



Unit 3, Neath Town Centre Retail Development
Fairfield Way, Neath, SA11 3ES

Noise Impact Assessment

1st August 2025
First Issue



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Revision History

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Executive Summary and Conclusions

This document, a Noise Impact Assessment (NIA) has been written to assess the risk of adverse impact from noise 'pollution' generated by plant to be installed as part of the development of Unit 3, Neath Town Centre Retail Development, Fairfield Way, Neath, SA11 3ES, which is for the *"change of use of ground floor unit from class A1 (shop) to class D2 (leisure) to provide a children's indoor role-play and activity centre, including provision of a new mezzanine floor, installation of themed play zones and ancillary café."*

The assessment has been made based on the manufacturer's noise data for the proposed plant (which includes 3 no. external condensers on the rooftop, a kitchen extraction fan, and a VAM unit with supply and extract ducts), using 3D noise mapping software to predict the plant noise emissions outside of neighbouring residential windows. This has then been assessed against background noise levels determined in accordance with BS 4142:2014+A1:2019, with context provided by further assessment against BS 8232:2014 and WHO noise guidelines.

PJA believes that the Local Planning Authority will require the noise emissions to be at most, equal to the representative background sound level when assessed in accordance with BS 4142:2014+A1:2019. The required noise limits are provided in **Table 5.1 (Section 5.1)**, based on monitoring conducted over several days at the site as part of the baseline noise survey (**Section 4.0**).

In this case, PJA has predicted a worst-case rating level of 28 dB (with all plant operating simultaneously at maximum capacity), which is 15 dB below the minimum background sound level of 43 dB during the proposed operational hours (07:00 – 23:00).

Therefore, the noise impact should be acceptably low, providing that the plant specification/design described in **Section 5.2** remains as stated, and the requirements of condition 5 under the planning approval will be met and thus the condition should be discharged.

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1.0 Introduction

This document, a Noise Impact Assessment (NIA) has been written to assess the risk of adverse impact from noise 'pollution' generated by plant to be installed as part of the development of Unit 3, Neath Town Centre Retail Development, Fairfield Way, Neath, SA11 3ES, which is for the *"change of use of ground floor unit from class A1 (shop) to class D2 (leisure) to provide a childrens indoor role-play and activity centre, including provision of a new mezzanine floor, installation of themed play zones and ancillary café."*

This document has been written to assess the risk of adverse impact from noise 'pollution' generated by the proposed plant on neighbouring residential properties once it is fully operational, which includes 3 no. external condenser units, a kitchen extract fan, and a VAM unit with supply and extract ducts.

The objective is to ensure that the risk of noise impact will be controlled sufficiently. This is based upon ensuring that the noise emissions from the plant will not cause internal ambient noise levels inside nearby residential properties to exceed typical levels which are deemed to be acceptable for good living and sleeping conditions and that external noise levels in gardens won't affect the recreational use of these areas.

Therefore, the purpose of this report is to demonstrate whether the plant is able to achieve sufficiently low noise emissions that avoid an adverse impact, and if not, to provide recommendations on how to do so.

Whilst every attempt has been made to ensure that this report communicates effectively to a reader who might not have much knowledge of acoustics, some parts are necessarily technical. A glossary of acoustic terminology and concepts is provided in **Appendix A**.

The assessment has been undertaken in reference to:

- Condition 5 of the planning approval;
- BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound';
- BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'; and
- the WHO Environmental Noise Guidelines for the European Region.

2.0 Site and Development Description

The property in question is Unit 3 of the Neath Town Centre Retail Development, Fairfield Way, Neath, SA11 3ES – located as shown in **Figure 2.1**, which includes retail and leisure units. It is surrounded by a variety of town centre uses.

The proposals have approval under planning reference P2025/0074 with Neath Port Talbot Council for the *change of use of ground floor unit from class A1 (shop) to class D2 (leisure) to provide a children's indoor role-play and activity centre, including provision of a new mezzanine floor, installation of themed play zones and ancillary café.*"

A location plan indicating Unit 3 is provided in **Figure 2.2**. **Figure 2.3** provides the proposed floor plans. The proposed roof plan and rear elevation, indicating the plant locations are shown in **Figures 2.4** and **2.5**.

In terms of plant, the proposals include:

- 3 no. *Daikin* AZAS100MV1 / AZAS100MY1 external condenser units installed on the roof of the building;
- 1 no. kitchen extract termination on the rear elevation, ducting to an internally located *Vent Axia* SDX200HC fan;
- 1 no. supply and 1 no. extract air termination located on the rear elevation, both ducted to an internally located *Daikin* VAM1500J VAM unit.

In terms of noise-sensitive receptors, there appear to be potential residential properties in several directions. Whilst not immediately clear, it appears that the closest may be along Water Street to the south-west, with standalone residential buildings and properties behind with commercial ground floor use and (assumed as a worst-case) residential upper floor use. It is assumed as a worst case (unless obviously clear otherwise) that buildings have residential use on the upper floors. There are also arrays of terraced dwellings to the north-east.

Condition 7 of the planning decision notice states that any external heating and ventilation plant shall not be operated outside of the hours of 07:00 to 19:00. However, this appears to contradict the permitted customer opening hours of 07:00 to 23:00 for the premises itself. In practice, it is reasonable to assume that the plant will need to operate in line with the full trading hours in order to maintain adequate ventilation, temperature control, and air quality for both staff and customers. Therefore, this assessment has assumed that any external plant will operate between 07:00 and 23:00, consistent with the permitted use of the premises.

Figure 2.1 – Aerial view of the site and surrounding area

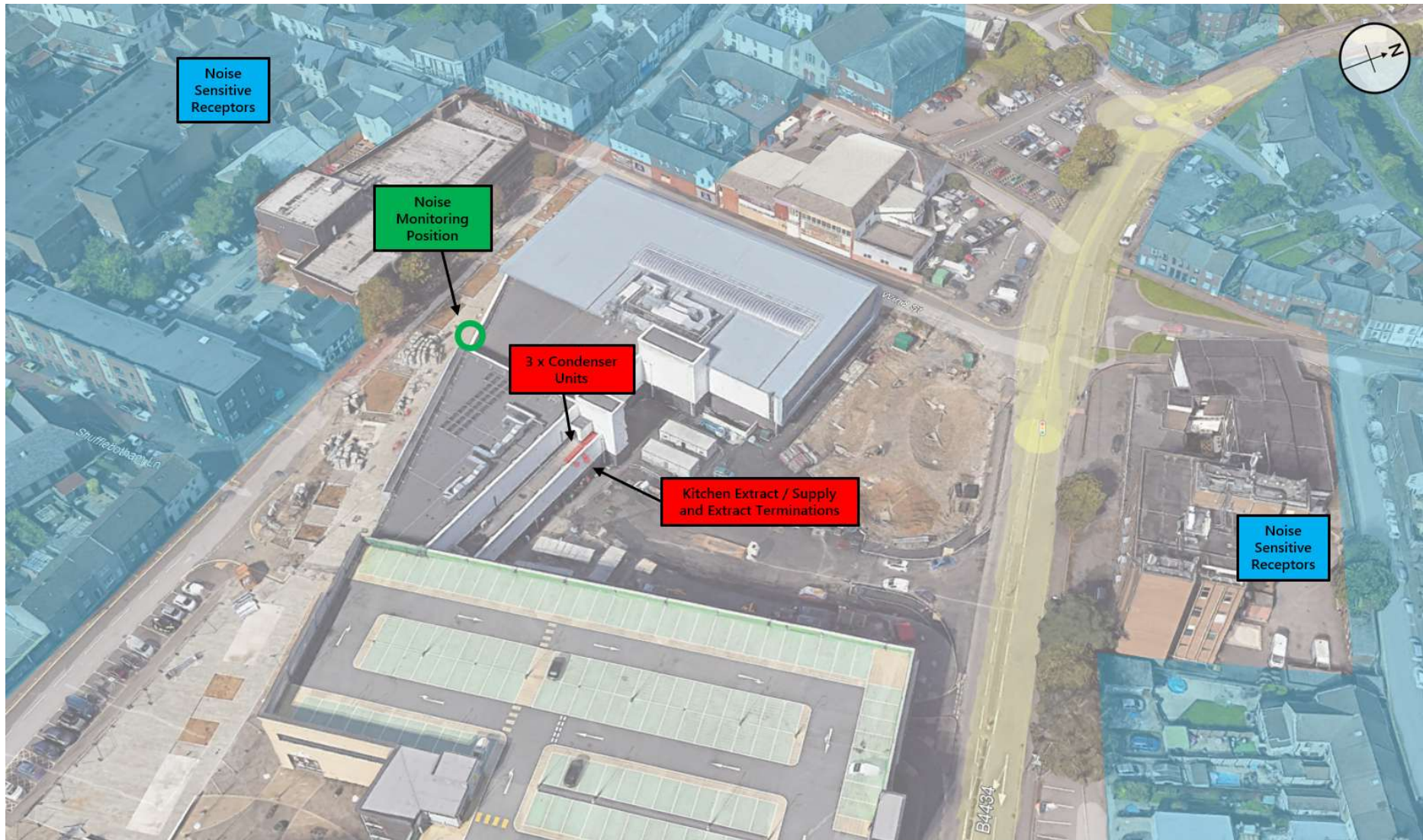


Figure 2.2 – Unit 3, Location plan

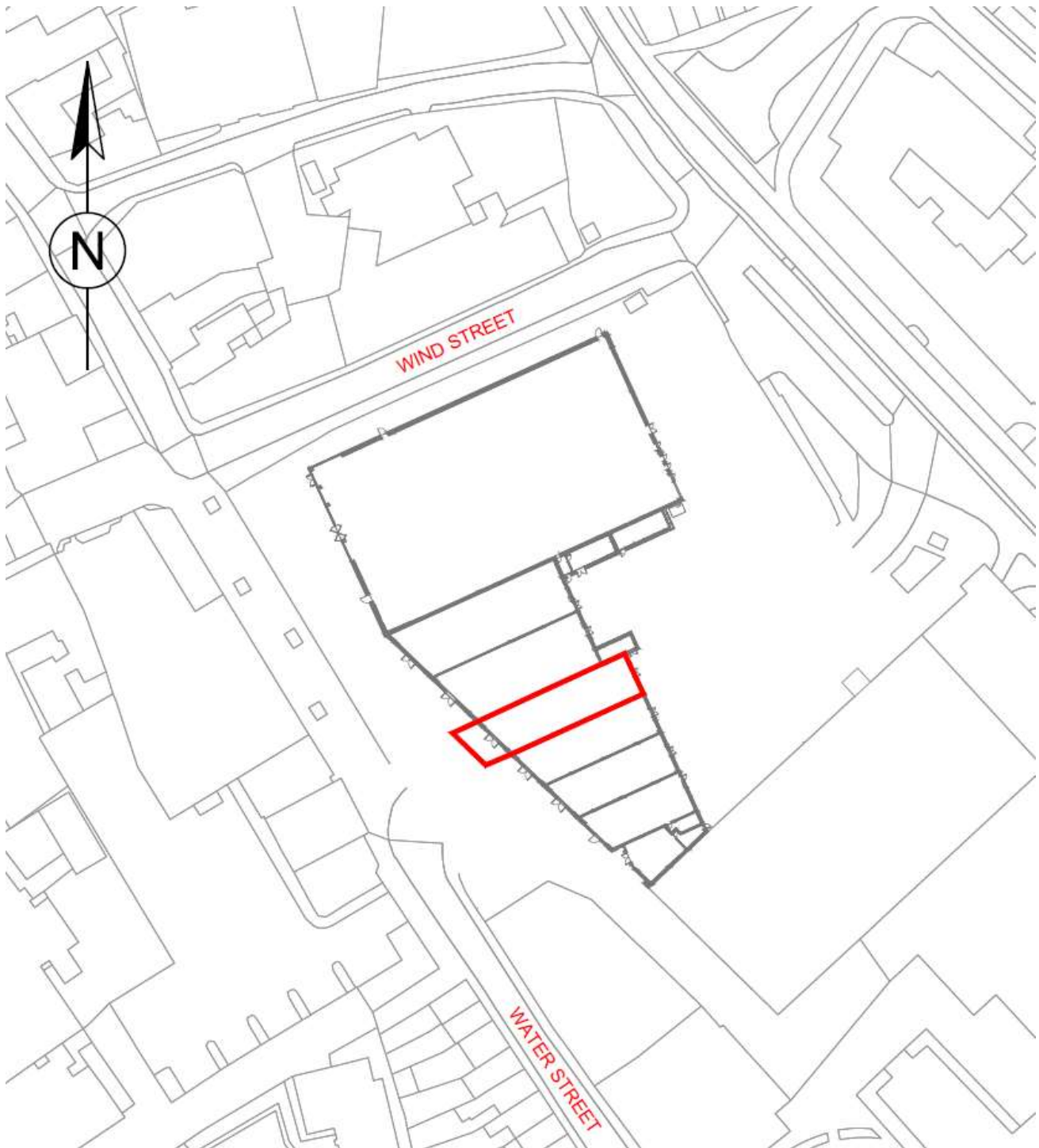


Figure 2.3 – Proposed floor plans

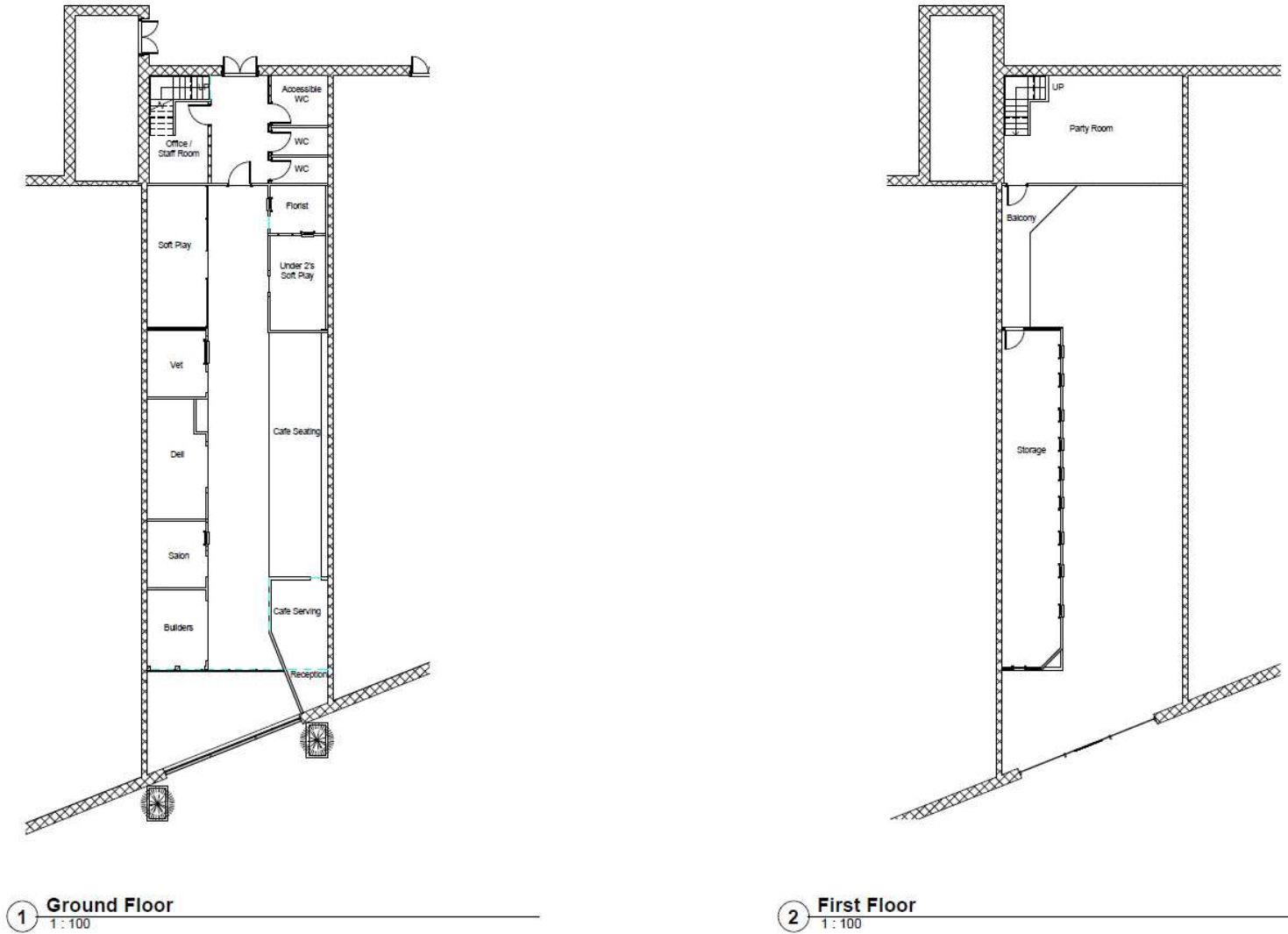


Figure 2.4 – Proposed roof plan, External condenser locations

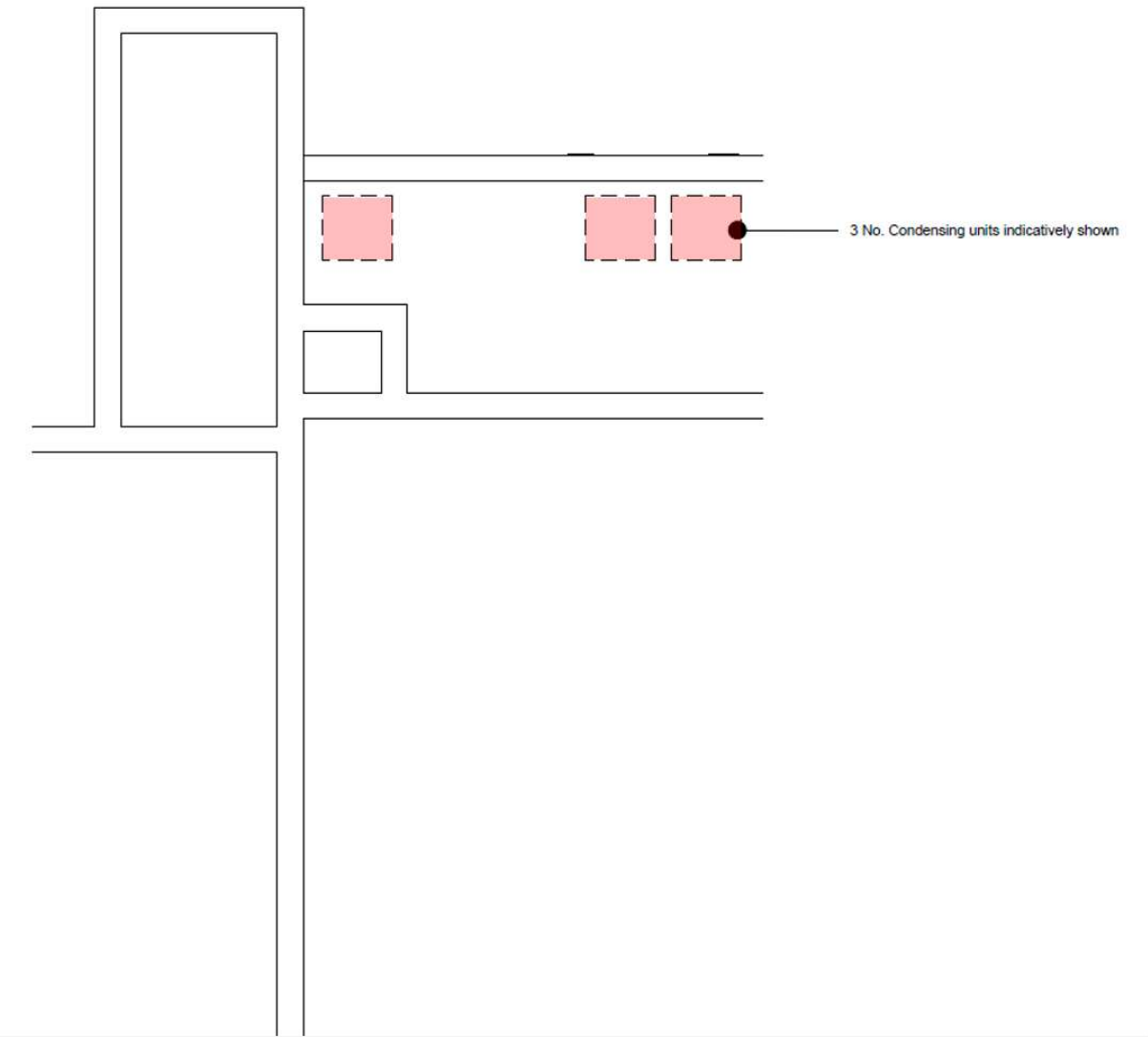
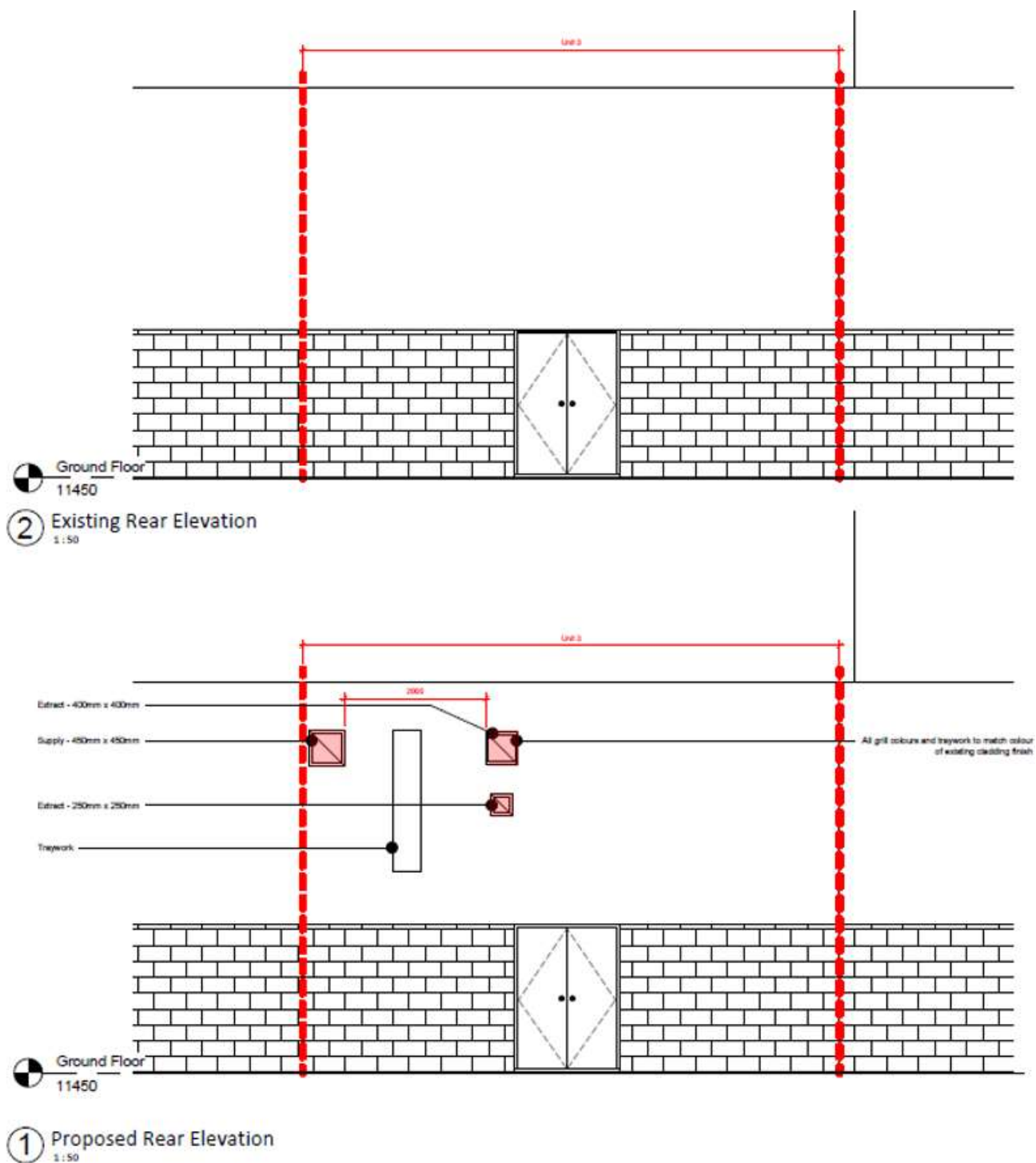


Figure 2.5 – Existing and proposed rear elevations, Kitchen extract / supply and extract duct termination locations



3.0 Relevant Guidelines

3.1 Local Authority Criteria

Based on a review of the decision notice (P2025/0074) associated with this development, the following planning condition (no. 5) is applicable to the mechanical plant noise assessment;

"Prior to the first installation of any external heating and ventilation plant, a Noise Impact Assessment shall be submitted to, and approved in writing by, the Local Planning Authority. The noise levels shall be determined at 1m outside of neighbouring residential windows at the nearest noise-sensitive premises or at another location that is deemed suitable by the Local Planning Authority. Measurements and assessments shall be made in accordance with 'BS 4142:2014 Method for rating and assessing industrial and commercial sound'.

The approved Noise Impact Assessment shall be fully implemented for the duration of the use of the premises, unless a variation to it (e.g. in the event of a change in occupier/business practice) has been first submitted to and approved in writing by the Local Planning Authority on application."

3.2 BS 4142:2014

BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' is intended to be used to assess the potential adverse impact of sound of an industrial and/or commercial nature, at nearby noise-sensitive receptor (NSR) locations (i.e., residential windows) within the context of the existing sound environment.

The method is based upon assessing the predicted noise emissions from plant/equipment against the existing background sound levels at NSRs, the latter of which is determined by a noise survey conducted at the site.

The predicted noise emissions are termed as a 'rating level', which is the 'specific sound level' from plant (the actual measurable noise level), plus 'penalties' which account for whether the noise has distinguishing characteristics such as tonality, intermittency, impulsivity, or is generally distinguishable from the ambient noise environment. Such features may attract attention and be considered annoying, hence sounds with these qualities should be penalised over sounds at the same specific noise level which is less intrusive.

The general aim is for the 'rating level' (plant noise emissions) to not exceed the existing background sound levels outside of residential windows. BS 4142:2014 states that *"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."*

3.3 BS 8233:2014

BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' suggests appropriate criteria and limits for different situations. This includes internal noise criteria for residential developments. The limits with BS 8233:2014 are similar to those in the WHO's 'Guidelines for Community Noise and Night Noise Guidelines for Europe' document.

Table 4 of BS 8233:2014 provides internal ambient noise level (IANL) limits for dwellings from "steady external noise sources". These are summarised in **Table 3.1** below.

Table 3.1 – BS 8233:2014 internal ambient noise level (IANL) upper limits

Activity	Location	Daytime (07:00 – 23:00)	Nighttime (23:00 – 07:00)
Resting	Living Room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

Annex G.1 of BS 8233:2014 suggests that "if partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB". Therefore, a noise limit directly outside of the nearest residential windows could be set based on the values above plus 15 dB. Therefore, to meet internal noise targets in nearby residential dwellings, noise from the proposed plant should not exceed 50 dB L_{Aeq} during the daytime and 45 dB L_{Aeq} during the nighttime when measured/calculated directly outside of a bedroom or living room window.

3.4 World Health Organisation (WHO) Environmental Noise Guidelines

The WHO document *Guidelines for Community Noise 1999* has recently been superseded by the *Environmental Noise Guidelines for the European Region*. However, the updated guidance states that 'all WHO guidelines for community noise (CNG) indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid'.

The document sets out guidance as to noise levels at which there will be an unacceptable impact on the local community. WHO guidelines state:

- To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB L_{Aeq} for a steady, continuous noise.
- To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB L_{Aeq} .

Therefore, noise from the proposed plant should not exceed 50 dB L_{Aeq} during the daytime when measured or calculated within a residential garden, patio, or balcony.

4.0 Baseline Noise Survey

4.1 Methodology

PJA has attended the site to conduct a baseline noise survey across several days between Friday the 27th and Monday the 30th of September 2024. The results have been used to determine a representative background sound level at a position representative of nearby residential receptors.

A fixed monitoring position was employed on the rooftop of the neighbouring site (Unit 2 ¹), on the southern side, facing towards the nearest dwellings. The microphone was angled downwards in front of the façade to remove any direct line of sight to neighbouring plant on the adjacent buildings. The location of the monitoring position is also shown in Figure 2.1 (Section 2.0).

The sound level meter was set to log noise levels over continuous 15-minute averaging periods with a 1-second time history rate. The monitoring equipment was left unattended for the majority of the survey with the exception of a short period around the installation and collection of the equipment.

The following noise indices were recorded (amongst others):

- $L_{Aeq,T}$: The A-weighted equivalent continuous noise level over the measurement period T. This parameter is typically considered as a good representation of the average ambient sound level;
- $L_{AFmax,T}$: The maximum A-weighted noise level during the measurement period T and the best representation of short high noise levels ‘events’ – i.e., emergency services sirens; and
- $L_{A90,T}$: The A-weighted noise level that is exceeded for 90% of the measurement period T. This parameter is often considered as the ‘average minimum level’ and is therefore used in determining the representative background noise level – or noise levels from continuous noise sources such as plant.

Appendix B contains further information on the methodology of the survey, including photographs taken from the site and the equipment used.

1 - The microphone was installed on the neighbouring building as part of a previous assessment for Unit 2 — the adjacent retail unit — for which ParkerJones Acoustics also undertook the noise impact assessment. The location remains representative of background conditions at Unit 3, given the shared site context and similar proximity to noise-sensitive receptors.

4.2 Results

A graph of the measured noise levels across the monitoring period is given in **Figure 4.1**.

Table 4.1 summarises the results across the assumed plant operating hours of 07:00 – 23:00, aligned with the permitted trading hours. While Condition 7 refers to a 19:00 limit for external plant, this appears inconsistent with the opening times and is unlikely to be enforceable in practice. Results for the closed period (23:00 – 07:00) are also shown, assuming some equipment (e.g. refrigeration condensers) may continue to run.

The most relevant parameter in terms of the ‘representative background sound level’ is the $L_{A90,15min}$. **Figure 4.2** presents histograms of the $L_{A90,15min}$ values.

Table 4.1 – Summary of measured noise levels

Period	Parameter	Maximum	Minimum	Mean Average	Modal Average	Median Average
Proposed opening hours (07:00 - 23:00)	$L_{Aeq,15min}$ (dB)	67	49	56	53	55
	$L_{AFMax,15min}$ (dB)	93	59	74	72	74
	$L_{A90,15min}$ (dB)	59	43	50	49	50
Closed hours (23:00 – 07:00)	$L_{Aeq,15min}$ (dB)	67	40	47	43	45
	$L_{AFMax,15min}$ (dB)	85	55	64	60	62
	$L_{A90,15min}$ (dB)	56	37	42	39	40

Figure 4.1 – Graph of measured noise levels

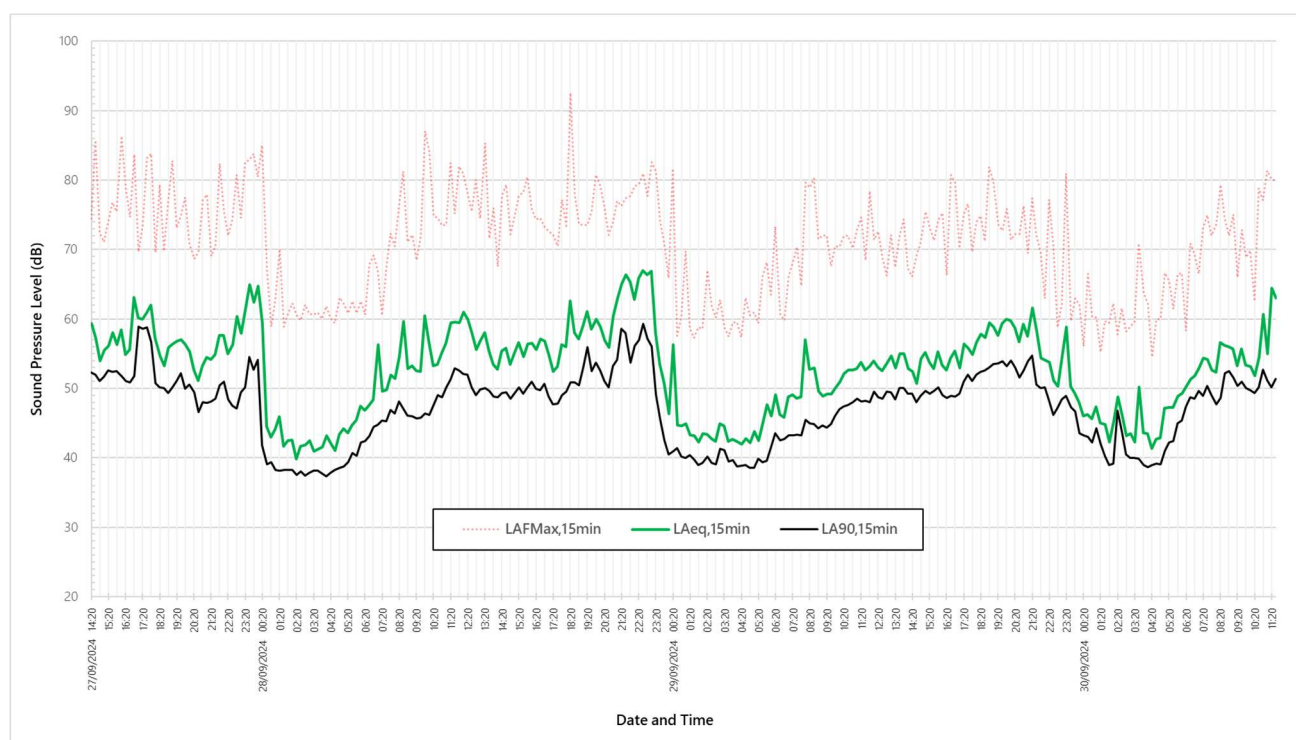
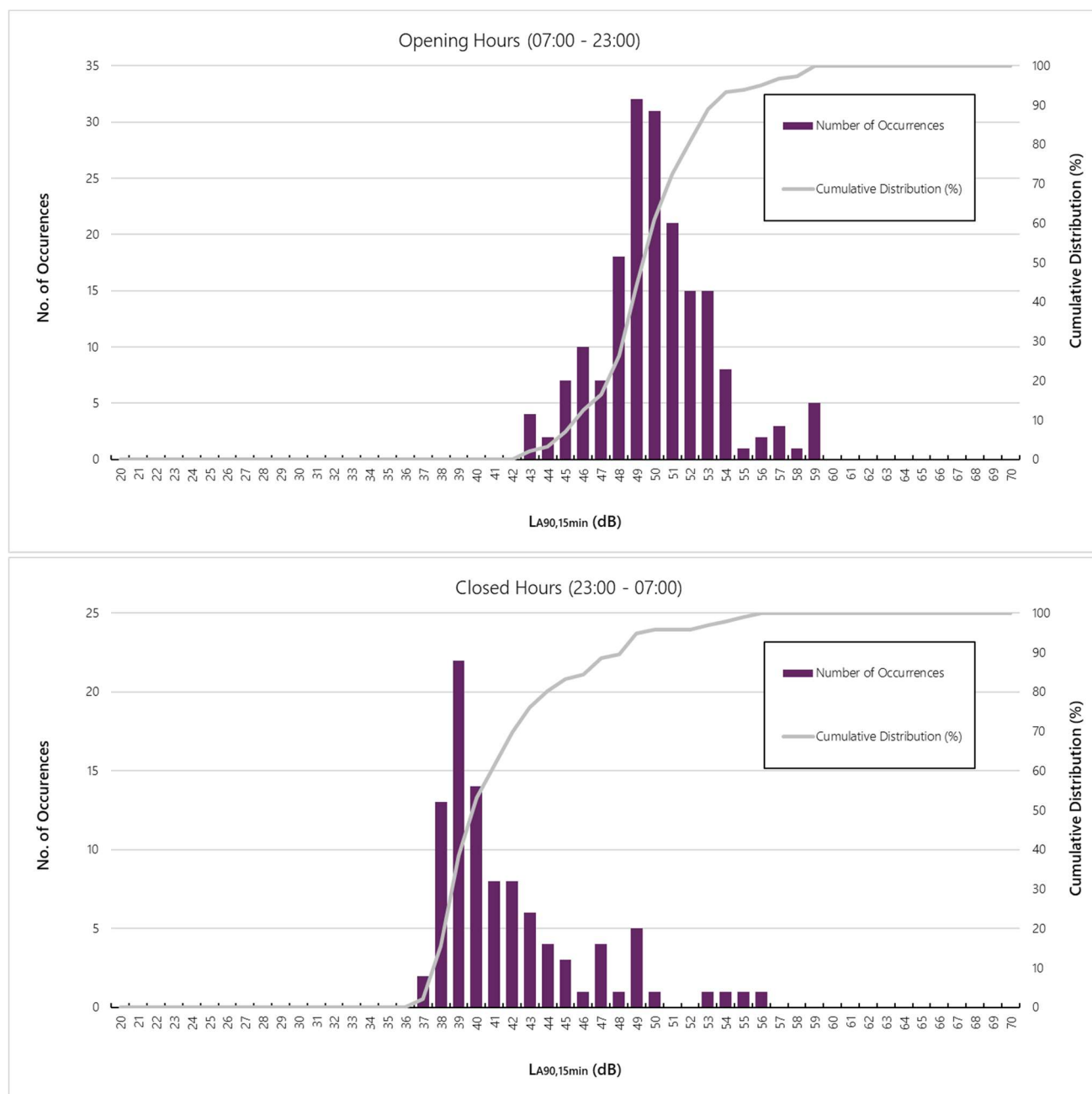


Figure 4.2 – Histogram of measured $LA_{90,15min}$ values



5.0 Assessment

The assessment has been undertaken in accordance with BS 4142:2014+A1:2019. The following summarises the main steps of action in the assessment method:

- a representative background sound level $L_{A90,15min}$ is determined based upon the results of the environmental noise survey;
- the specific sound level L_s generated by the proposed plant is predicted outside of the windows of neighbouring noise-sensitive windows in the area;
- the rating level $L_{Ar,15min}$ is determined by the application of any 'penalties' which adjust for characteristic features of the sound which may be perceptible and potentially cause annoyance at each NSR;
- the predicted rating level $L_{Ar,15min}$ is compared to the $L_{A90,15min}$ and assessed following the guidance of BS 4142:2014+A1:2019; and
- if necessary, further mitigation measures are recommended to reduce the predicted noise emissions.

5.1 Background Sound Levels

In accordance with BS 4142:2014, the predicted rating level should be assessed against a 'representative' background sound level. This is commonly determined through the results of a baseline sound survey, as has been done in this case.

BS 4142:2014 states that *"in using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods."* BS 4142:2014 further states that *"a representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either minimum or modal value"*.

In this case, PJA has used the minimum values $L_{A90,15min}$ as the representative background sound level to represent a worst-case.

These levels appear consistent or lower than minimum background sound levels determined during a noise survey conducted over several days at street level monitoring positions in early 2020, submitted with planning application P2020/0486 as part of the Neath Town Centre Leisure and Retail Development (and thus before the application site and adjacent buildings were erected). Thus this would appear to be an appropriate worst-case representative level.

Table 5.1 – Derived representative background sound level $L_{A90,T}$ at nearby residential NSRs

Noise-Sensitive Receptor (NSR)	Period	Representative Background Sound Level $L_{A90,T}$ (dB)
1m outside of neighbouring residential windows	Proposed opening hours (07:00 – 23:00)	43
	Closed hours (23:00 – 07:00)	37

5.2 Proposed Plant

5.2.1 Kitchen Extract Fan

The proposals include 1 no. kitchen extract fan (a *Vent Axia* SDX200HC model), ducting to a termination on the rear elevation.

The applicant has supplied PJA with information regarding the equipment which will be installed. The relevant data for in-duct sound power levels on the atmospheric side of the fan is provided in **Table 5.2** below. Extracts from the manufacturers' technical data documents are given in **Appendix C**.

Table 5.2 – In-duct sound power levels of the kitchen extract fan

Fan	Model	Source Type	Sound Power Levels (SWL)							
			dB at Octave Band Centre Frequencies, Hz							dB(A)
			63	125	250	500	1 k	2 k	4 k	
Kitchen Extract Fan	Vent Axia SDX200HC ²	In-duct outlet	80	78	74	73	67	66	62	74

Notes:

- The octave band sound power levels are presented here as Z-weighted levels, rather than the A-weighted levels provided by the manufacturer.

- The in-duct levels represent those that are relevant to the atmospheric side of the fans.

- References are made at the bottom of the page to the source of the sound power level information.

Calculations indicate that the required noise emission limits can be met at the affected residential receptors without the provision of an in-duct attenuator to the fan exhaust.

² - https://asset.eezybridge.com/nc/ba7b9546-29dd-40c4-87a7-885627281b87/VA_SDV_Inline_Catalogue.pdf

5.2.2 Condenser Units

The proposals include 3 no. *Daikin* AZAS100MV1 / AZAS100MY1 external condenser units installed on the roof of the building.

The manufacturer stated noise data is provided in **Table 5.3** below. Extracts from the manufacturers' technical data documents (from which this data is taken from ³) are given in **Appendix C**.

Within the calculations, the units are modelled as point sources at a height matching the top of the unit (which are 0.99m high), with the sound power level of the source based on those in the table below.

Table 5.3 – Source noise emission data for the proposed condensers

Make/Model	No. Units	Sound Power Levels							
		dB at Octave Band Centre Frequencies, Hz							dB(A)
		63	125	250	500	1 k	2 k	4 k	
Daikin AZAS100MV1 / AZAS100MY1	3	76	73	73	69	61	56	54	70

5.2.3 VAM Unit

The proposals include a *Daikin* VAM1500J VAM unit, ducted to supply (450mm x 450mm) and extract (400mm x 400mm) grilles on the rear facade.

The manufacturer stated noise data is provided in **Table 5.4** below. Extracts from the manufacturers' technical data documents (from which this data is taken from) are given in **Appendix C**. There are assumed to be in-duct sound power levels.

Table 5.4 – Source noise emission data for the proposed VAM unit

Make/Model	Source Type	Sound Power Levels							
		dB at Octave Band Centre Frequencies, Hz							dB(A)
		63	125	250	500	1 k	2 k	4 k	
Daikin VAM1500J	"Ultra-high"	78	69	61	60	55	53	47	62

Again, calculations have indicated that in-duct attenuators are not required to meet with the local authority noise emission limits..

³ http://www.daikintech.co.uk/Data/Split-Sky-Air-Outdoor/AZAS/2017/AZAS-M7Y1B/AZAS-M7Y1B_Databook_EEDEN17.pdf

5.3 Predicted Noise Emissions

The noise predictions within this report have been undertaken using the proprietary software CadnaA® by DataKustik, a 3-D noise mapping package that implements a wide range of national and international standards, guidelines, and calculation algorithms, including those set out in ISO 9613-2:1996. A full explanation of the noise modelling is provided in **Appendix D** along with images and noise maps/results from the model.

Figure D.2 in **Appendix D** shows the predicted specific noise levels ($L_{Aeq,15min}$) with all plant operating simultaneously at 100% capacity, at 1m outside of facades containing residential windows. The predicted specific noise level outside of the worst affected residential window is **25 dB L_{Aeq}** in this worst-case scenario.

As per **Section 3.2**, a rating level penalty could be applied when assessing in accordance with BS 4142:2014+A1:2019:

- **Tonality** – the silencers are expected to muffle any notable tonal qualities with the fans, and condensers do not usually carry a notable tonal quality (at least to the extent that would incur a rating level penalty when assessed using the Joint Nordic method described in BS 4142);
- **Impulsivity** – no penalty as fans do not generally generate impulsive noises.
- **Intermittency** – whilst the noise sources are not operating continuously for 24 hours a day, it is not 'on' and 'off' in nature every few minutes, it would remain on for 100% of the reference assessment period and, therefore, no tonality penalty is applied.
- **Other sound characteristics** – as a worst-case, it is assumed that despite the presence of large arrays of other plant on the neighbouring roofs of the retail and leisure development, that the noise could be distinguishable and thus a 3 dB penalty is applied.

Therefore, a 3 dB rating level penalty has been applied as a worst case. **Table 5.5** summarises the BS 4142 assessment result.

Table 5.5 – Predicted rating noise levels – worst-case with all plant operating simultaneously

Location	Period	Specific Noise Level $L_{Aeq,15min}$ (dB)	Rating Level Penalties (dB)	Predicted Rating Level $L_{Ar,15min}$ (dB)	Representative Background Sound Level $L_{A90,15min}$ (dB)	Difference
1m outside of the worst-affected residential window	Proposed opening hours (07:00 - 23:00)	25	+3	28	43	-15
	Closed hours (23:00 – 07:00)				37	-9

5.4 Analysis and Conclusions

BS 4142:2014+A1:2019 advises that where the rating level does not exceed the background sound level, this indicates a low impact, subject to context. As noted in **Section 3.1**, it is also understood that the Local Planning Authority typically applies a criterion requiring the rating level to not exceed the representative background level.

In this case, the worst-case rating level of 28 dB is 15 dB below the background level during the proposed opening hours (07:00 – 23:00), and 9 dB below during the closed period (23:00 – 07:00). While the plant is not expected to operate overnight, this lower impact scenario has been included to account for the possibility of refrigeration plant running continuously.

In addition, the predicted external façade noise level of 25 dB is well below the WHO daytime guideline range of 50 – 55 dB, and would also remain comfortably beneath the BS 8233 internal bedroom target of 30 dB, assuming 15 dB of attenuation with open windows. On this basis, the noise impact is considered acceptably low, provided the plant specification described in **Section 5.2** remains unchanged.

Appendix A – Acoustic Terminology and Concepts

A.1 – Glossary

Table A.1 – Glossary of acoustic terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio of the root-mean-square pressure of the sound and a reference pressure (2×10^{-5} Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e., 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Frequency	Sound can occur over a range of frequencies extending from the very low, such as the rumble of thunder, up to the very high such as the crash of cymbals. Sound is generally described over the frequency range from 63Hz to 4000Hz (4kHz). This is roughly equal to the range of frequencies on a piano.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period. This parameter is typically considered as a good representation of the 'average' overall noise level. It is referred to technically as the A-weighted equivalent continuous sound level and is a dB(A) as defined above.
$L_{A90,T}$	The A-weighted noise level that is exceeded for 90% of the measurement period T. This parameter is often considered as the 'average minimum level'.
$L_{AFmax,T}$	The maximum A-weighted noise level during the measurement period T.

A.2 – Subjective Changes in Noise Level

Table A.2 – Subjective loudness from an increase or decrease in sound pressure level

Change in sound pressure level	Relative change in sound power energy (multiplier)		Change in apparent subjective loudness (for mid-frequency range)
	Decrease	Increase	
3 dB	1/2	2	'Just perceptible'
5 dB	1/3	3	'Clearly noticeable'
10 dB	1/10	10	'Half or twice as loud'
20 dB	1/100	100	'Much quieter, or louder'

Appendix B – Noise Survey Methodology

B.1 – Survey Equipment

The monitoring equipment used for the baseline noise survey is detailed in the table below. The sound level meter was calibrated before and after the survey, with no significant drifts of greater than 0.5 dB observed. The sound level meter had been calibrated to a traceable standard within the 24 months preceding the survey, and the calibrator had been calibrated to a traceable standard within the 12 months preceding the survey. The equipment complies with the standards of a BS EN 60942:2003 Class 1 device.

Table B.1 – Equipment used for the noise survey

Name	Serial Number	Last Calibrated	Calibration Due
SVAN 957 Class 1 Sound Level Meter	28043	Jan-24	Jan-26
Casella CEL 120-1 Class 1 Calibrator	2651640	Feb-24	Feb-25

B.2 - Photos

Table B.2 – Photographs of the noise monitoring position



Appendix C - Manufacturer Noise Data

Figure C.1 – Manufacturer stated sound power levels – Vent Axia SDX200HC

Sound Power Level Spectra dB (ref 10⁻¹² Watts)

Dia.	Motor Phase	Stock Ref	Spectrum	125	250	500	1k	2k	4k	8k	dB(A) @ 3m
100	1	SDX100C	Inlet	53	58	60	66	65	58	47	49
100	1	SDX100C	Outlet	54	60	61	67	66	58	48	50
100	1	SDX100C	Breakout	34	58	44	55	54	47	37	39
125	1	SDX125C	Inlet	50	54	63	65	64	56	47	48
125	1	SDX125C	Outlet	49	53	61	64	63	55	45	47
125	1	SDX125C	Breakout	28	29	45	53	52	44	35	36
150	1	SDX150C	Inlet	51	66	67	71	62	61	53	52
150	1	SDX150C	Outlet	52	67	68	72	64	63	50	54
150	1	SDX150C	Breakout	30	49	51	60	52	50	36	41
200	1	SDX200C	Inlet	46	53	62	66	63	64	54	50
200	1	SDX200C	Outlet	45	54	61	68	64	65	53	51
200	1	SDX200C	Breakout	22	24	41	49	53	43	40	35
200	1	SDX200HC	Inlet	53	60	66	69	66	65	63	53
200	1	SDX200HC	Outlet	54	62	65	70	67	67	63	54
200	1	SDX200HC	Breakout	25	35	46	53	55	47	45	38
250	1	SDX250C	Inlet	41	52	61	66	66	64	56	51
250	1	SDX250C	Outlet	43	53	60	68	67	65	57	52
250	1	SDX250C	Breakout	24	30	38	48	47	45	40	32
250	1	SDX250HC	Inlet	54	62	67	69	67	67	65	54
250	1	SDX250HC	Outlet	55	63	66	70	68	67	65	54
250	1	SDX250HC	Breakout	33	38	47	50	48	47	46	34
315	1	SDX315C	Inlet	50	59	67	68	66	65	64	52
315	1	SDX315C	Outlet	51	60	66	69	67	66	65	53
315	1	SDX315C	Breakout	33	38	45	48	47	45	43	32

Figure C.2 – Manufacturer general information – Daikin AZAS100MV1 / AZAS100MY1

2-4 Technical Specifications					AZAS100MY1B	AZAS125MY1B	AZAS140MY1B
Capacity control	Method				Inverter controlled		
Casing	Colour				Ivory white		
	Material				Painted galvanized steel plate		
Dimensions	Unit	Height	mm		990		
		Width	mm		940		
		Depth	mm		320		
	Packed unit	Height	mm		1,170		
		Width	mm		1,015		
		Depth	mm		422		
Weight	Unit		kg		70	77	
	Packed unit		kg		78	85	
Packing	Weight		kg		9		
Heat exchanger	Fin	Type			WF fin		
		Treatment			Anti-corrosion treatment (PE)		
Compressor	Quantity				1		
	Type				Hermetically sealed swing compressor		
	Starting method				Inverter driven		
Fan	Type				Propeller		
	Discharge direction				Horizontal		
	Quantity				1		
	Air flow rate	Cooling	Nom.	m³/min	69	71	76
		Heating	Nom.	m³/min	82		
Fan motor	Quantity				1		
	Model				Brushless DC motor		
	Output			W	200		
	Drive				Direct drive		
	Speed	Cooling	Super low	rpm	-		
		Heating	Super low	rpm	-		
Sound power level	Cooling			dBA	70	71	73
	Heating			dBA	-		
Sound pressure level	Night quiet mode	Level 2		dBA	44		
	Cooling	Nom.		dBA	53	54	
	Heating	Nom.		dBA	57		

Figure C.3 – Manufacturer stated sound power levels – *Daikin* AZAS100MV1 / AZAS100MY1

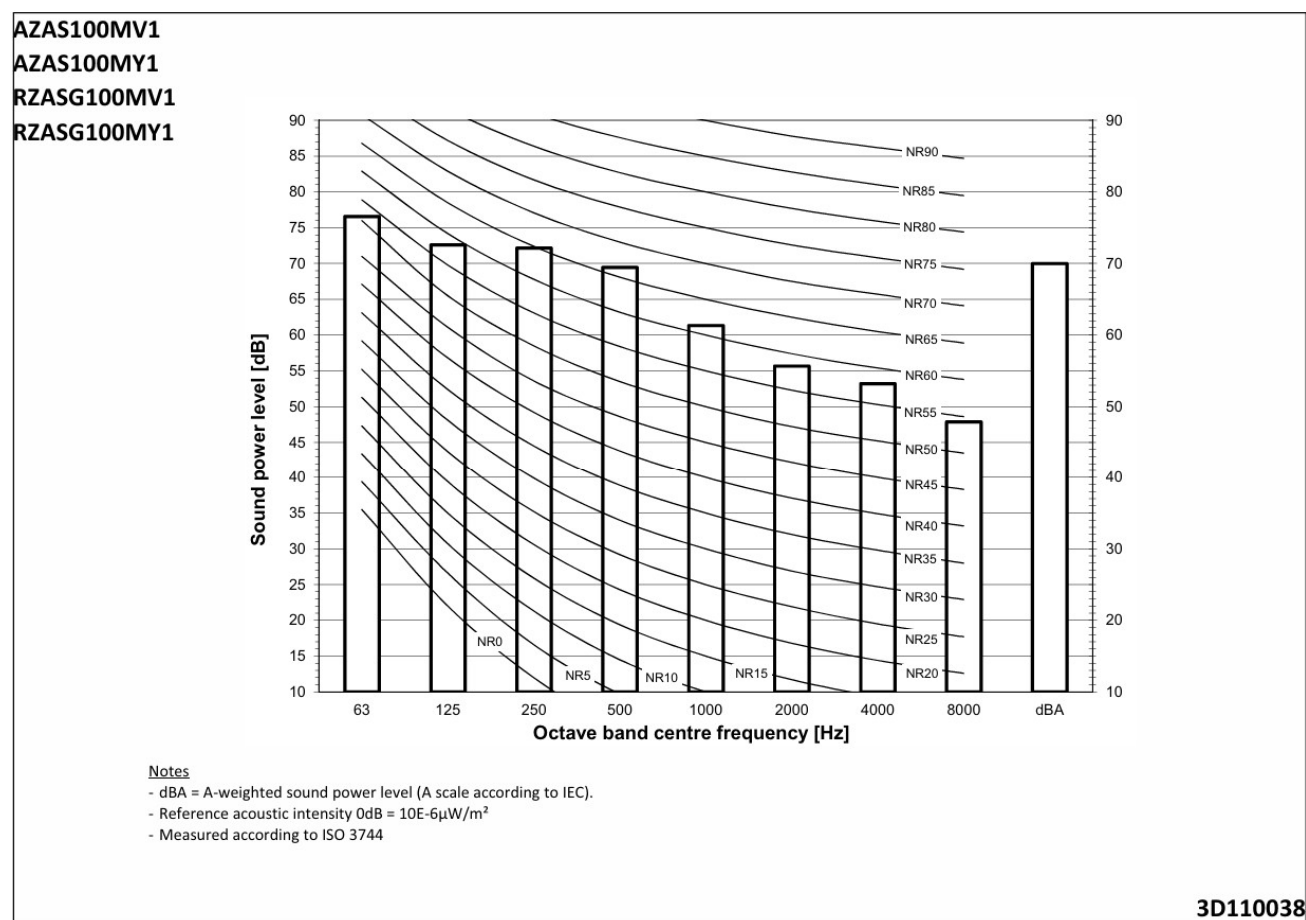
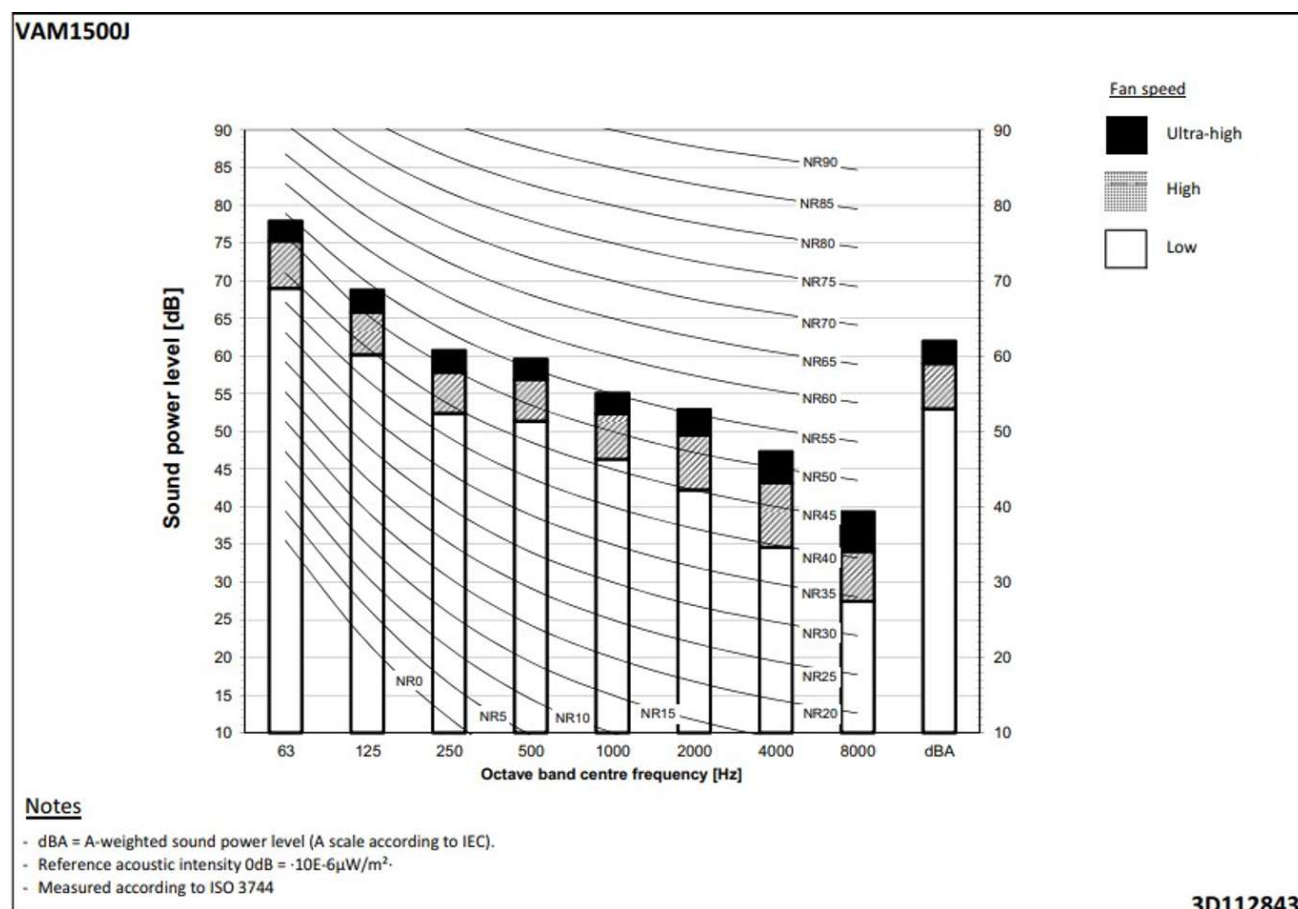


Figure C.4 – Manufacturer stated sound power levels – *Daikin VAM1500J*



Appendix D – Calculations

D.1 – In-Duct Noise

Table D.1 – Sound power leaving the kitchen extract termination

Kitchen Extract Fan				Octave Band Centre Frequencies, Hz							
Sound Power Levels at the Termination				63	125	250	500	1000	2000	4000	dB(A)
Fan In-duct Sound Power Level (SWL)	Vent Axia SDX200HC			80	78	74	73	67	66	62	74
Duct/Bend	Width	Length / Angle / Number of bends	Type								
Straight 1	200 mm	1.3 m	Radiused	-0.8	-0.8	-0.6	-0.4	-0.3	-0.3	-0.3	
Bend 1	200 mm	1		0.0	0.0	0.0	0.0	-1.0	-2.0	-3.0	
Straight 2	200 mm	26.0 m		-15.6	-15.6	-11.7	-7.8	-6.5	-6.5	-6.5	
Outlet End Reflection Loss	25 cm	25 cm		-13.0	-9.0	-5.0	-1.0	0.0	0.0	0.0	
Total in-duct Attenuation				-29.4	-25.4	-17.3	-9.2	-7.8	-8.8	-9.8	dB(A)
SWL at the Termination Point				51	53	57	64	59	57	52	65

Table D.2 – Sound power leaving the VAM unit extract termination

VAM Extract				Octave Band Centre Frequencies, Hz								
Sound Power Levels at the Termination												
Fan In-duct Sound Power Level (SWL)		VAM1500J ULTRA HIGH		63	125	250	500	1000	2000	4000	dB(A)	
Fan In-duct Sound Power Level (SWL)		VAM1500J ULTRA HIGH		78	69	61	60	55	53	47	62	
Duct/Bend	Width	Length / Angle / Number of bends	Type									
Straight 1	350 mm	0.5 m	Radiused	-0.3	-0.3	-0.2	-0.2	-0.1	-0.1	-0.1		
Bend 1	350 mm	1		0.0	0.0	0.0	-1.0	-2.0	-3.0	-3.0		
Straight 2	350 mm	2.6 m		-1.6	-1.6	-1.2	-0.8	-0.5	-0.5	-0.5		
Bend 2	350 mm	1	Radiused	0.0	0.0	0.0	-1.0	-2.0	-3.0	-3.0		
Straight 3	350 mm	6.0 m		-3.6	-3.6	-2.7	-1.8	-1.2	-1.2	-1.2		
Outlet End Reflection Loss	40 cm	40 cm		-11.0	-7.0	-3.0	-1.0	0.0	0.0	0.0		
Total in-duct Attenuation				-16.5	-12.5	-7.1	-5.7	-5.8	-7.8	-7.8	dB(A)	
SWL at the Termination Point				62	57	54	54	49	45	39	55	

Table D.3 – Sound power leaving the VAM unit supply termination

VAM Supply				Octave Band Centre Frequencies, Hz								
Sound Power Levels at the Termination												
				63	125	250	500	1000	2000	4000	dB(A)	
Fan In-duct Sound Power Level (SWL)		VAM1500J ULTRA HIGH		78	69	61	60	55	53	47	62	
Duct/Bend	Width	Length / Angle / Number of bends	Type									
Straight 1	350 mm	0.9 m	Radiused	-0.5	-0.5	-0.4	-0.3	-0.2	-0.2	-0.2		
Bend 1	350 mm	1		0.0	0.0	0.0	-1.0	-2.0	-3.0	-3.0		
Straight 2	350 mm	3.0 m		-1.8	-1.8	-1.4	-0.9	-0.6	-0.6	-0.6		
Bend 2	350 mm	1	Radiused	0.0	0.0	0.0	-1.0	-2.0	-3.0	-3.0		
Straight 3	350 mm	5.5 m		-3.3	-3.3	-2.5	-1.7	-1.1	-1.1	-1.1		
Outlet End Reflection Loss	45 cm	45 cm		-9.0	-5.0	-2.0	0.0	0.0	0.0	0.0		
Total in-duct Attenuation				-14.6	-10.6	-6.2	-4.8	-5.9	-7.9	-7.9	dB(A)	
SWL at the Termination Point				63	58	55	55	49	45	39	56	

D.2 – Noise to Atmosphere

The noise predictions within this report have been undertaken using the proprietary software CadnaA® by DataKustik, a 3-D noise mapping package that implements a wide range of national and international standards, guidelines, and calculation algorithms, including those set out in ISO 9613-2:1996.

The majority of the objects within the model (buildings, roads, barriers/fences, etc) have been imported from OpenStreetMap – or drawn manually where not possible. The scaled site plan, floor plan, and elevation for the proposed development have also been accounted for in the model.

The kitchen extract termination and VAM unit supply and extract terminations are represented by vertical area sources, in line with the applicable areas for each grille, with the sound power levels in **Tables 5.2** and **5.4**. No potential insertion losses for the louvre have been accounted for as a worst case.

The rooftop condensers been modelled as point sources at a height matching the top of the unit (which are 0.99m high), with the sound power level of the source set to the dB(A) sound power level in **Table 5.3**. The octave band sound pressure levels have been scaled up to achieve the dB(A) sound power level.

The noise model has been used to predict the resulting L_{Aeq} noise emissions from the proposed plant. The noise model has assumed:

- downwind propagation, i.e., a wind direction that assists the propagation of sound from source to receptor, as a worst-case;
- a maximum reflection factor of two where buildings and barriers are assumed to have a 'smooth' reflective façade, as a worst-case;
- a ground absorption factor of 0 to represent hard, reflective ground as a worst-case.
- receptor heights on noise sensitive facades at heights of 1.5m, 4.5m, 7.5m, etc, placed at 1m outside of noise sensitive facades which contain windows, with the plot showing the highest/worst-affected floor level from each individual façade/elevation.
- noise contours plotted at a height of 4.5m (1st floor window height).
- atmospheric sound absorption based upon a temperature of 10°C and a humidity level of 70%, as per Table 2 of ISO 9613-2:1996.

Figure D.1 – 3D views of the model setup

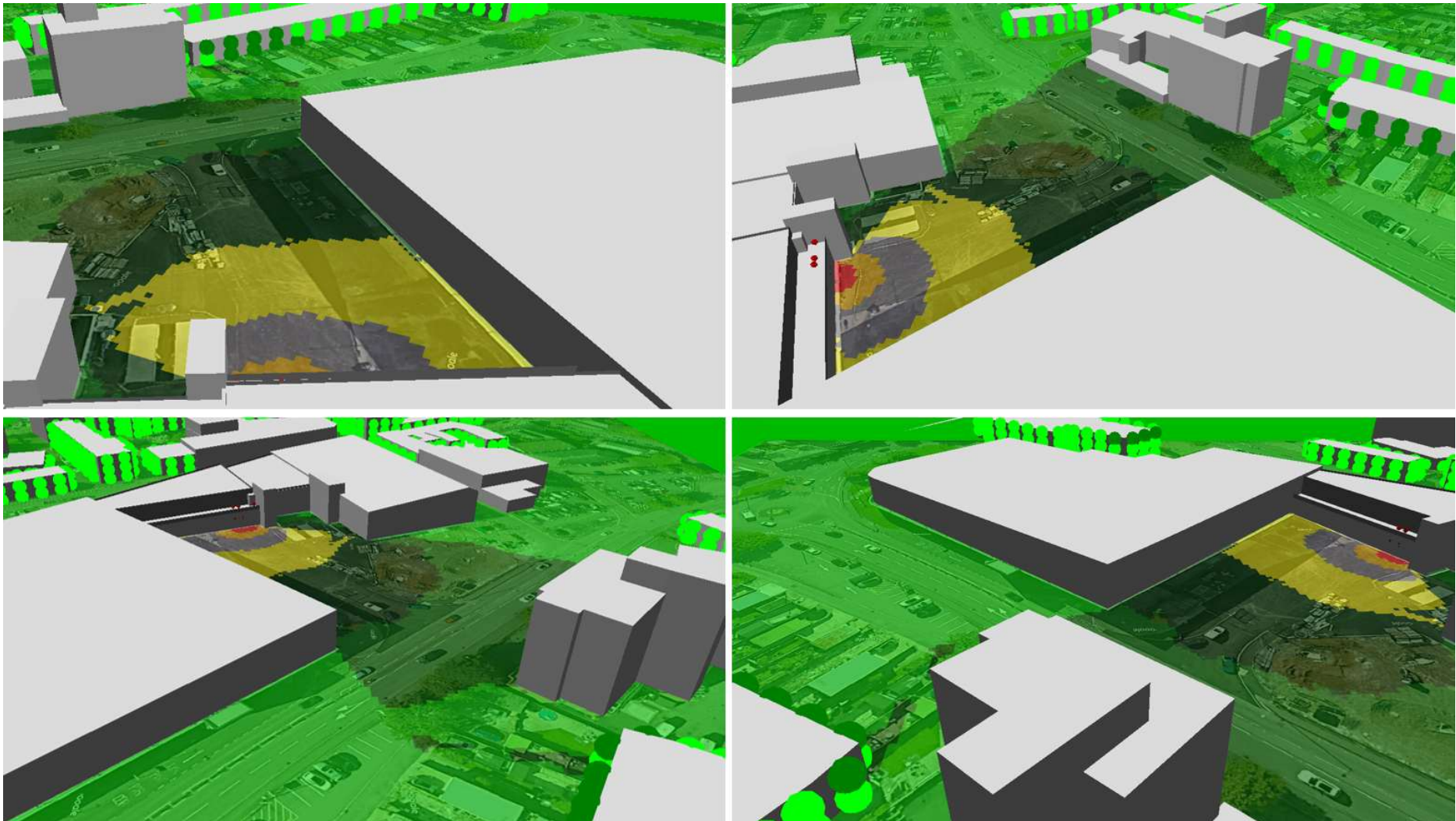
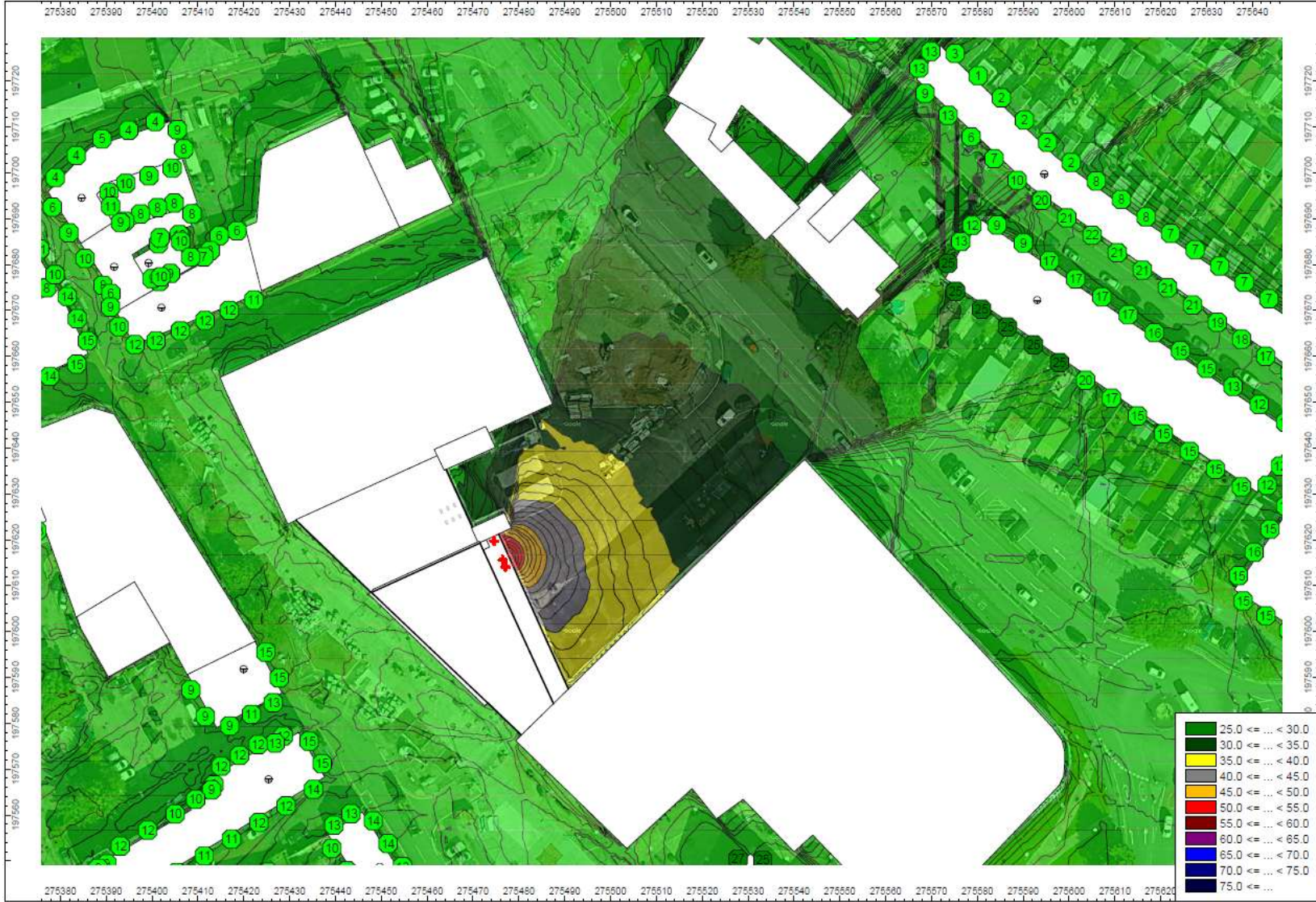


Figure D.2 – Predicted specific noise levels (dB LAeq) – all plant operating simultaneously



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