

PEAK acoustics



Noise Impact Assessment

Client: Muse Architects

Site: 42 Yew Tree Road, Manchester, M14 7PP

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Executive Summary

A Noise Impact Assessment has been undertaken for the proposed installation of a kitchen extraction system (retrospective) at 42 Yew Tree Road, Manchester, M14 7PP. The system will serve the ground floor restaurant of the site.

The nearest or most-affected Noise Sensitive Receptors (NSRs) were identified as 1st floor windows of 42 and 44 Yew Tree Road that are in closest proximity or most exposed to the system.

Using the measured background noise survey data, a representative daytime background sound level of 39dB L_{A90} was derived for the assessment.

Measurements of the prevailing background noise climate were undertaken from 29th – 30th November 2023 at a location representative of the identified Noise Sensitive Receptors (NSRs).

Acoustic modelling software, SoundPLAN, was utilised to calculate external sound propagation from the site using ISO-9613-2 - *Attenuation of sound during propagation outdoors*. Manufacturers noise data has been used to calculate the noise output of the system where no silencing is included.

A BS4142:2014 Initial Impact Assessment of the predicted unsilenced noise impact indicated the potential for a 'significant adverse impact' at NSR 1, with Rating Levels 17dB above the representative daytime background sound level.

A further Contextual Assessment was undertaken where noise levels from the site have been assessed to the existing noise climate along with other relevant factors.

Mitigation has been recommended by introducing silencing to the extract system that provides a 17dB reduction in noise output from the ductwork termination.

It is noted that a silencer exists within the system already, however the specification is not known. This is discussed in section 6.

The noise model was subsequently updated and mitigated impact is indicated to be 'Low', corresponding to achievement 'NOEL – No Observed Effect Level' in the NPSE.

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1. Introduction

Overview

A Noise Impact Assessment has been undertaken at 42 Yew Tree Road, Mancheser, M14 7PP in relation to the proposed installation of a kitchen extraction system (retrospective).

Details of the extract system have been provided by the applicant and are listed below:

- Fan – Vent-Axia VSP50014
- 1 x in-duct silencer (unspecified)

Manufacturer technical data sheets with noise level data for the fan unit have been sourced and are given in **Appendix G**.

The fan unit is installed within the ground floor of the property with ductwork running up the rear façade and terminating above roof level.

The plant equipment is associated with the ground floor kitchen of the ‘Kere Shado’ restaurant.

An assessment of the proposed plant equipment is to be undertaken to determine whether residents are likely to suffer a loss of amenity as a result of noise from the extract system. Mitigation will be given should any potential loss of amenity be indicated.

Scope & Objectives

The scope of the noise assessment can be summarised as follows:

- Baseline sound monitoring survey to evaluate the prevailing background sound levels at the Noise Sensitive Receptor (‘NSR’) in accordance with BS7445 - *‘Description and Measurement of Environmental Noise’*;
- Detailed sound modelling, acoustic calculations and analysis to predict sound levels at the NSR using industry-standard acoustic modelling software ‘SoundPLAN’. This software uses ISO-9613-2 - *Attenuation of sound during propagation outdoors*;
- A contextual assessment for the suitability of the site, in accordance with relevant standards in respect of sound from the proposed sources; and
- Recommendation of mitigation measures where necessary, to comply with the requirements of the National Planning Policy Framework (2021), Noise Policy for England (2010) and British Standard BS 4142:2014+A1:2019 – Methods for rating and assessing industrial and commercial sound.
- No local policy guidance has been provided.
- Further information on the legislation can be found in **Appendix I**.

2. Environmental Noise Survey

Measurement Methodology

To establish the existing environmental noise levels on site, a noise survey was conducted from the 29th – 30th November 2023 from 13:15 to 12:35. Measurements of $L_{Aeq,T}$ and $L_{A90,T}$ were logged in 5-minute intervals in accordance with BS7445 - *'Description and Measurement of Environmental Noise'*.

The unattended monitoring location (M1) was positioned to the rear of the property at a height of approximately 2.5 metres. The location was selected to provide noise levels representative of those at the rear facing windows of the site and adjacent properties.

The monitoring position is deemed representative of sound levels at 'NSR 1 and 2' during the typical operational periods of the proposed development.

Further detail of the measurement along with site pictures is given in **Appendix A**.

Measurements were obtained using Class 1 instrumentation. Full equipment details are given in **Appendix B**.

Equipment was calibrated before and after use and no significant drift occurred during measurements. Up-to-date calibration certification can be provided upon request. Full calibration details are provided in **Appendix C**

Daytime temperatures during the survey were noted as between 2 - 3°C with wind speeds typically between 0.5 - 2m/s; deemed suitable for conducting environmental noise monitoring. Detailed meteorological information can be found in **Appendix D**.

The site, proposed noise source and NSR locations are shown in **Figure 1**.

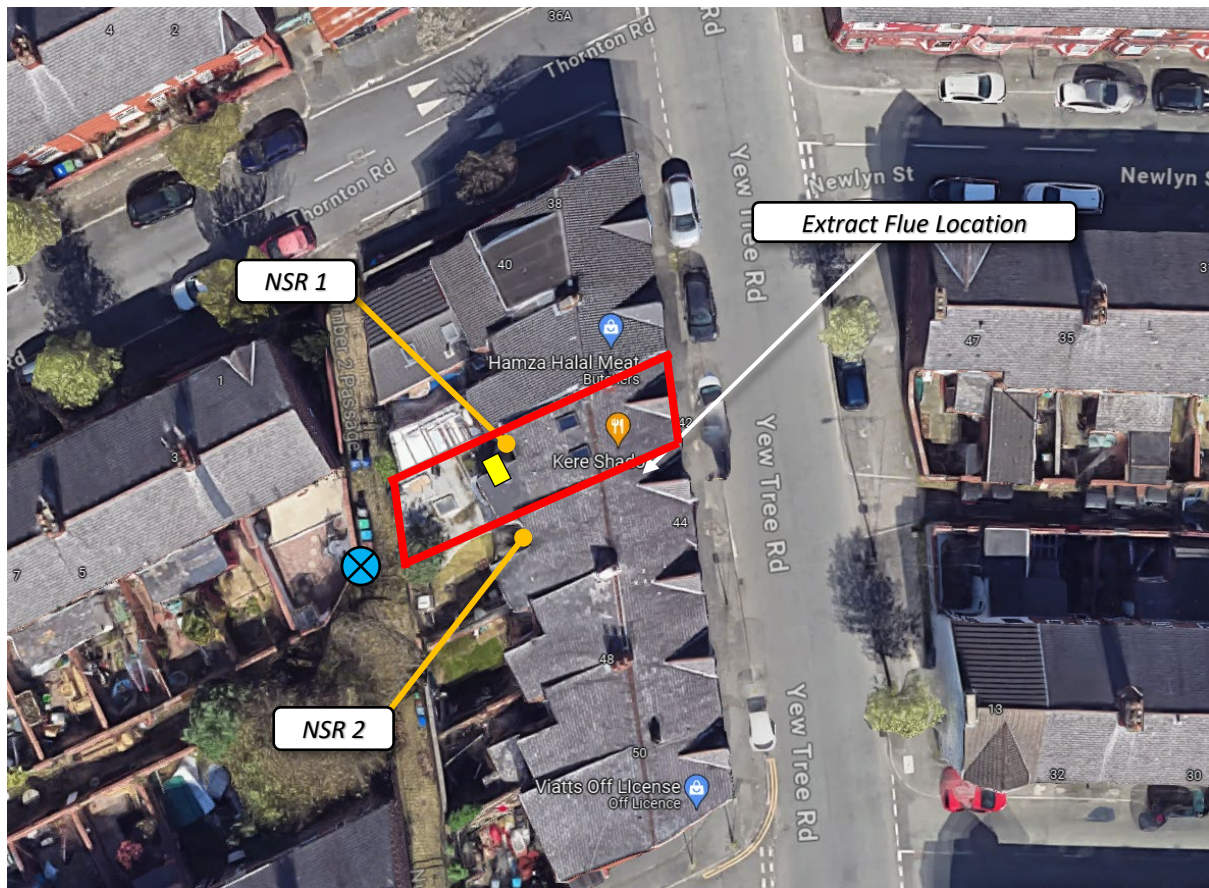


Figure 1: Site, Source & NSR Locations - <https://google.co.uk/maps>

-  Site Boundary (Approx.)
-  Extract Flue Location (Approx.)
-  Noise Sensitive Receptors (NSRs)
-  Background Monitoring Location M1 (Approx)

Site Description

The site is a restaurant at ground floor level and residential flat at 1st floor level. The building is located mid-terrace on Yew Tree Road in Manchester. Adjacent buildings include a Butchers at 40 Yew Tree Road with a flat above and 44 Yew Tree Road which is entirely residential.

The surrounding area is predominantly made up of residential terraced houses, including rear amenity areas and access roads.

Context and Subjective Noise Climate

Noise Source	Description	Time of Observation	Photo
Road	Light road noise from passing vehicles including cars, vans and buses.	Intermittent during site visits	
Music	Music playing within the 'Kere Shado' restaurant kitchen	Constant during site visits	N/A
Pedestrians	Pedestrians passing the site while conversing	Intermittent during site visit	

Table 1: Subjective Summary of Noise Sources

Non-Representative Noise Sources

During the survey, no noise events occurred which would be deemed as atypical of the site location.

Noise Sensitive Receptors

The nearest or most-affected Noise Sensitive Receptors (NSRs) were identified as rear façade 1st floor windows of the 44 and 42 Yew Tree Road. These are assumed to be habitable room windows and will be considered as specific reception points in calculations.

3. Environmental Noise Survey Results

Measurement Results

The extract system is to serve the ground floor restaurant and therefore has the potential to operate between 11:00 and 23:00.

The day and night-time background sound levels from measurement M1 are summarised below.

Measurement	Date(s)	Period	$L_{Aeq,T}$	$L_{A90,T}$
M1	29 th & 30 th November 2023	Daytime (07:00 – 23:00)	49	39
	29 th – 30 th November 2023	Night-time (23:00 – 07:00)	42	29

Table 2: M1 Background Noise Survey Results

A full-time history of the survey data is shown in **Appendix E**.

For the derivation of a representative night-time background sound level the sound level data from the whole daytime period (07:00 – 23:00) has been statistically analysed.

A graph of the statistical analysis for M1 daytime data is given below.

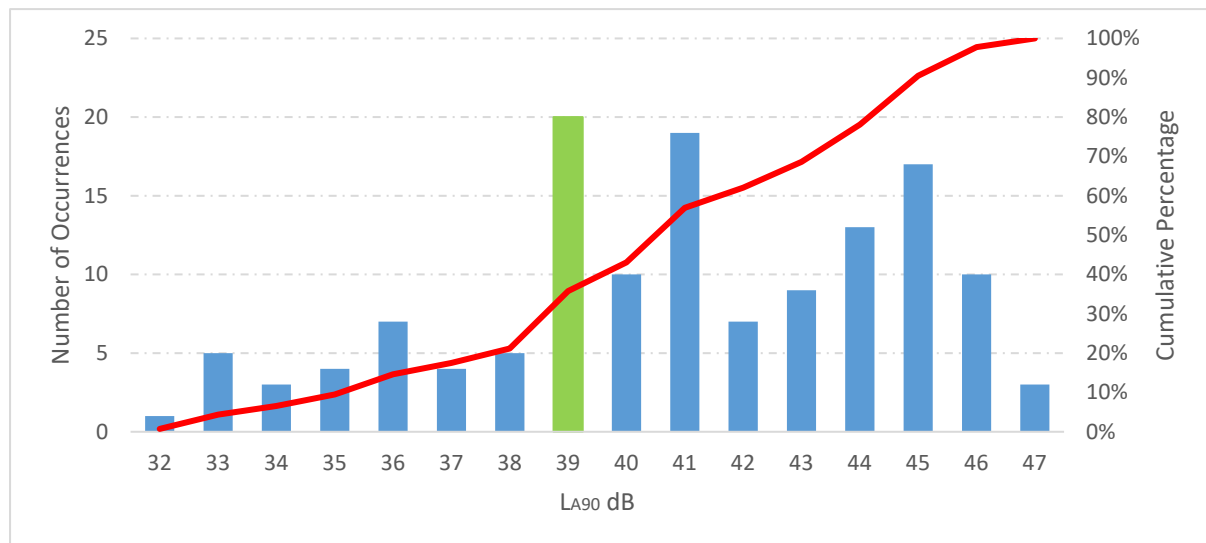


Figure 2: M1 Background Statistical Analysis

From the statistical analysis of M1 measurement, **39 dB L_{A90}** has been selected as the representative background sound level for the BS4142:2014 assessment at the NSR locations.

4. BS4142:2014 Initial Impact Assessment

Noise Modelling

External sound propagation from the site has been calculated using industry-standard acoustic modelling software 'SoundPLAN'. This software uses ISO-9613-2 - *Attenuation of sound during propagation outdoors* and the model takes into account the following key factors:

- *Aerial Imagery & Terrain Data sourced from Google Maps/Elevations*
- *Geometric divergence of sound*
- *Atmospheric absorption of sound*
- *Ground absorption*
- *A light downwind correction toward the NSRs*
- *Surrounding structures and objects which may reflect or block sound toward the NSRs*
- *The height of the NSRs (i.e., First/second-floor reception point)*
- *Operational schedule of equipment*

The following input parameters were used in the noise model:

Parameter	Input
Reflection Order	3
Ground Absorption Factors	Within site: G = 0.3 (Hard Ground)
Air pressure	1013.3 mbar
Relative Humidity	70.0 %
Temperature	10.0°C

Table 3: Calculation Input Parameters

Source Noise Levels

Details of the extract system have been provided by the applicant, and include:

- 1 x Extract Fan – Vent-Axia VSP50014
- 1 x in-duct silencer (unspecified)

Manufacturer technical data sheets with noise level data for the fan unit have been sourced and are given in **Appendix G**.

The client has stated that the system contains a silencer between the fan and ductwork termination point. This is indicated on plans to be 3.5m from the ductwork termination. For the initial impact assessment, the contribution of the silencer will be disregarded.

The manufacturer's stated sound power level of the fan unit is provided below:

Unit	Para.	63	125	250	500	1k	2k	4k	8k	dBA
Vent-Axia VSP50014	Lw	80	78	72	70	71	69	63	57	75

Table 4: Extract Fan Sound Power Levels

The noise output from the extract flue has been calculated via a ductwork calculation using dimensions from the site plans provided within **Appendix H**. The calculation is based on a 500mm diameter unlined circular duct with a single 90-degree bend and 4m between the fan and ductwork termination.

Details of the noise sources that have been modelled in 'SoundPLAN' are given below:

Source No.	Source	Parameter	Noise Level, dBA	Height above Ground (m)
1	Ductwork Termination	L _{WA}	72	6

Table 5: Modelled Source Noise Levels

To account for a worst-case scenario, the source will be modelled to be running at 100% throughout the assessment period. The system is likely to operate continuously while the restaurant is open.

The noise model does not account for minor landscape features such as low garden walls and fences.

Specific Sound Levels

The Specific Sound Level is denoted L_{AS} and is the A-weighted, equivalent noise level at the NSR locations. Specific Sound Levels have been calculated from the noise model and the levels at the worst affected floors of receptors are given below.

Location	Specific Sound Level, dB L _{AS}
NSR 1 (1F)	53
NSR 2 (1F)	43

Table 6: Specific Sound Levels

Rating Levels

In accordance with BS4142, the Specific Sound Levels may be corrected for characteristics that make the sound more noticeable at the NSR location such as tonality, impulsivity and intermittency. Section 9.2 of BS4142:2014 gives commentary on these characteristics and appropriate penalties:

“Tonality

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

NOTE 2 *Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If*

one feature is dominant then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

Noise from kitchen extract systems is generally broadband aerodynamic noise which is not tonal or impulsive. No rating penalty will be applied in relation to these factors.

The system is also likely to run constantly throughout the day and so no penalty will be applied in relation to intermittency.

As the unit is likely to be readily distinctive against the residual acoustic environment, a penalty of +3dB will be applied to account for this.

The resultant Rating Levels are summarised below:

Location	Specific Sound Level, dB L_{As}	Total BS4142 Character Corrections	Rating Level, dB L_{Ar}
NSR 1	53	+ 3	56
NSR 2	43		46

Table 7: Rating Levels

Rating Levels Vs Background

The Rating Levels are to be compared to the representative background sound level to determine the noise impact in accordance with BS4142.

A Sound Rating Level at or below the background noise level is indicative of Low Impact;

A Sound Rating Level that exceeds the background noise level by around +5dB is likely an indication of Adverse Impact, depending on the context;

A Sound Rating Level that exceeds the background noise level by around +10dB is likely an indication of Significant Adverse Impact, depending on the context;

The indicated noise impact at the identified Noise Sensitive Receptors is summarised below:

Location	Rating Level, dB L _{ar}	Background Sound Level, dB L _{A90}	Difference, dB	Noise Impact
NSR 1	56	39	+17	Significant adverse
NSR 2	46	39	+7	Adverse

Table 8: Noise Impact

The noise impact at the 1st floor window of 44 Yew Tree Road (NSR 1) is indicative of a 'significant adverse impact' in accordance with BS4142:2014 with an 'adverse impact' indicated at NSR 2.

5. BS4142:2014 Contextual Assessment

Aspects of absolute level

Absolute levels on site with the unsilenced extract system operating have been calculated in 'SoundPLAN' to be 56 dBA (this is exclusive of any rating penalties), at NSR 1. In comparison to the range of night-time background sound levels measured on site (32 – 47 dB L_{A90}) the absolute level is 9dB above highest background level measured on site.

With context, it may be that the system runs at a reduced setting at times of lower demand, which would give a lower noise output.

In considering the points above, the absolute sound level is deemed to be appropriate whilst considering a worst-case scenario but with context, the sound levels on site may be lower than modelled.

Aspects of character

The external plant equipment is assumed to be broadband in nature, with no tonal or impulsive characteristics. The external plant equipment serves to provide air extraction and fresh air supply to the kitchen and therefore is expected to run continuously.

A +3 dB penalty has been applied in the Initial Impact Assessment to account for the system being distinctive against the residual acoustic environment. In context, the system may not be distinctive from the residual noise environment however the noise impact would still be in excess of BS4142 criteria.

Aspects of the receptor

The NSR location is a residential area of the site which is assumed to be accustomed to the current noise climate as the system is understood to have been operational for some time.

Guidance is taken from 'Appendix C' of the 'Acoustics Ventilation And Overheating: Residential Design Guide-January 2020' to specify an outside-to-inside level difference of approximately 13 dB through an open window. When this is applied to the predicted daytime levels at the NSR location, internal levels would exceed the guidelines of BS8233:2014.

Contextual recommendations

After analysis of the existing site use in conjunction with this proposal, mitigation of the proposed system is deemed necessary to achieve a 'Low Impact' accordance with BS4142:2014.

Mitigation is discussed in the next section.

6. Mitigation

A reduced noise impact of approximately 17dB is required in order to achieve a 'Low Impact' in accordance with BS4142 criteria. The effect of reducing noise output of the system via silencing of the system has been investigated within the noise model. For silencing achieving a 17dB reduction across the frequency spectrum, the following outcome is calculated:

Location	Rating Level, dB L _{ar}	Background Sound Level, dB L _{A90}	Difference, dB	Noise Impact
NSR 1	36	39	0	Low
NSR 2	26		-10	Low

Table 9: Noise Impact

The mitigated noise impact is indicative of a Low Impact in accordance with BS4142 criteria.

Existing Silencer

Site plans indicate an existing silencer within the system however the client has indicated that the specification is unknown as the system was installed by a previous owner of the site. If the existing silencer performance can be determined to provide a minimum of reduction of 13dB or greater, then the impact of the system as installed is likely to achieve a low impact.

If the existing silencer performance cannot be determined then it is recommended that it is replaced with one which provides performance as stated above.

7. Conclusion

A Noise Impact Assessment has been undertaken at 42 Yew Tree Road, Manchester, M14 7PP in relation to the proposed installation of a kitchen extraction system (retrospective).

Measurements of the background noise climate were undertaken from 29th – 30th November 2023 at a position deemed representative of the identified Noise Sensitive Receptors (NSRs).

The nearest or most-affected Noise Sensitive Receptors were identified as 1st floor windows of 44 and 42 Yew Tree Road.

A BS4142:2014 Initial Impact Assessment of the predicted daytime noise impact indicated the potential for a 'significant adverse impact' at the NSR 1 location, with Rating Levels 17dB above the representative daytime background sound level.

A further Contextual Assessment was undertaken where noise levels from the site have been assessed to the existing noise climate along with other relevant factors.

Mitigation has been recommended by introducing silencing to the extract system that provides a 17dB reduction in noise output from the ductwork termination.

The noise model was subsequently updated and mitigated impact is indicated to be 'Low', corresponding to achievement 'NOEL – No Observed Effect Level' in the NPSE.

8. Uncertainty

The background monitoring equipment is subject to a 1dB error margin, however, calibration before and after measurements allows the drift within the margin to be monitored and thus demonstrates that minimal drift occurred throughout the measurements.

Uncertainty can arise in the prediction of noise propagation from and around flat reflective surfaces, such as the surrounding structures present on site. This has been reduced to a minimum by utilising an acoustic modelling software that uses the validated method, ISO-9613-2, as described in BS4142.

Uncertainty in the calculated specific sound levels is further reduced by utilising manufacturer-given sound power levels.

APPENDIX A - Measurement Details

Measurement	Kit	Start Date	Start Time	End Date	End Time
M1	A3	29/11/2023	13:15	30/11/2023	12:35

Table 10: Measurement Dates



Figure 3: Site Location Measurement Pictures

APPENDIX B - Equipment Details

Kit	Equipment	Make	Model	Class	Serial Number
A3	Sound Meter	Svantek	971	1	41980
A3	Pre-Amp	Svantek	SV18	1	44331
A3	Microphone	ACO	7052E	1	60249
2	Calibrator	Svantek	SV33	1	83715

Table 11: Measurement Equipment Details

APPENDIX C - Calibration Details

Measurement	Calibrator Ref Level (dB)	Deviation Before (dB)	Deviation After (dB)
M1	113.80	0.36	0.46

Table 12: Calibration Details

APPENDIX D - Meteorology Details

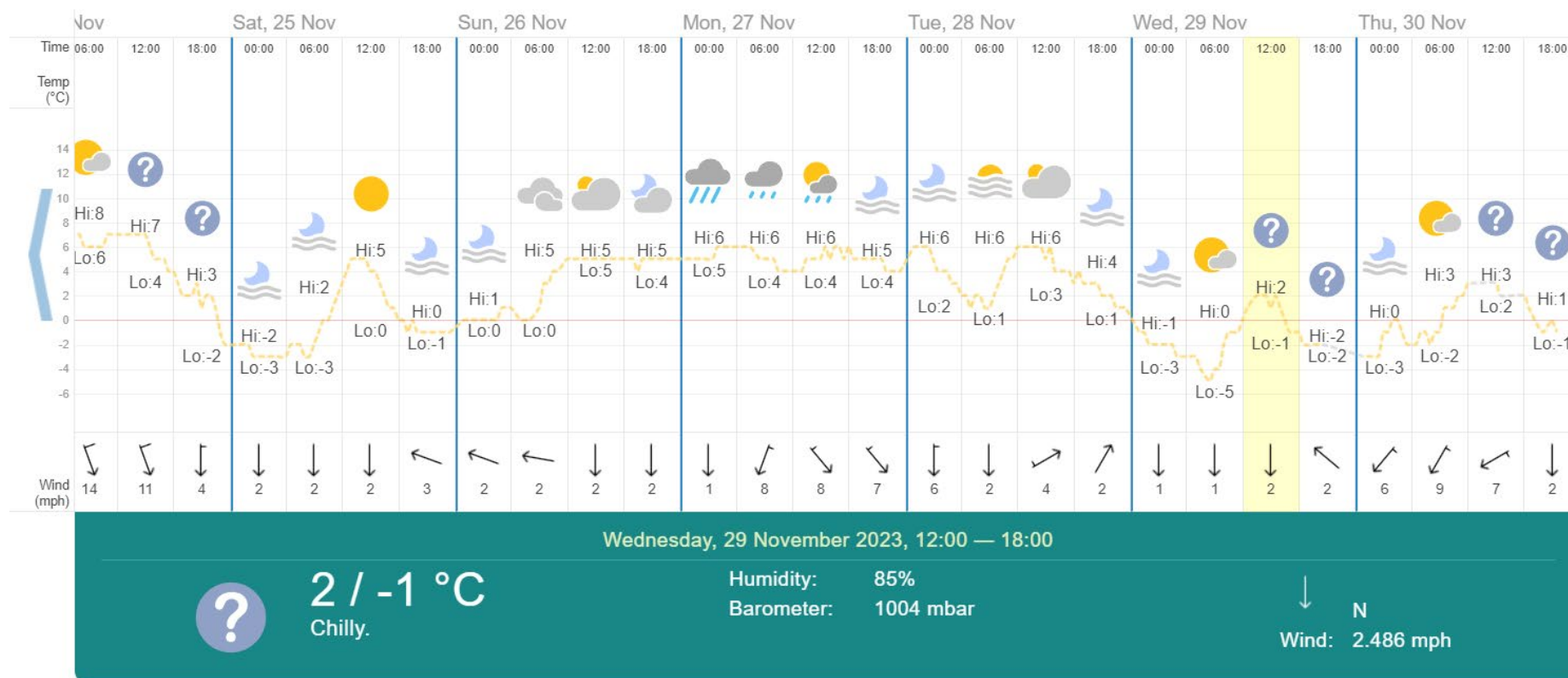


Figure 4: Meteorology Data - <https://www.timeanddate.com/weather>

APPENDIX E - Noise Survey Results

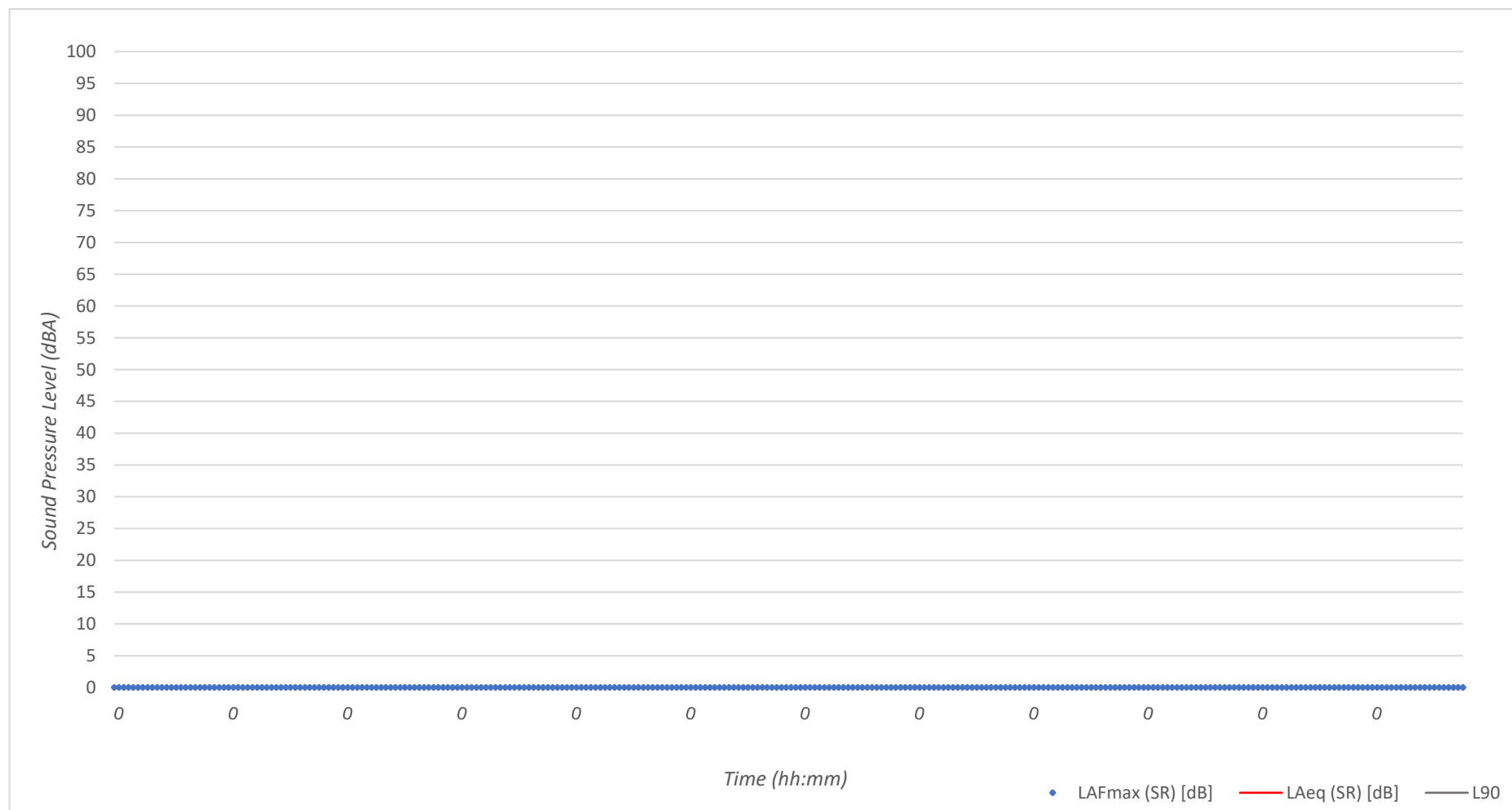


Figure 5: Measured Background Sound Levels Time History (M1): 29th – 30th November 2023

APPENDIX F - Grid Noise Maps

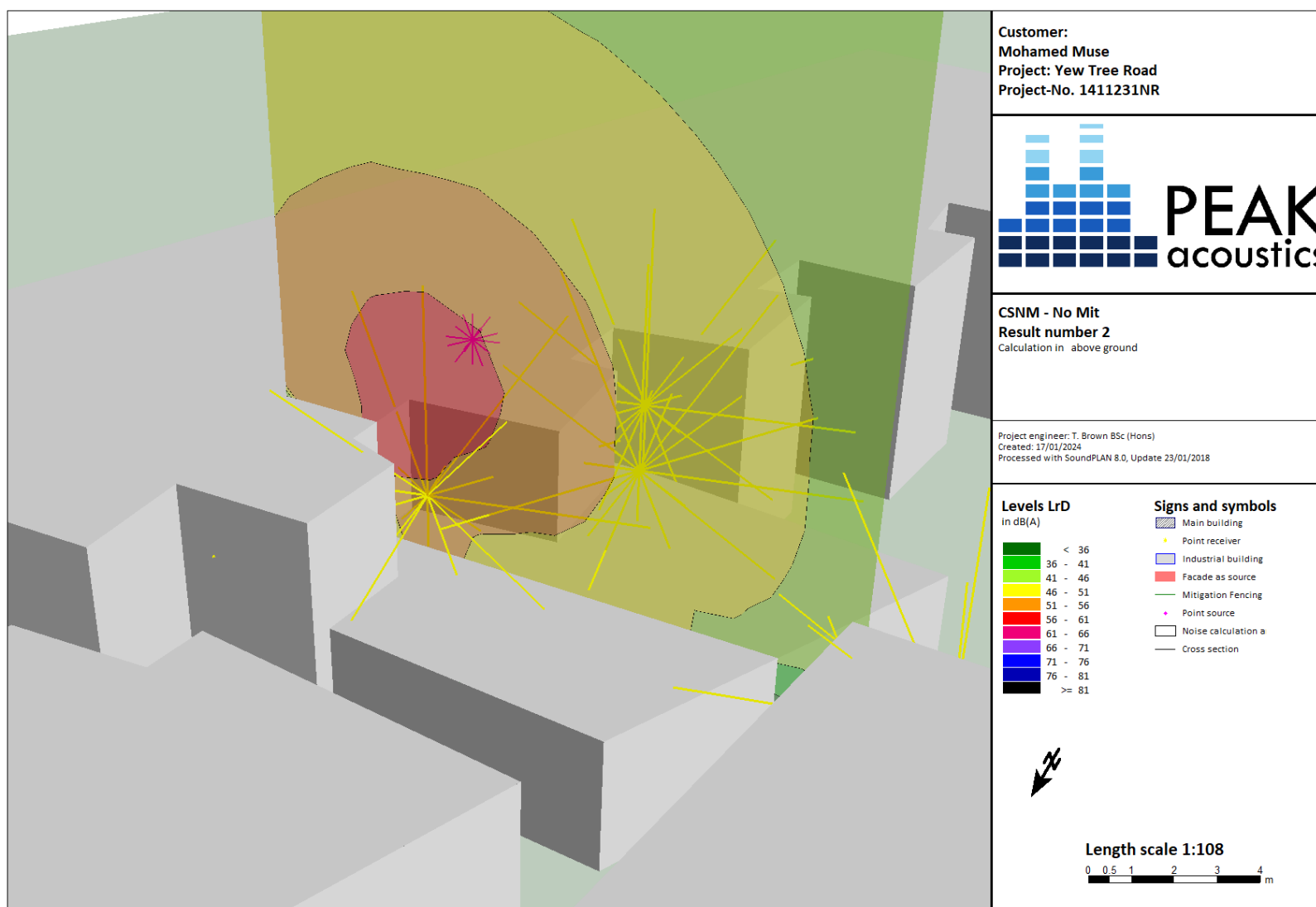


Figure 6: 3D Grid Noise Map of daytime Initial Impact Assessment

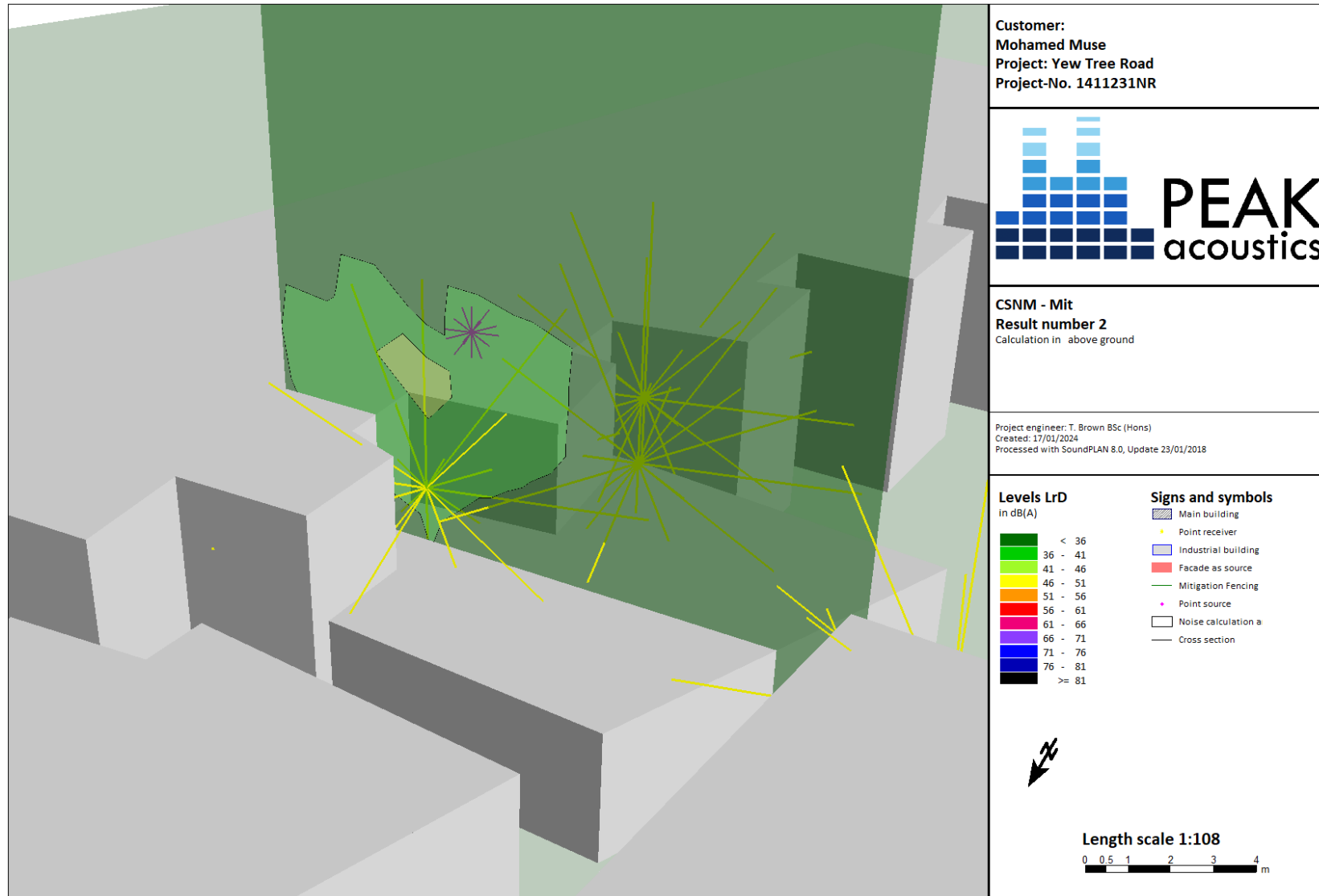
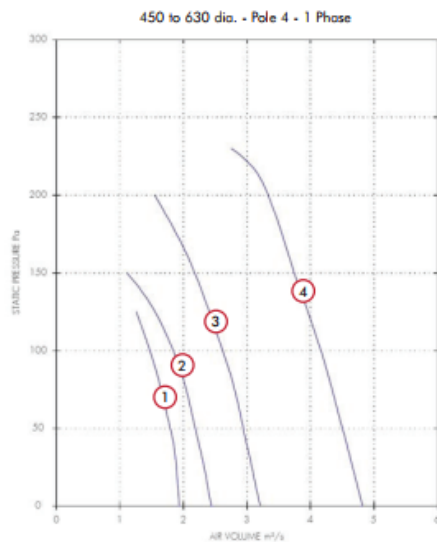
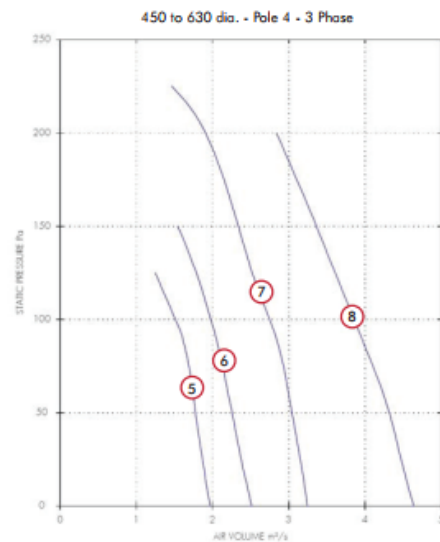


Figure 7: 3D Grid Noise Map of daytime Mitigated Impact Assessment

APPENDIX G - Manufacturer Technical Data Sheets

Vent-Axia
Plate & Case Fans

Performance Curves



Performance Guide

			Performance		IP		m³/s at Pa										Motor		S.C.	F.L.C.	dBA @
Dia.	Phase	Stock Ref	Curves	Poles	r.p.m.	Rating	0	25	50	75	100	125	150	200	225	kW	Amps	Amps	3m		
450	1	VSP45014	1	4	1310	IP54	1.94	1.89	1.74	1.65	1.48	1.26				0.61	7	2.8	59		
450	3*	VSP45034	5	4	1360	IP54	1.97	1.87	1.78	1.69	1.52	1.25				0.38	4	1.05	57		
500	1	VSP50014	2	4	1250	IP54	2.45	2.33	2.17	2.05	1.84	1.65	1.11			0.78	7.1	3.4	55		
500	3*	VSP50034	6	4	1330	IP54	2.51	2.38	2.26	2.14	1.98	1.79	1.55			0.49	5.2	1.45	58		
560	1	VSP56014	3	4	1350	IP54	3.21	3.08	2.92	2.81	2.62	2.41	2.18	1.55		1.10	15	5.1	66		
560	3*	VSP56034	7	4	1280	IP54	3.25	3.15	3.04	2.93	2.75	2.52	2.34	1.91	1.47	0.65	7	2.4	63		
630	1	VSP63014	4	4	1370	IP54	4.83	4.66	4.51	4.35	4.17	3.95	3.73	3.33	2.78	1.75	21	7.7	69		
630	3*	VSP63034	8	4	1380	IP54	4.64	4.48	4.32	4.11	3.86	3.61	3.36	2.84		1.15	9	3.1	66		

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

Dia.	Phase	Stock Ref	Poles	63	125	250	500	1k	2k	4k	8k	dBA @ 3m
450	1	VSP45014	4	69	81	72	72	74	70	63	56	59
450	3	VSP45034	4	63	76	67	68	69	70	66	59	57
500	1	VSP50014	4	80	78	72	70	71	69	63	57	55
500	3	VSP50034	4	76	77	74	73	75	72	65	58	58
560	1	VSP56014	4	73	76	80	76	79	78	74	67	66
560	3	VSP56034	4	83	80	74	74	77	75	70	61	63
630	1	VSP63014	4	88	85	82	82	82	80	75	68	69
630	3	VSP63034	4	84	83	78	77	79	79	74	67	66

APPENDIX H - Site Plans

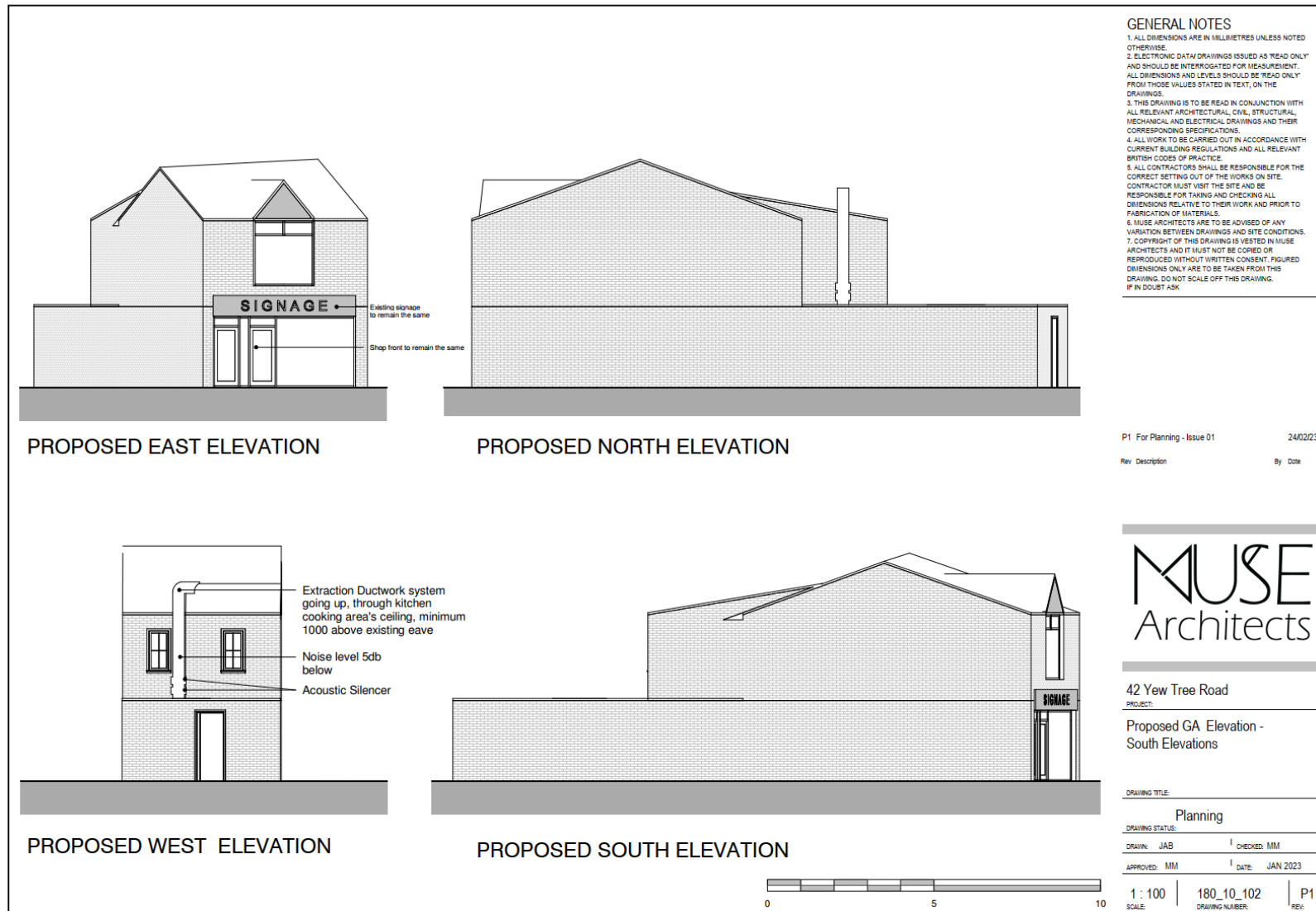


Figure 9: Site Plans Provided by 'Muse Architects'

APPENDIX I - Legislation, Policy & Guidance

Guidance for the assessment of noise affecting new residential development is given in the National Planning Policy Framework (NPPF). Section 15 of the NPPF states:

“174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of...noise pollution.”

Section 185 further states:

“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 impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the 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.”*

Section 187 states:

“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

To avoid and mitigate adverse noise effects on health arising from and impacting new development, the NPPF makes reference to NPSE. The Noise Policy Statement for England (NPSE) was published in March 2010 and covers all forms of noise other than occupational noise.

The Noise Policy Statement for England (NPSE) states the following aims in paragraph 2.2.

NOEL – No Observed Effect Level.

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level.

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level.

This is the level above which significant adverse effects on health and quality of life occur.

The NPSE does not define the SOAEL numerically, stating in paragraph 2.22:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the "NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

There is no local or national guidance on how the three terms should be defined numerically, it is for the assessor to collate and interpret appropriate guidance on noise, such as may be found in British Standards, and correlate the guidance with the concepts of NOEL, LOAEL and SOAEL.

BS4142:2014+A1:2019

The common standard for the assessment of industrial and commercial sound is '**BS4142 – Methods for rating and assessing industrial and commercial sound**'. The industrial noise assessment method in BS4142 is based on the difference between the measured 'background sound level' (L_{A90}), and the 'Rating Level' of the industrial source, at a noise-sensitive location (NSR). BS4142:2014 states:

"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs."

An estimation of the impact of the specific sound can be obtained by the difference between the rating sound level and the background sound level whilst considering the following:

*"A Sound Rating Level at or below the background noise level is indicative of Low Impact;
A Sound Rating Level that exceeds the background noise level by around +5dB is likely an indication of Adverse Impact, depending on the context;
A Sound Rating Level that exceeds the background noise level by around +10dB is likely an indication of Significant Adverse Impact, depending on the context;"*

BS4142 further states:

"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 negligible impact, depending on the context."

Achievement of a *Low Impact* in accordance with BS4142 along with a contextual assessment can be deemed to correspond to '*NOEL – No Observed Effect Level*' in the NPSE.

BS8233:2014

BS8233:2014 - *Guidance on sound insulation and noise reduction for buildings* suggests indoor ambient noise levels for dwellings in Table 4, Section 7.7.2. These are summarised below.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

BS8233 states that the guideline values given above are for 'noise without character', further stating:

"Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate."

Table 4 of BS8233 also has accompanying notes that were subject to additions in ProPG. The relevant notes with the additions of ProPG are given below.

"NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events."

"NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

APPENDIX J - Acoustic Terminology

To aid the understanding of acoustic terminology and the relative difference between noise levels the following background information is provided.

We perceive sound when the ear detects fluctuations in air pressure (sound waves), which are then processed by the brain and perceived as sound. Humans can hear an incredibly wide range of sound intensities ranging from jet engines to fingertips lightly brushing against each other. This range is quantified using a logarithmic scale called the decibel scale (dB). The comfortable range of the decibel scale typically ranges from 0dB (the threshold of hearing) to around 140dB. Here are some examples of common environments and their typical noise levels.

Noise Level	Environment
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40 dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a moving car
60 to 70 dB(A)	Typical high street
100 to 110 dB(A)	Fire alarm at 1 metre away
140 dB(A)	Threshold of pain

Terminology

dB (decibel) – A unit used to quantify the pressure level of sound. Defined as 20 times the logarithm of the ratio between the root-mean-square pressure of a given sound field and a reference pressure level (2×10^{-5} Pa – threshold of hearing).

$L_{Aeq, T}$ – The equivalent continuous sound pressure level over a stated period. It quantifies a fluctuating sound level over a given period as the equivalent continuous sound level over which the same amount of acoustic energy is contained over. This is A-weighted in order to assess human perception.

L_{A90} – The sound level exceeded 90% of the time. Typically used to describe background noise the L_{90} is regarded as the ‘average minimum level’ and quantifies the common sound level of a fluctuating sound field i.e. the sound level that occurs 90% of the time. Alternatively, L_{10} describes the sound level exceeded 10% of the time and therefore quantifies the ‘average maximum level’ of sound which is often used during the calculation of road traffic noise.

A-Weighting – A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.

R_w – The Weighted Sound Reduction Index (R_w) is a number used to rate the effectiveness of a soundproofing system or material.