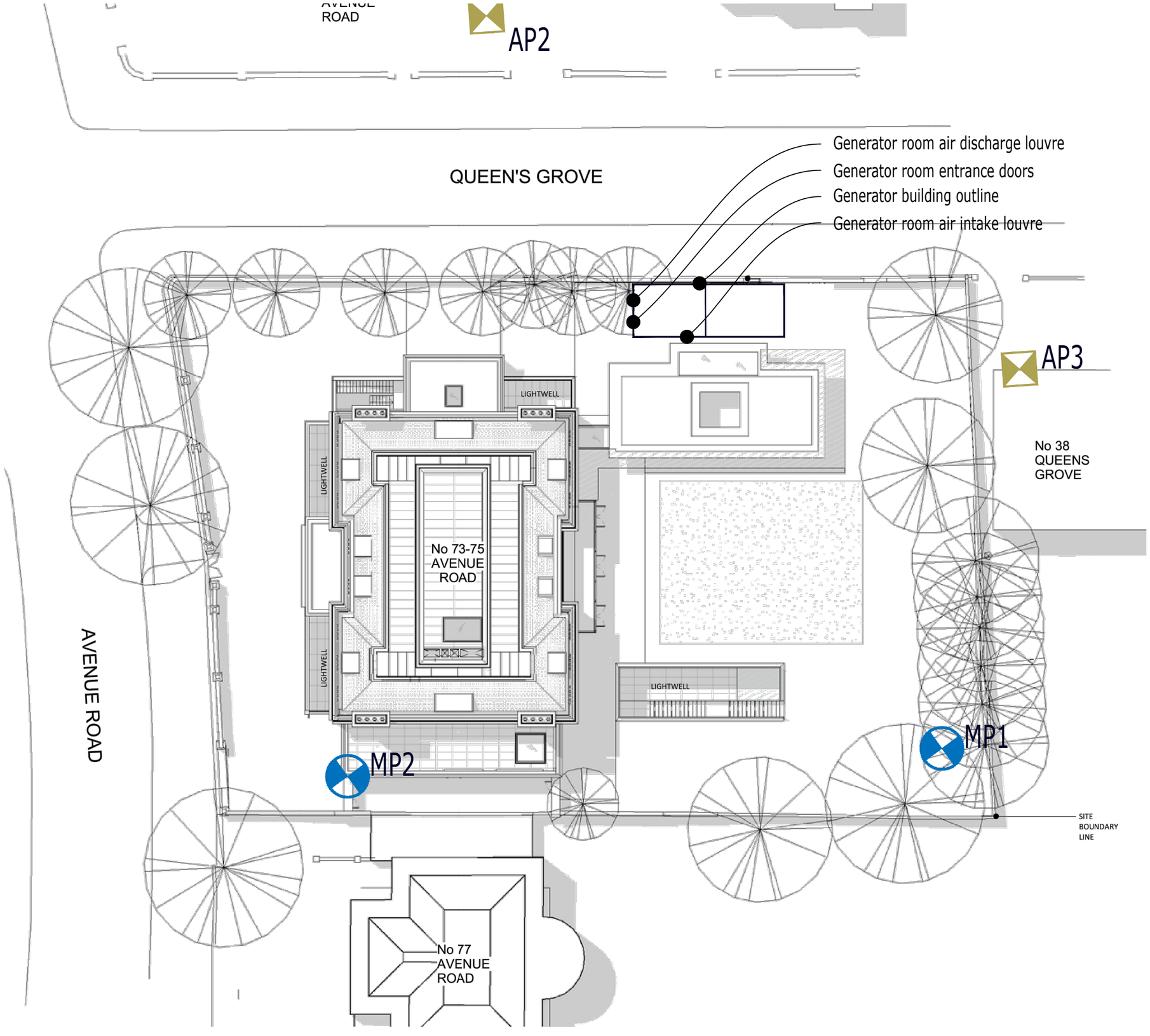

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Figure 18/0635/R4/F1

Title:

Site plan illustrating noise survey measurement positions and noise assessment receiver positions

MP1 Noise Survey Measurement Position

AP1 Noise Assessment Receiver Position

NORTH

Project:

73-75 Avenue Road, London NW8 6JD

Date: September 2020

Revision: -

Scale: Not to scale

Cole Jarman Limited
t +44 (0)1932 829007 **f** +44 (0)1932 829003

John Cree House, 24B High Street, Addlestone, Surrey KT15 1TN
e info@colejarman.com **w** www.colejarman.com

Noise Level Time History at Position MP1, 11 to 12 December 2018

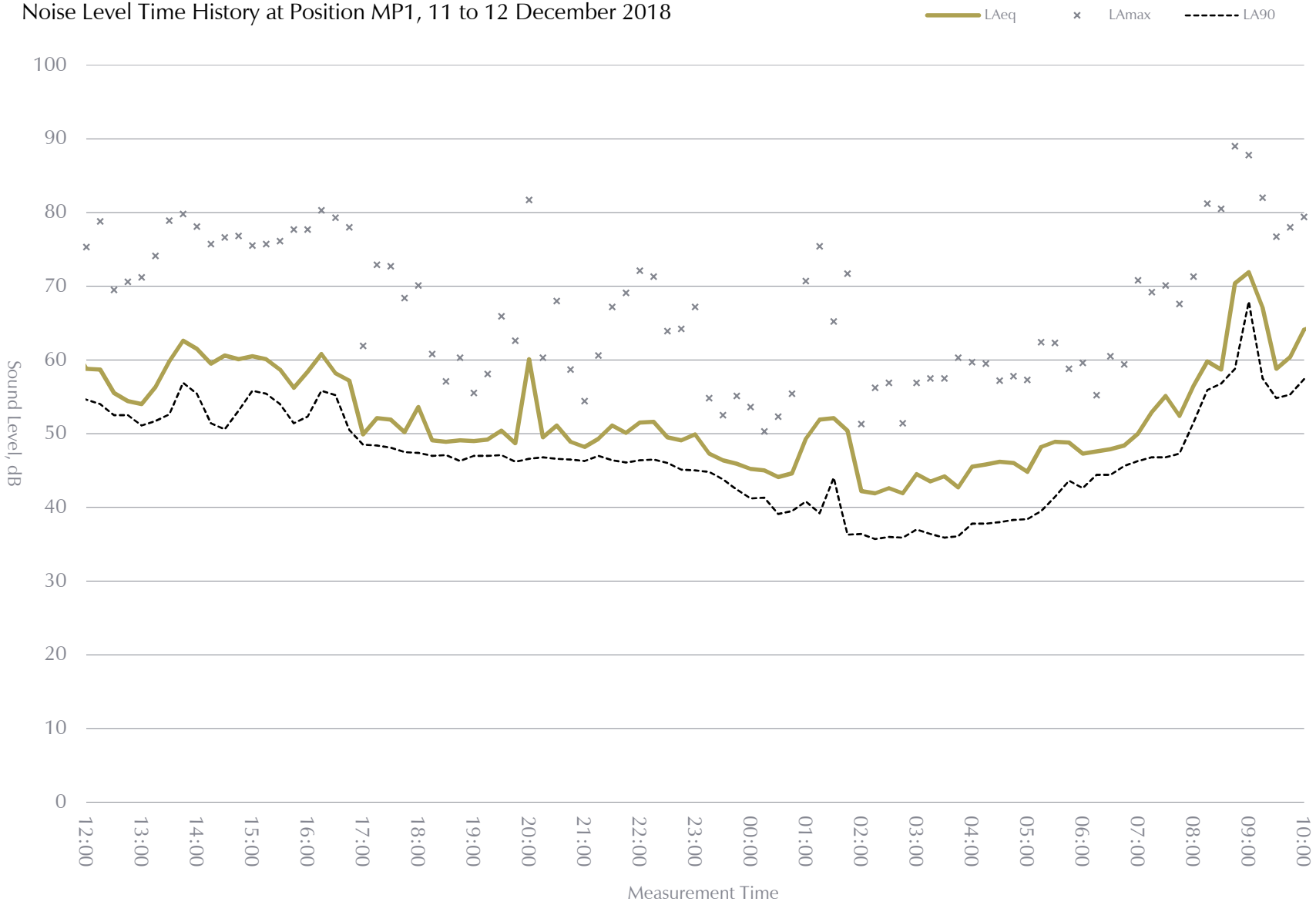


Figure 18/0635/TH01

Noise Level Time History at Position MP2, 11 to 12 December 2018

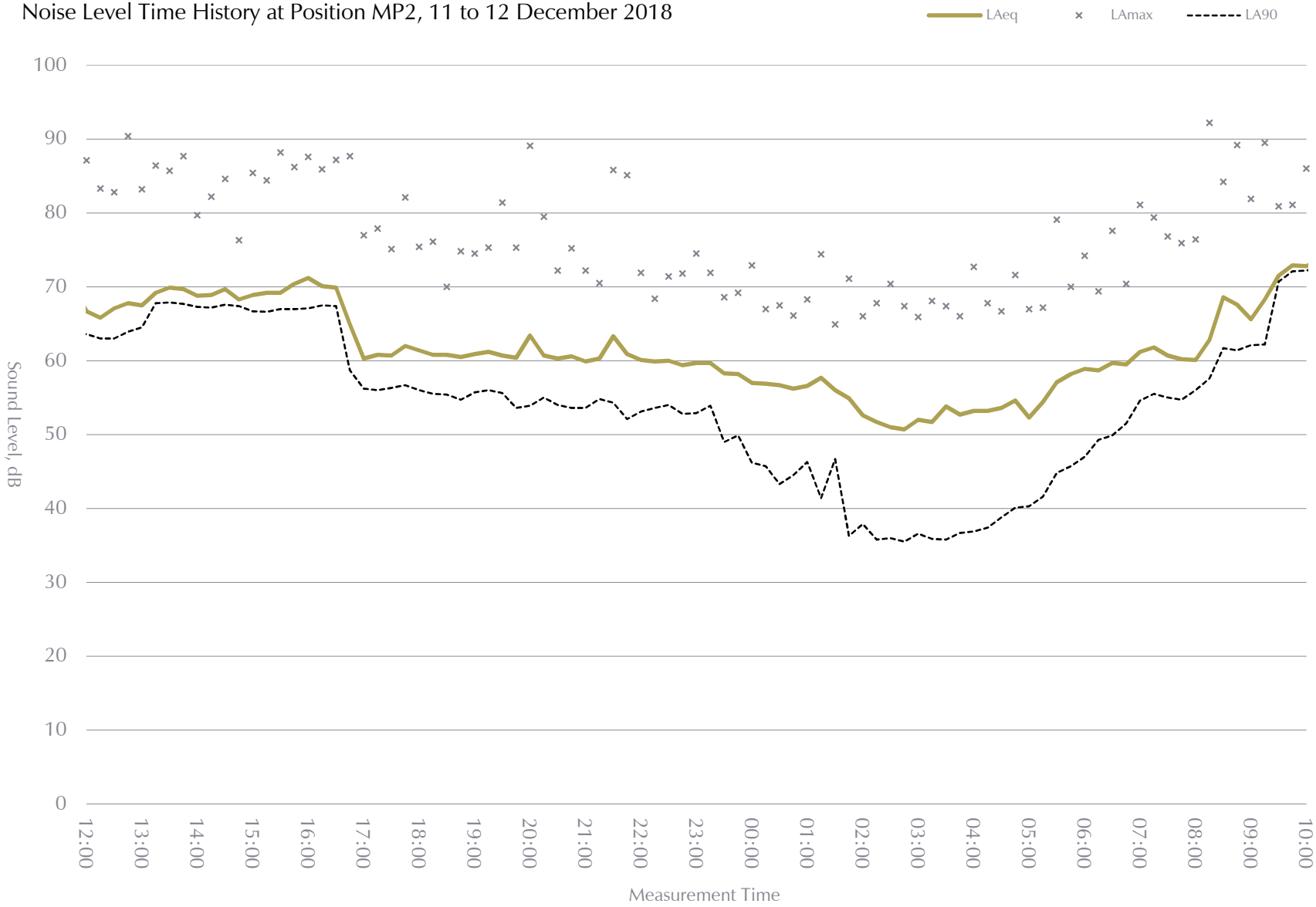


Figure 18/0635/TH02

Schedule of silencers and required insertion loss, dB.

Item[1]	System	Location	m^3/s (2)	Pa (3)	Dimensions (mm)[4]			Octave Band Centre Frequency (Hz)							
					H	W	L	63	125	250	500	1k	2k	4k	8k
AS1	Generator room	Air discharge	4.7	40	velocity ≤ 3.0		600	4	8	12	17	29	28	23	16
AL1	Generator room	Air intake	4.7	40	velocity ≤ 1.5		300	5	7	10	12	14	16	13	12

Notes

[1] RS, CT and AS notation refers to Room Side, Cross Talk and Atmospheric Side respectively. AL refers to Acoustic Louvre.
[2] Volume flow rate through silencer, m^3/s
[3] Maximum resistance or pressure drop, Pa
[4] Where "velocity" is stated instead of height and width dimension, silencers should be sized such that the stated air velocity (in m/s) is not exceeded. Air velocity is evaluated by dividing the flow rate by the entire cross-sectional area of the silencer, not just the open or free area.

Specification 18/0635/SPC3

Project: **73-75 Avenue Road, London**
Subject: **Acoustic Lining**
Date: **September 2020**

1 General

This specification defines the applicable requirements for black faced, mineral fibre lining to the emergency generator plant room. The suppliers of the materials shall provide the necessary information and data to verify the required performance.

The supplier shall be responsible for ensuring that all the performance criteria set out herein are met by the product being offered.

2 Products

The acoustic lining is to be supplied in the minimum thickness stated and shall be inorganic glass fibre material with a minimum density of 48 kg/m^3. The material shall be provided with an erosion resistive acoustically transparent coating suitable for airflow velocities up to 15 m/s.

The sound absorption provided by the material (with and/or without the erosion resistive facing) shall meet or exceed the values tabulated below:

Minimum Thickness (mm)	**Octave Band Centred Frequency (Hz)**					
	125	**250**	**500**	**1k**	**2k**	**4k**
100	0.60	0.90	0.90	0.90	0.9	0.90

T1 Absorption Coefficients of Acoustically Absorbent Plant Area Lining

3 Execution

3.1 Attach to the entire surface of the plant room soffit.

3.2 All available portions of the area designed to receive the acoustic liner shall be completely covered. All joints shall be neatly butted and there shall be no interruptions or gaps.

3.3 The erosion resistive face shall be orientated toward the plant room (not the wall).

3.4 The acoustic liner shall be secured with mechanical fasteners which shall compress the liner sufficiently to hold it firmly in place.

3.5 Liner shall be compressed to assure overlapped and compressed longitudinal corner joints.

End of Section

Specification 18/0635/SPC4

Project: **73-75 Avenue Road, London**
Subject: **Specification for acoustically rated door sets**
Date: **September 2020**

1 Performance

1.1 Acoustically rated door sets are expected to achieve the following minimum overall acoustic performance:

Door Rating R_w, dB	Minimum on-site R'_w, dB	Installed Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)					
		125	250	500	1k	2k	4k
45	40	25	30	37	40	40	40

T1 Sound isolation performance of acoustic rated door sets.

1.2 Suppliers of door sets rated in excess of R_w 35dB shall provide an installed sound reduction index (SRI) (as tested in accordance with EN ISO 140 Parts 4 and 5:1998, as relevant) of not less the above values.

1.3 The manufacturer or supplier of acoustic doors shall guarantee the specified SRI, in an installed condition on site. Any failure to meet the specification because of faulty design, manufacture or supplier being held liable for remedial or replacement costs including consequential liability.

2 Construction

2.1 Moderate Performance

2.1.1 A solid timber construction is expected to be sufficient for door sets rated at and below 35dB:

- R_w 30dB door – 44mm solid timber
- R_w 35dB door – 54mm solid timber

2.1.2 Doors should be well fitted to seal effectively around its perimeter in a substantial frame with an effective stop. Compression or wipe seals should be used around the door's perimeter along with a threshold seal beneath. A drop-down or wipe type threshold seal is suitable.

2.1.3 Doors may incorporate vision panels comprising 7 mm glass up to an area of 0.16m^2.

2.1.4 Gaps between door frames and the walls in which they are fixed should be not more than 10 mm. Where there are gaps between door frames and the walls in which they are fixed close to this size, the gaps should be packed to the full depth of the wall with mineral wool. In all cases frames should be sealed on both sides of the wall with sealant.

2.2 High Performance

2.2.1 It is expected that where an R_w value greater than 35dB is required, the door should be of steel construction with sufficient seals to the head, jambs and threshold to achieve the acoustic rating. For very high performances double or triple seal sets would be expected to achieve an acoustic labyrinth when the door is closed.

2.2.2 Double doors should incorporate a central jamb or overlapping leaves to ensure a good seal at the middle joint. The door fastener or lock should be designed to ensure that the seals operate over the whole periphery of the door. For very high performances, double door sets should be avoided.

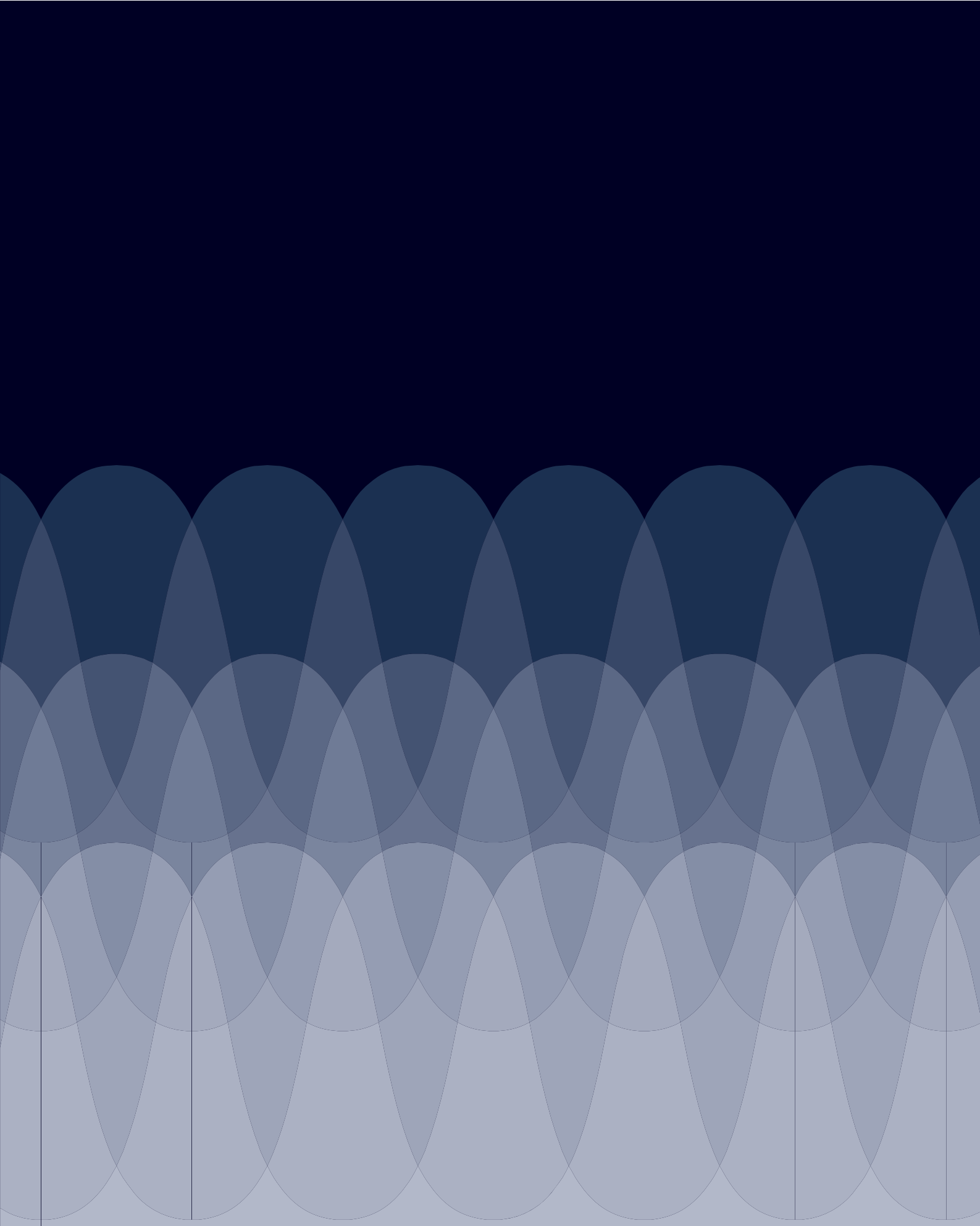
2.2.3 The acoustic doors shall be complete with all seals and frames, and with furniture as specified by the Architect.

End of Section

Appendix A

					63	125	250	500	1k	2k	4k	8k	dB(A)	
AP2 - 71 Avenue Road														
Exhaust air louvre					61	58	45	32	14	9	7	- -	44	
Roof					35	- -	- -	- -	- -	- -	- -	- -	9	
Door					17	33	20	6	- -	- -	- -	- -	18	
Engine exhaust													39	
TOTAL					61	58	45	32	14	9	7	- -	45	
LIMIT													46	dBA
AP3 - 38 Queen's Grove														
Intake louvre- rev					58	56	46	38	31	26	24	- -	43	
Intake louvre- direct					57	53	43	32	23	17	16	- -	40	
Roof					35	- -	- -	- -	- -	- -	- -	- -	9	
Engine exhaust													39	
TOTAL					60	58	47	39	32	26	24	- -	46	
LIMIT													46	dBA
DUCTED EXHAUST AIR TO AP2														
Generator Lw					107	108	103	97	93	90	86	33	100.3	dBA
Half sound power to outlet	-3	dB			-3	-3	-3	-3	-3	-3	-3	-3		
Attenuator	600	mm	30%	free area	-4	-8	-12	-17	-29	-28	-23	-16		
End reflection	3.15	m2			0	0	0	0	0	0	0	0		
Directivity					1	1	-1	-1	-1	-1	-1	-1		
Radiation	-8	dB			-8	-8	-8	-8	-8	-8	-8	-8		
Distance	24	m			-28	-28	-28	-28	-28	-28	-28	-28		
Screening	0.18	m path difference			-6	-7	-8	-11	-13	-16	-19	-20		
Façade	2.5	dB			3	3	3	3	3	3	3	3		
Result					61	58	45	32	14	9	7	-40	44	dBA
DOOR TO AP2														
Generator Lw					107	108	103	97	93	90	86	33	100.3	dBA
Half sound power to room	-3	dB			-3	-3	-3	-3	-3	-3	-3	-3		
Krev					-7	-8	-10	-10	-10	-11	-12	-12		
Door size	3.4	m2			5	5	5	5	5	5	5	5		
rev to ff	-6	dB			-6	-6	-6	-6	-6	-6	-6	-6		
SRI door					-24	-25	-30	-37	-40	-40	-40	-40	39	Rw
Radiation	-8	dB			-25	-8	-8	-8	-8	-8	-8	-8		
Distance	25	m			-28	-28	-28	-28	-28	-28	-28	-28		
Screening	0.05	m path difference			-5	-6	-6	-7	-9	-11	-14	-17		
Façade	2.5	dB			3	3	3	3	3	3	3	3		
Result					17	33	20	6	-3	-9	-17	-73	18	dBA
INTAKE AIR LOUVRE TO AP3-rev														
Generator Lw					107	108	103	97	93	90	86	33	100.3	dBA
Half sound power to room	-3	dB			-3	-3	-3	-3	-3	-3	-3	-3		
Krev					-7	-8	-10	-10	-10	-11	-12	-12		
Louvre size	3.1	m2			5	5	5	5	5	5	5	5		
rev to ff	-6	dB			-6	-6	-6	-6	-6	-6	-6	-6		
300mm acoustic louvre					-5	-7	-10	-12	-14	-16	-13	-12		
Radiation	-8	dB			-8	-8	-8	-8	-8	-8	-8	-8		
Distance	25	m			-28	-28	-28	-28	-28	-28	-28	-28		
Façade	2.5	dB			3	3	3	3	3	3	3	3		
Result					58	56	46	38	31	26	24	-28	43	dBA
INTAKE AIR LOUVRE TO AP3-direct														
Generator Lw					107	108	103	97	93	90	86	33	100.3	dBA
Half sound power to room	-3	dB			-3	-3	-3	-3	-3	-3	-3	-3		
300mm acoustic louvre					-5	-7	-10	-12	-14	-16	-13	-12		
Radiation	-8	dB			-8	-8	-8	-8	-8	-8	-8	-8		
Distance	27	m			-29	-29	-29	-29	-29	-29	-29	-29		
Screening	0.67	m path difference			-8	-10	-13	-16	-19	-20	-20	-20		
Façade	2.5	dB			3	3	3	3	3	3	3	3		
Result					57	53	43	32	23	17	16	-36	40	dBA
ROOF TO AP2 / AP3														
Generator Lw					107	108	103	97	93	90	86	33	100.3	dBA
Half sound power to room	-3	dB			-3	-3	-3	-3	-3	-3	-3	-3		
Krev					-7	-8	-10	-10	-10	-11	-12	-12		
Roof size	22	m2			13	13	13	13	13	13	13	13		
rev to ff	-6	dB			-6	-6	-6	-6	-6	-6	-6	-6		
SRI roof- 200mm concrete					-36	-42	-41	-50	-57	-60	-65	-70		
Radiation	-8	dB			-8	-8	-8	-8	-8	-8	-8	-8		
Distance	27	m			-29	-29	-29	-29	-29	-29	-29	-29		
Screening	-	m path difference			- -	- -	- -	- -	- -	- -	- -	- -		
Façade	2.5	dB			3	3	3	3	3	3	3	3		
Result					35	-79	-81	-90	-97	-101	-106	-111	9	dBA
ENGINE EXHAUST TO AP2 / AP3														
Limiting SPL at 1m	65	dB											65	dBA
Distance	27	m											-29	
Façade	2.5	dB											3	
Result													39	dBA

End of Section



Cole Jarman Limited Reg. in England and Wales No. 7102436
An RSK Company

Registered Office Spring Lodge, 172 Chester Road, Helsby WA6 0AR
www.colejarman.com info@colejarman.com

Head Office +44 (0)1932 829007
John Cree House, 24b High Street, Addlestone, Surrey, United Kingdom KT15 1TN

Manchester 0161 470 8888 | Fourways House, 57 Hilton Street, Manchester M1 2EJ
Bristol 0117 287 2633 | The Old School, Stillhouse Lane, Bristol BS3 4EB