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Architectural & Environmental Acousticians

Noise & Vibration Engineers

NOISE ASSESSMENT

49-51 FARRINGDON ROAD

ANDREW KIRK MANAGEMENT LTD

RP01-18294

NOISE ASSESSMENT

PROJECT: 49-51 FARRINGDON ROAD

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1. INTRODUCTION

1.1 Cass Allen has been instructed by Andrew Kirk Management Ltd to assess the noise impact of seven proposed new condenser units on the first floor roof at 49-51 Farringdon Road in Camden.

1.2 The assessment has been carried out in accordance with relevant local and national planning guidance.

1.3 The aims of the assessment were:

- To assess the potential impact of noise emissions from mechanical plant associated with the development at the positions of existing sensitive receptors in the area.
- Where required, identify appropriate measures to optimise the acoustic design of the development and achieve acceptable noise levels at the positions of existing sensitive receptors in the area.

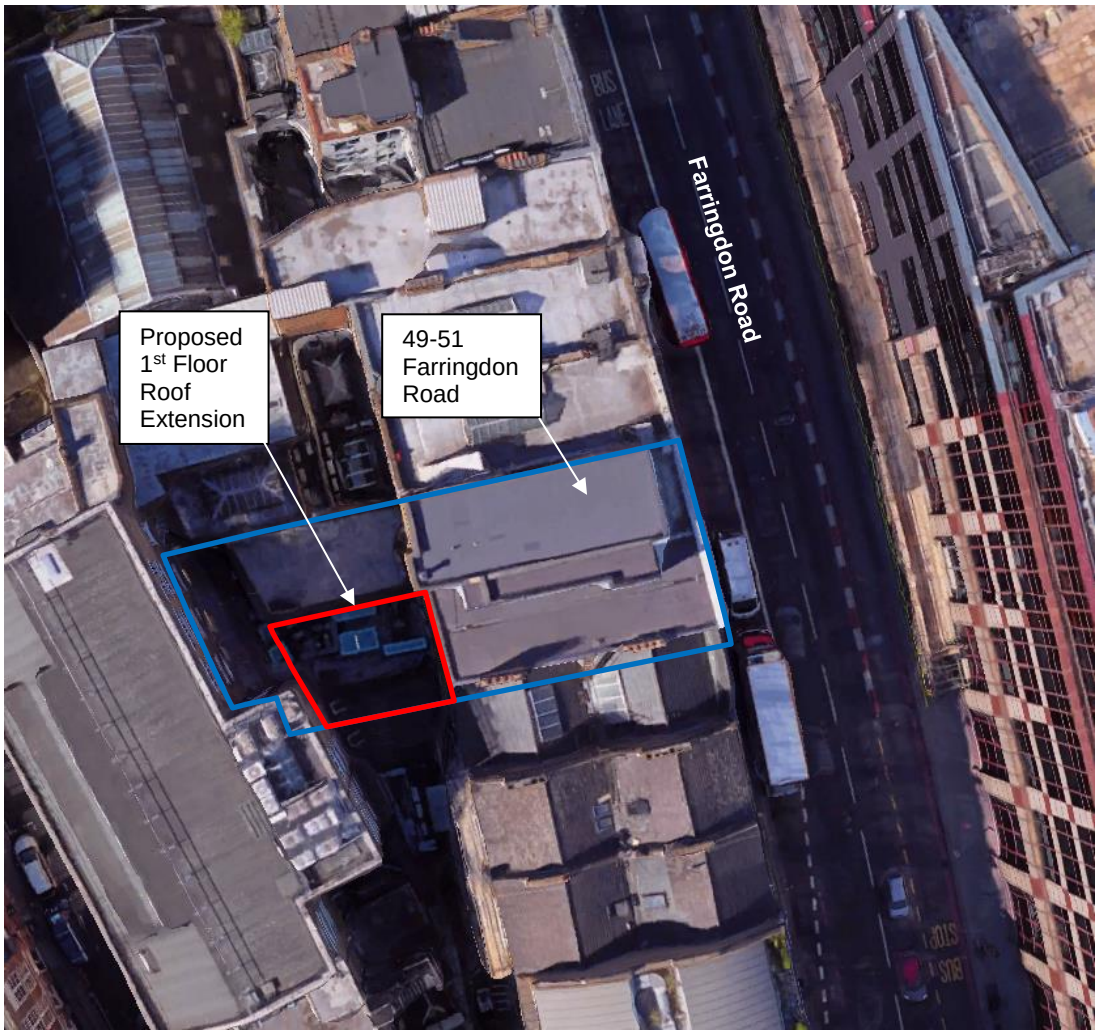
1.4 This report contains technical terminology; a glossary of terms can be found at www.cassallen.co.uk/glossary.

2. PROJECT DESCRIPTION

2.1 49-51 Farringdon Road is a mixed use commercial building comprising a former dental surgery (D1) at ground floor and vacant B1 offices on the upper floors with ancillary accommodation at basement level. The building is bounded to the east by Farringdon Road.

2.2 An annotated aerial photo of the site is shown in Figure 1 below.

Figure 1 Annotated Aerial Photo



2.3 The building has planning permission (ref. 2016194/P) for internal and external alterations to the building, extensions and reconfiguration of building to provide a replacement roof extension at fifth floor level; a first floor rear extension; internal reconfiguration and extension of retail (A1), healthcare (D1) and office (B1a) uses with an overall uplift of 115sq.m (GIA); restoration of façade and upgrading of shopfront; alterations to rear elevation and associated additions/alterations. However, no external plant was allowed for in this scheme and so is being applied for now alongside some other small changes to the scheme. This acoustic assessment supports this new application, which proposes seven condenser units at first floor roof level at the rear of the building. A drawing of the proposed first floor roof layout is shown in Appendix 1.

3. PLANNING POLICY

National Policy

3.1 Outline guidance for the assessment of noise affecting new developments is given in the July 2018 National Planning Policy Framework (NPPF). Section 170 of the NPPF states:

> *Planning policies and decisions should contribute to and enhance the natural and local environment by…preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of…noise pollution.*

3.2 and in section 180:

> *Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and quality of life;*
> *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

Local policy

3.3 Policy A4, *Noise and Vibration,* given in the Camden Local Plan (June 2017), states:

> *The Council will seek to ensure that noise and vibration is controlled and managed.*
>
> *Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:*
>
> *a. development likely to generate unacceptable noise and vibration impacts; or*
>
> *b. development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.*
>
> *We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development.*

3.4 To address the requirements of the national and local policies, the effect of noise emissions from mechanical plant associated with the development at the position of existing sensitive receptors in the area has been assessed.

4. PLANT NOISE IMPACT ASSESSMENT

Design criteria – Mechanical plant noise

4.1 BS4142:2014 – Methods for rating and assessing industrial and commercial sound (BS4142) can be used to assess the impact of noise from external industrial noise sources on nearby sensitive receptors.

4.2 The BS4142 assessment methodology can be summarised as follows:

1. Measure the existing background noise levels (LA90,T dB) at the locations of nearby noise sensitive receptors during the quietest periods when the noise source(s) under investigation will operate;
2. Predict or measure the noise emissions (LAeq,T dB) from the noise source(s) under investigation at the location(s) of the nearby sensitive receptors, and add corrections for any distinguishable acoustic features (e.g. tones, whines, screeches, hisses etc);
3. Subtract the measured background noise levels (item 1 above) with the measured or predicted rating noise levels (item 2 above) at each sensitive receptor. BS4142 states that:

a) Typically, the greater this difference, the greater the magnitude of the impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

NOTE Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

4.3 It is understood from guidance given in the document 'Camden Local Plan' (2017) that Camden Council consider a rating level of '10 dB below background' to be appropriate for industrial and commercial noise sources (including plant). Therefore, '10 dB below background' has been adopted as the target level for the new plant noise at the positions of nearby sensitive residential receptors.

4.4 In this case, the proposed plant are new, high specification condenser units. It is beneficial that the proposed plant are not expected to present any distinctive acoustic characteristics for the following reasons:

- Tonality: Spectral data have been provided for the condenser units in question (discussed below) which show that the units do not emit significant tonal noise;

- Impulsivity: The noise generating element of the unit is a fan. The operation of fans mean they will not normally generate impulsive noise;
- Intermittency: Intermittency will not be distinctive given that the condenser units are inverter driven and will therefore 'ramp up' and 'ramp down' with load.

4.5 Figure 2 below shows the positions of the nearest sensitive receptors. The distance between the 'worst-case' residential window in terms of noise and the nearest plant item is approximately 11 metres. This is illustrated by the blue arrow below.

Figure 2 Location of nearby sensitive receptors

4.6 Section 6.90 of the document 'Camden Local Plan' (2017) indicates that offices should be considered noise-sensitive receptors. Although office spaces are sensitive to noise, it is our view that offices are not as sensitive to noise as residential dwellings. Furthermore, offices will not normally be sensitive to noise during night-time hours (2300-0700hrs).

4.7 Therefore, a nominal daytime noise limit of 55 dB LAeq,T has been adopted for offices in the vicinity of the development. No noise limit has been adopted for the night time. This criterion is based on a target internal noise level within the offices of 40 dB LAeq,T (based on guidance given in BS8233:2014) and the fact that a façade with an open window will provide 15 dB of sound reduction (as detailed in BS8233:2014).

4.8 A noise survey was carried out to measure existing background noise levels (LA90) at the site – this is outlined in Appendix 2. The measured background noise levels have been used to develop noise limits for plant noise emissions from the new development at the positions of the surrounding residential properties in accordance with the BS4142:2014 assessment methodology. The limits are shown in Table 1 below.

Table 1 BS4142 Noise Limits – Façade Levels

Location	Period	
	Day-time/Evening (0700-2300hrs)	**Night-time (2300-0700hrs)**
Nearest and 'worst case' residential dwellings to 1st floor roof extension	41 dB LAeq,Tr	35 dB LAeq,Tr
Nearest and 'worst case' sensitive receptor at the position of nearby offices (at the rear of the roof extension)	55 dB Leq,Tr	-

Proposed mechanical plant design

4.9 Full details of the mechanical plant associated with the 1st floor roof extension are yet to be confirmed. Therefore, to determine the suitability of the scheme with respect to noise, indicative details have been provided by MEP Pro (the project M&E Consultant) and are as follows:

- Three Mitsubishi PURY-EP250YLM-A1(-BS) condenser unit;
- One Mitsubishi PURY-EP350YLM-A1(-BS) condenser unit;
- Two Mitsubishi PURY-EP450YLM-A1(-BS) condenser unit;
- One Mitsubishi PURY-EP550YLM-A1(-BS) condenser unit.

4.10 Noise emission data for these units has been provided by Mitsubishi and is shown in Appendix 3. All units will be configured to run in low noise mode during the night-time.

4.11 As shown on the application drawings, the plant will be located within two separate areas on the roof:

- An area on the southern side of the first floor roof, comprising three Mitsubishi PURY-EP250YLM-A1(-BS) units, one Mitsubishi PURY-EP350YLM-A1(-BS) unit and two Mitsubishi PURY-EP450YLM-A1(-BS) condenser unit;
- A smaller area along the eastern side of the first floor roof, comprising one Mitsubishi PURY-EP550YLM-A1(-BS) condenser unit.

4.12 To achieve acceptable noise levels, both areas will be surrounded by a 2 metre barrier. The barrier will need to be of imperforate construction and minimum surface mass 10 kg/m^2 to achieve acceptable noise levels in accordance with BS41424:2014.

4.13 Initially, an acoustic enclosure with a minimum height of 3 metres was specified by the design team to ensure compliance with BS4142 noise limits. However, it is understood that the Council raised concerns regarding the appearance of the proposed enclosure, in particular the necessary height. Subsequently the design has been modified to reduce the visual impact by relocating the plant and incorporating a 2 metre noise barrier. The location of the proposed barrier is illustrated in Appendix 1.

4.14 A 3D noise model was created using CadnaA 2018 noise modelling software to calculate noise emissions from the condenser units at the locations of surrounding noise sensitive receptors. Full details of the modelling results are given in Appendix 4 and are summarised below.

Table 2 Predicted Plant Noise Emissions at 'Worst-Case' Sensitive Receptors

Location	Predicted Plant Noise Levels (dB LAr,Tr)		Adopted Criteria (dB LAr,Tr)	
	Day-time/Evening (0700-2300hrs)	Night-time (2300-0700hrs)	Day-time/Evening (0700-2300hrs)	Night-time (2300-0700hrs)
Nearest and 'worst case' residential dwellings to 1st floor roof extension	42	-	41	-
Nearest and 'worst case' residential dwellings to 1st floor roof extension	-	35	-	35
Nearest and 'worst case' sensitive receptor at the position of nearby offices (at the rear of the roof extension)	53	-	55	-

4.15 It can be seen from Table 2 that the predicted plant noise levels at the nearest and existing residential and office receptors are predicted to comply with the BS4142:2014 criteria (a 1 dB exceedance at the nearest and 'worst-case' residential receptor is considered to be negligible on the basis that a 1 dB change in noise levels is at the limit of perceptibility).

4.16 Initially, calculations were carried out with each unit operating at full capacity during the daytime (0700-2300hrs). With this scenario, noise levels at the nearest and 'worst-case' residential receptor would have significantly exceeded the BS8233 criteria. As a result, the noise levels in Table 2 above will be achieved with the below plant items operating at 'Low noise mode' 24 hours a day:

- One Mitsubishi PURY-EP350YLM-A1(-BS) condenser unit;
- Two Mitsubishi PURY-EP450YLM-A1(-BS) condenser unit;
- One Mitsubishi PURY-EP550YLM-A1(-BS) condenser unit.

4.17 Furthermore, the results of the 3D noise modelling indicate the barrier would provide a noise reduction of approximately 6 dB.

4.18 Compliance with the BS4142:2014 criteria is because of the acoustic barrier being specified as part of the assessment process to ensure the noise criteria are met; mitigation has effectively been built into our assessment, rather than being assessed and added in at the end.

4.19 It is also recommended that, where appropriate, all mechanical plant will be fitted on manufacturer recommended anti-vibration mounts (including inertia bases where applicable) to ensure that structure-borne noise or vibration does not disturb nearby residents. Flexible connectors, hangers and pipework will be used to prevent rigid connections between plant items and the building structure. Plant (and associated ducting) will not be supported from separating walls and floors to residential units.

4.20 The proposed plant on the first floor roof is therefore considered acceptable with respect to noise emissions. Compliance with the limits could be secured through the imposition of a suitable planning condition if deemed necessary by the Local Planning Authority.

5. CONCLUSIONS

5.1 Cass Allen was instructed by Andrew Kirk Management Ltd to assess the suitability of the site for the proposed development with regards to noise.

5.2 The assessment was carried out in accordance with relevant local and national planning guidance.

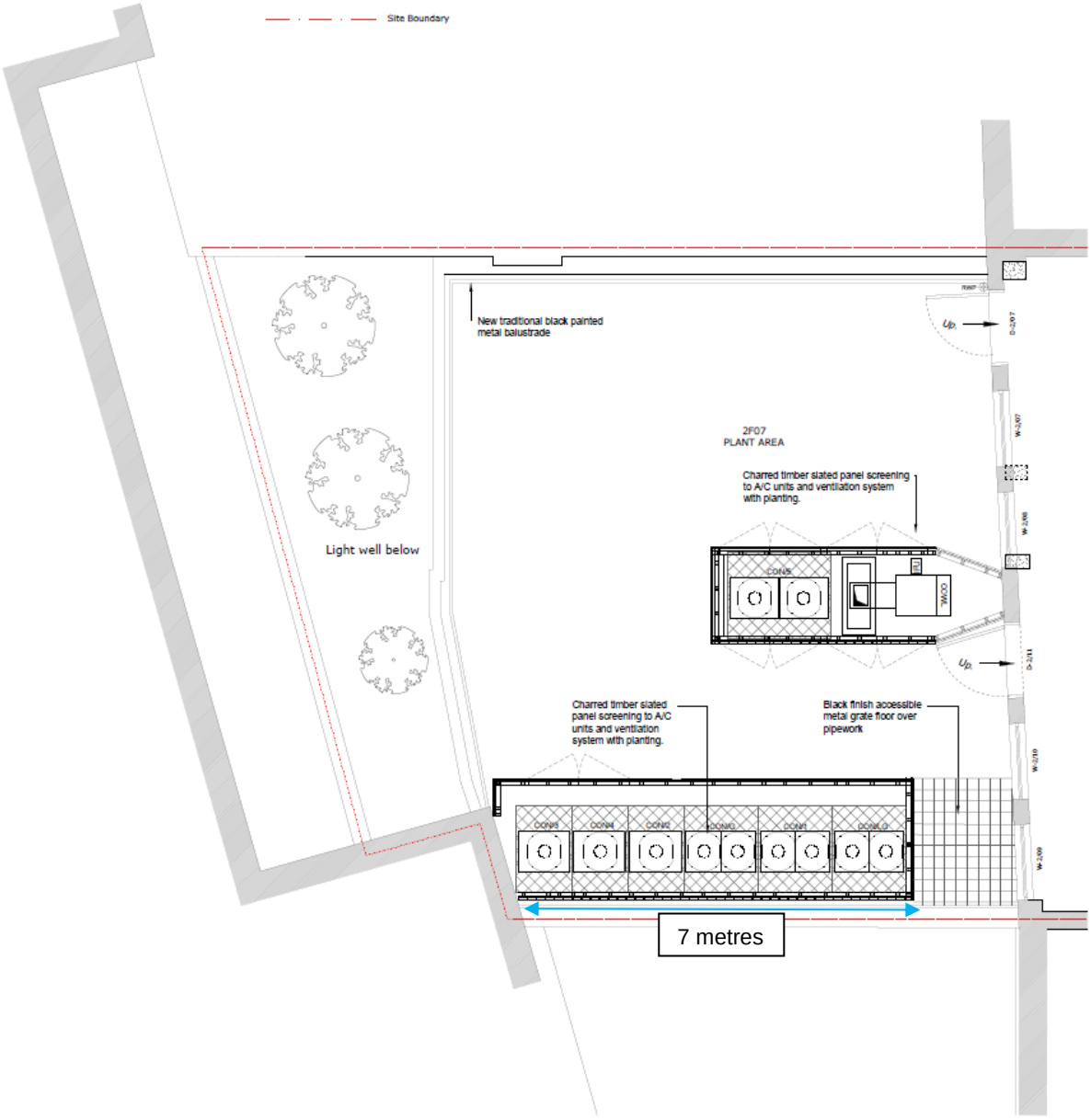
5.3 A noise survey was carried out at the site. Noise limits were developed as per the methodology detailed in BS4142:2014 (in the case of residential receptor positions) and/or based on guidance provided in BS8233:2014 (in the case of nearby offices).

5.4 Mechanical plant noise levels were calculated at the location of nearby noise sensitive receptors using a 3D noise model of the site. Noise levels were seen to comply with the noise limits at all receptor positions (apart from a 1 dB exceedance at the position of the nearest and 'worst-case' residential receptor which is considered to be negligible).

5.5 All plant will be fitted on manufacturer recommended anti-vibration mounts where appropriate to ensure that structure-borne noise or vibration generated by the mechanical plant systems do not affect adjoining premises.

5.6 In summary of the above the proposed external mechanical plant is acceptable with regards to noise.

Appendix 1 Proposed Condenser Location



Appendix 2 Survey Results

Survey Summary:

The survey comprised a period of unattended noise monitoring at the site. Noise levels at the site were generally dictated by road traffic from Farringdon Road.

Survey Period:

23/04/2018 to 27/04/2018

Survey Objectives:

- To identify noise sources that contribute to ambient noise levels at the site;
- To measure noise levels around the site over a typical day and night-time period.

Equipment Used (Appendix 2, Table 1):

Type	Manufacturer	Model	Serial Number
Calibrator	Rion	NC-74	34551703
Sound level meter[1] (noise logger)	Rion	NL-32	00272007

Note 1: All sound level meters were calibrated before and after measurement periods and no significant drift in calibration was found to have occurred. The results of the measurements are therefore considered to be representative.

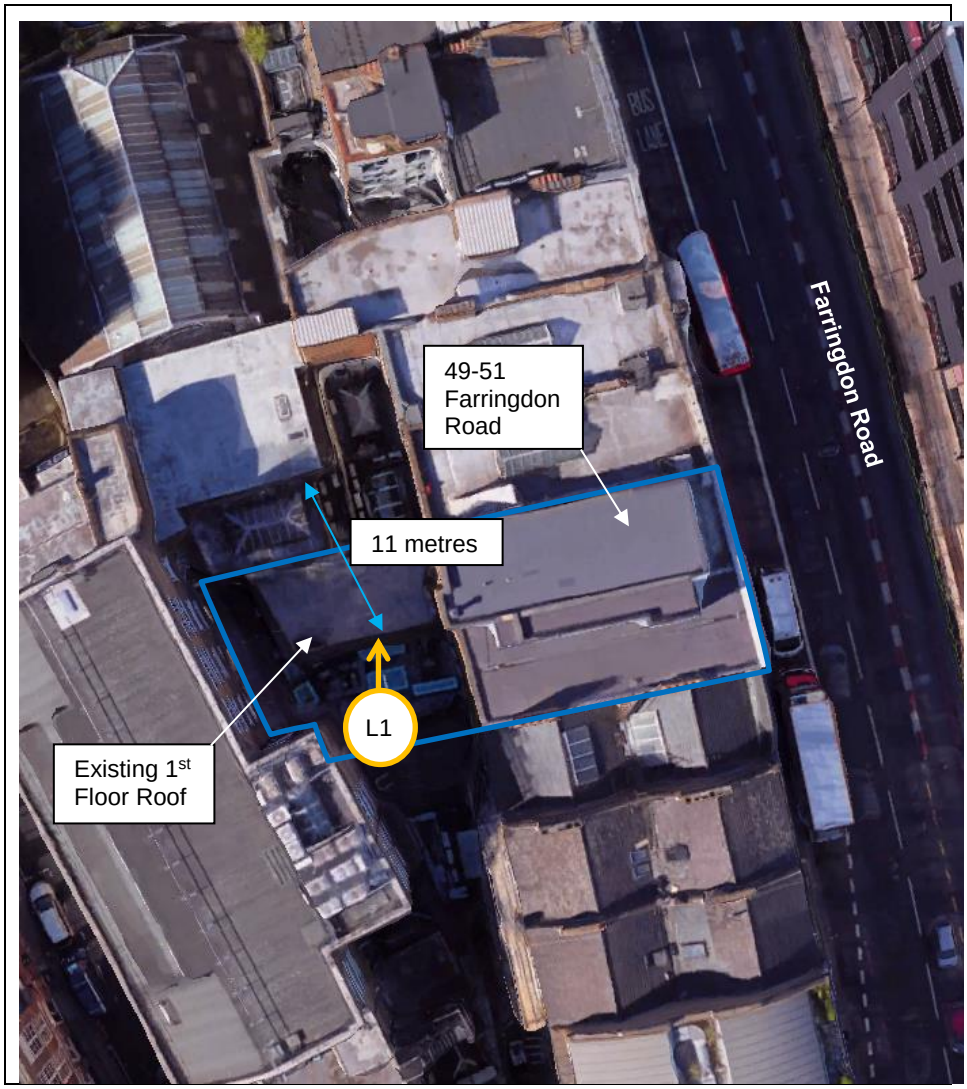
Weather Conditions:

The observed weather conditions were acceptable for acoustic measurement throughout the attended survey periods (low-medium wind speeds and no rain). Weather records for the area confirmed that weather conditions were also generally acceptable for acoustic measurement during the unattended monitoring. Data between 26th and 27th April have been adversely affected by rain and have been excluded from the data analysis.

Measurement Position (Appendix 2, Table 2):

Position (refer plan below)	Description
L1	Unattended noise logging position. 1.5m above 1st floor roof level and 6m above the lower courtyard. Free-field.

Site Plan showing Measurement Positions (Appendix 2, Figure 1):



Unattended Noise Monitoring Results (Appendix 2, Table 3):

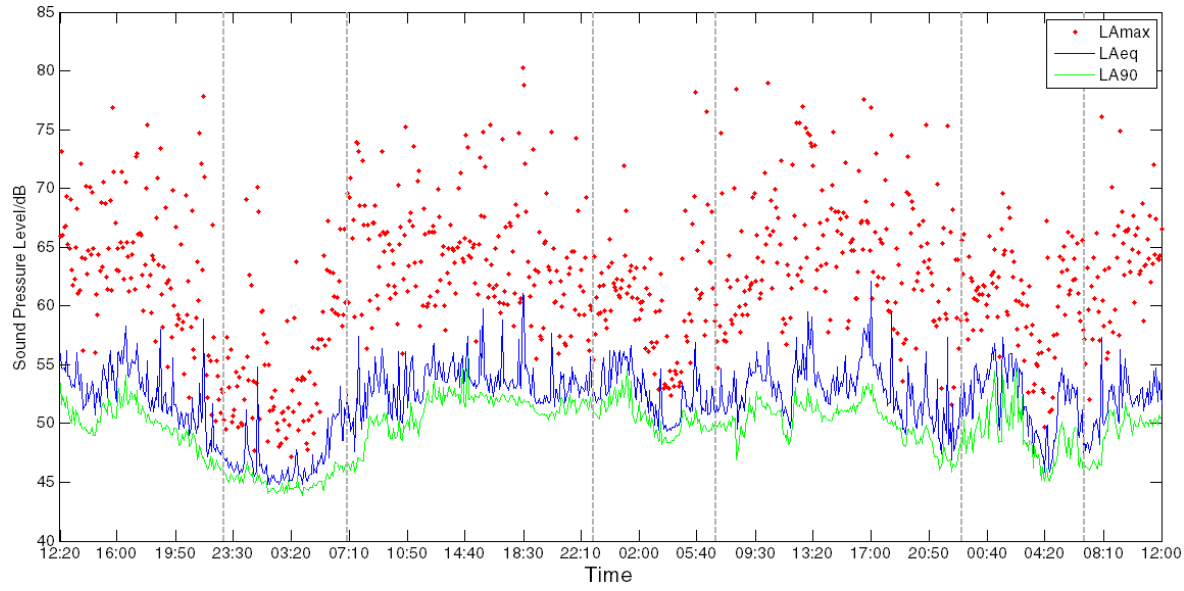
Meas. Period	Position	Daytime (0700-2300hrs)		Night-time (2300-0700hrs)		
		LAeq,16hr, dB	LA90,1hr dB[1]	LAeq,8hr, dB	LA90,5mins, dB[1]	LAmax, dB[2]
23/04/2018 to 27/04/2018	L1	54	51	52	45	65

Note 1: Typical lowest measured during the period shown.

Note 2: Highest typical maximum noise level during the night-time (not exceeded more than 10-15 times per night).

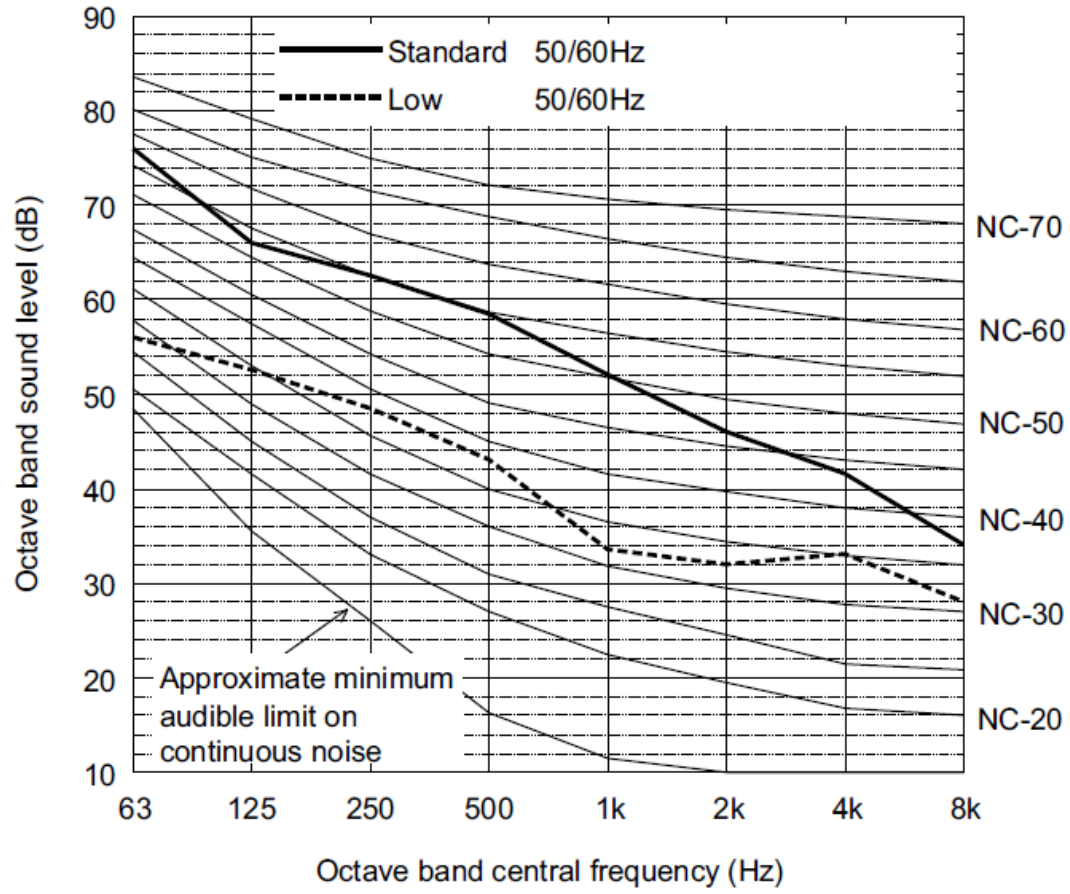
Unattended Noise Monitoring Results (Appendix 2, Figure 2):

Meas. Period	Position	
23/04/2018 to 27/04/2018	L1	



Appendix 3 Mitsubishi Plant Noise Data

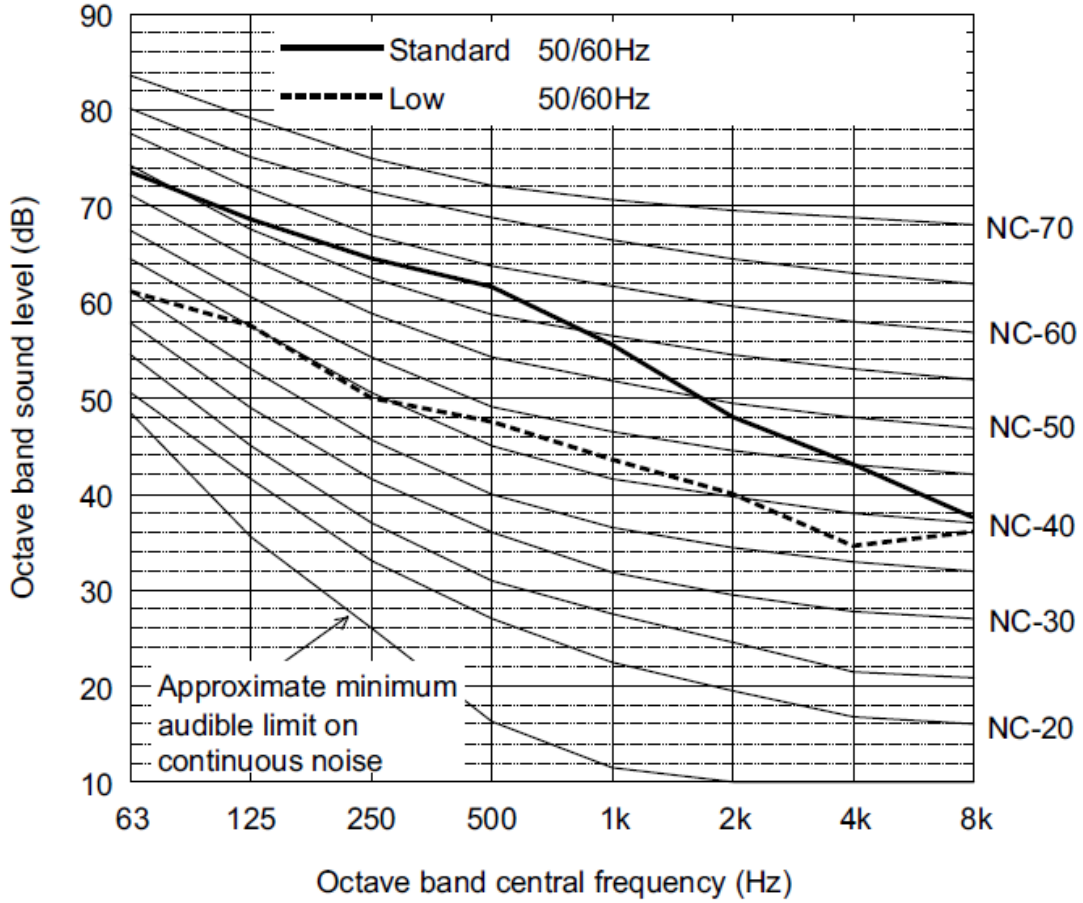
Sound level of PURY-EP250YLM-A1(-BS)



		63	125	250	500	1k	2k	4k	8k	dB(A)
Standard	50/60Hz	76.0	66.0	62.5	58.5	52.0	46.0	41.5	34.0	60.0
Low noise mode	50/60Hz	56.0	52.5	48.5	43.0	33.5	32.0	33.0	28.0	45.0

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

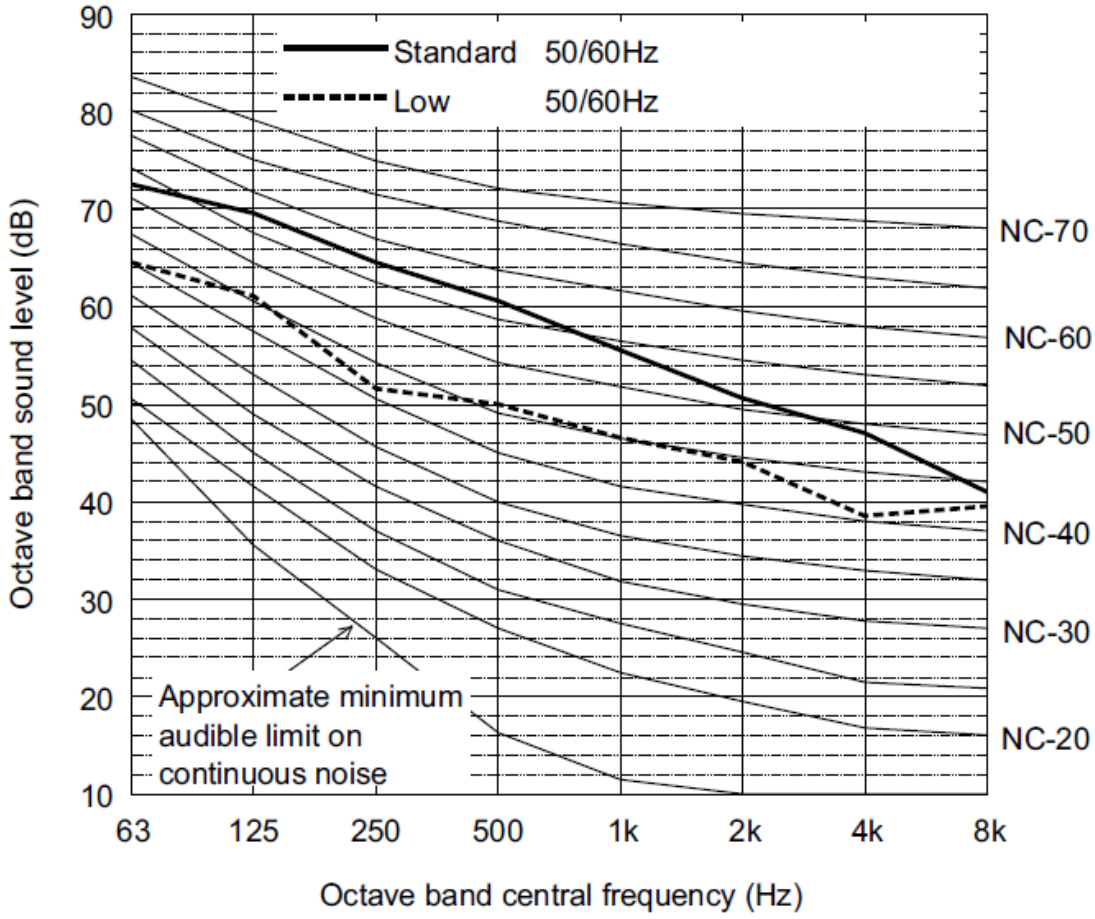
Sound level of PURY-EP350YLM-A1(-BS)



		63	125	250	500	1k	2k	4k	8k	dB(A)
Standard	50/60Hz	73.5	68.5	64.5	61.5	55.5	48.0	43.0	37.5	62.5
Low noise mode	50/60Hz	61.0	57.5	50.0	47.5	43.5	40.0	34.5	36.0	50.0

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

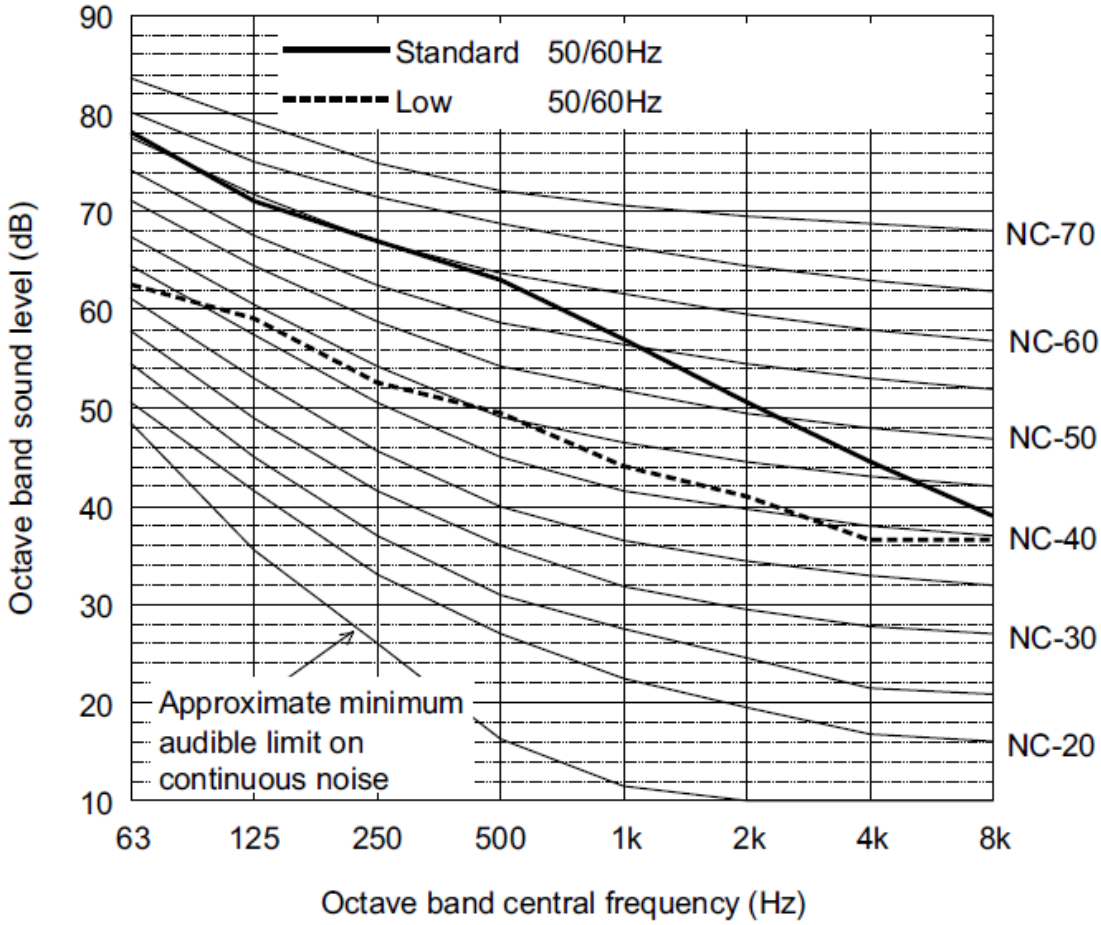
Sound level of PURY-EP450YLM-A1(-BS)



		63	125	250	500	1k	2k	4k	8k	dB(A)
Standard	50/60Hz	72.5	69.5	64.5	60.5	55.5	50.5	47.0	41.0	62.5
Low noise mode	50/60Hz	64.5	61.0	51.5	50.0	46.5	44.0	38.5	39.5	53.0

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

Sound level of PURY-EP550YSLM-A1(-BS)



		63	125	250	500	1k	2k	4k	8k	dB(A)
Standard	50/60Hz	78.0	71.0	67.0	63.0	57.0	50.5	44.5	39.0	64.5
Low noise mode	50/60Hz	62.5	59.0	52.5	49.5	44.0	41.0	36.5	36.5	51.5

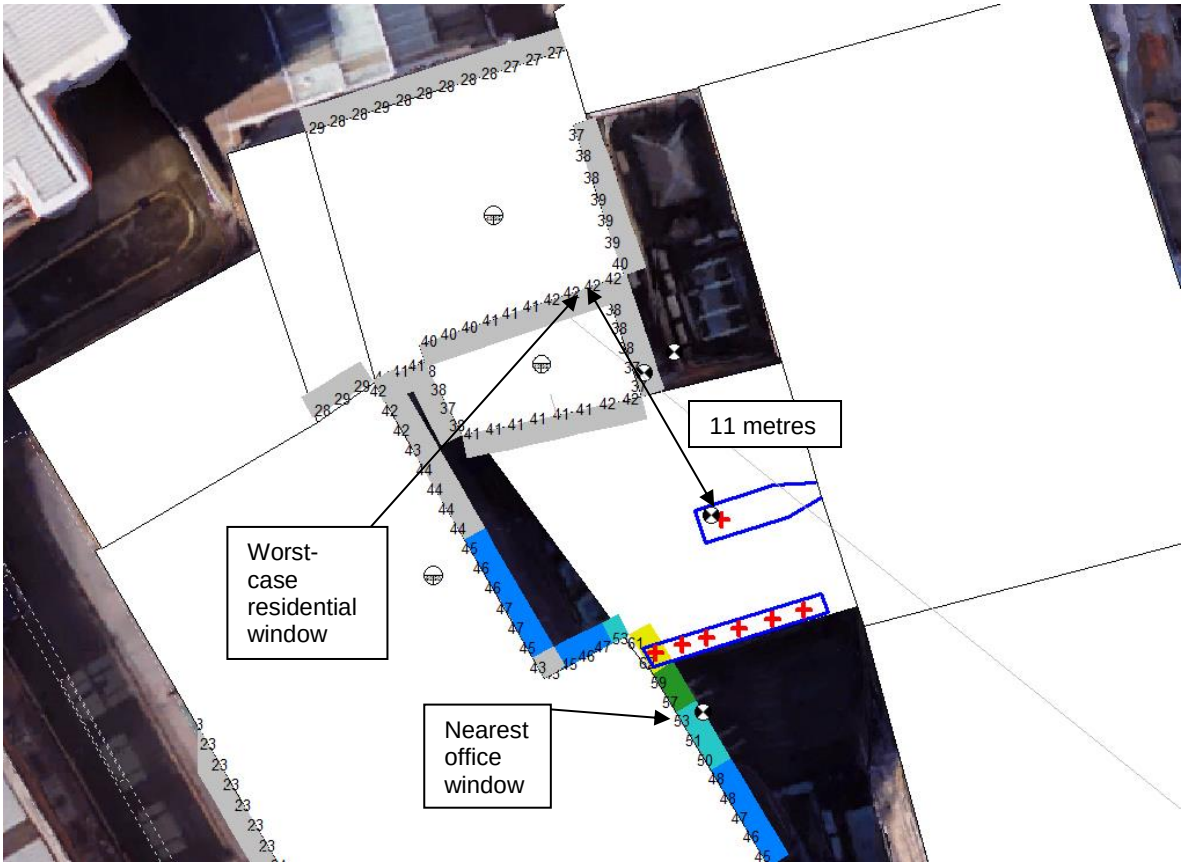
When Low noise mode is set,the A/C system's capacity is limited. The system could return to normal operation from Low noise mode automatically in the case that the operation condition is severe.

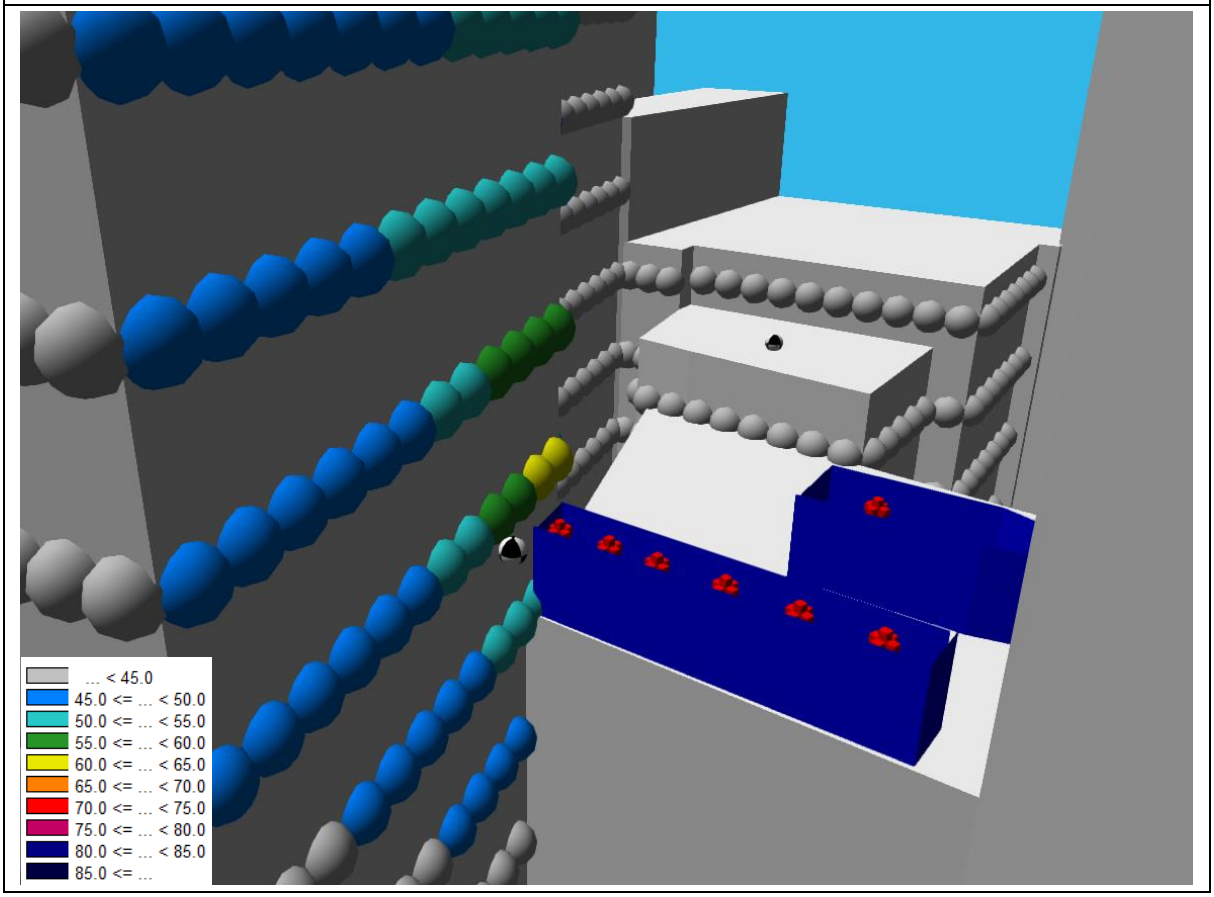
Appendix 4 Modelling Results

Modelling Software:	CADNA/A Version 2018
Modelled Scenarios:	Day and night-time average background noise levels across the site
Data inputs:	• Noise survey results • Topographical data for the site • Plant data • Development layout
Calculation Algorithms Used:	• Calculation of Road Traffic Noise 1988 – Department of Transport • ISO 9613-1:1993 Acoustics-Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere • ISO 9613-2:1996 Acoustics-Attenuation of sound during propagation outdoors – Part 2: General method of calculation

Modelling Printout (Appendix 4, Figure 1):

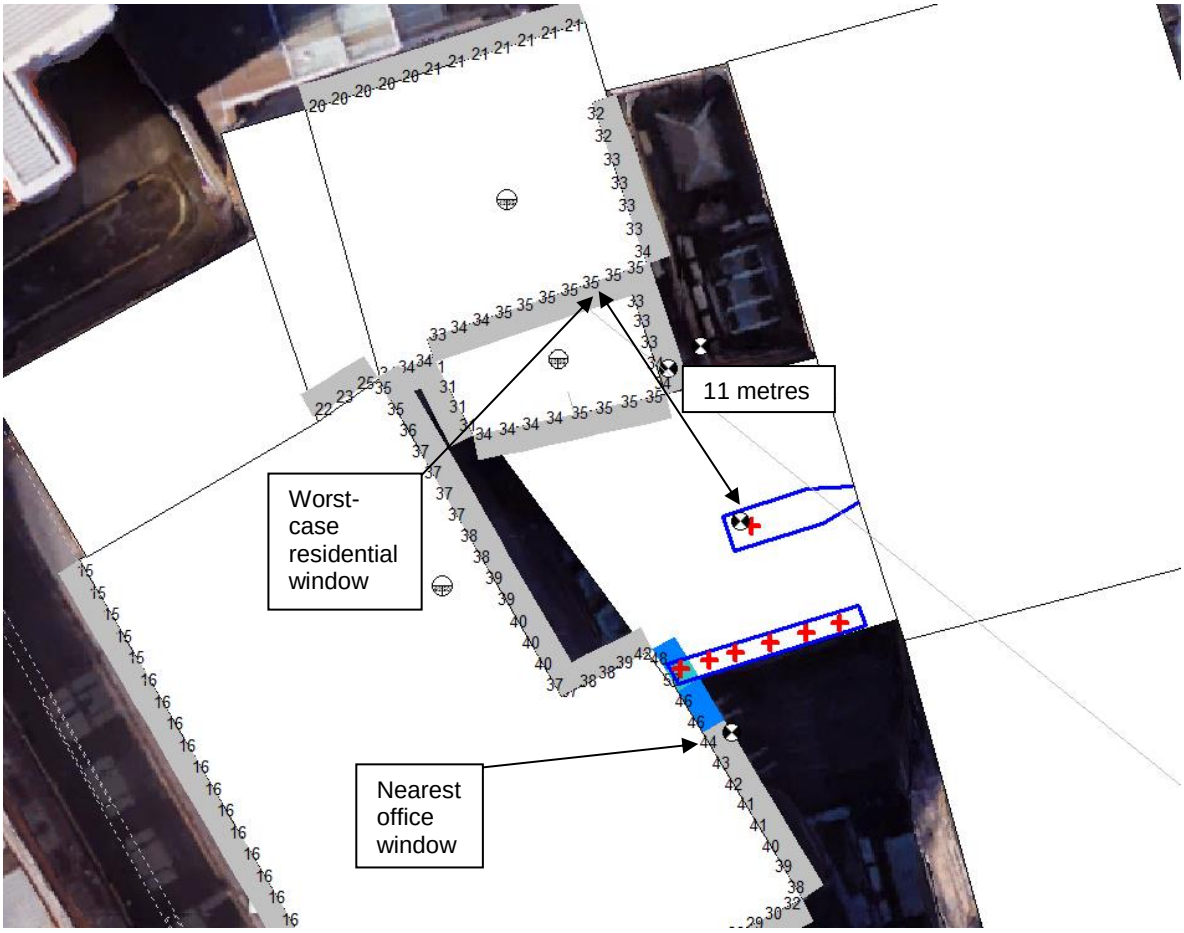
Scenario	Daytime plant noise levels (LAeq,Tr)

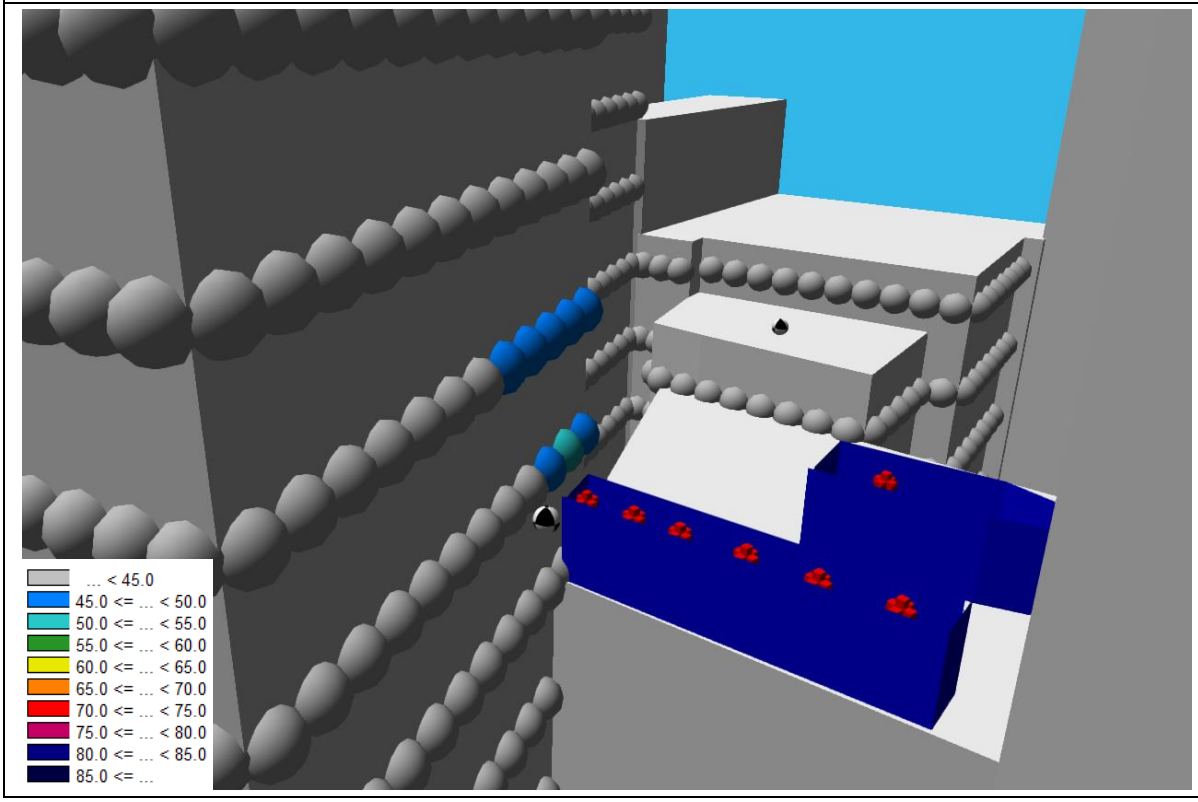




Modelling Printout (Appendix 4, Figure 2):

Scenario	Night-time plant noise levels (LAeq,Tr)





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