

Mr Jalil Ali

18-20 Mackets Lane, Liverpool L25 0LQ

Acoustic Assessment



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1. Introduction

Peninsular Acoustics has been commissioned by Mr Jalil Ali (hereafter referred to as “the Client”), to conduct an Acoustic Assessment to evaluate the noise impact of a new kitchen extract system for a proposed restaurant/takeaway unit, at 18-20 Mackets Lane, Liverpool L25 0LQ (hereafter referred to as “the site”) on nearby noise sensitive receptors.

This report is necessarily technical in nature and therefore to assist the reader an acoustics glossary is provided in Appendix A.

1.1. Site Description

Existing Site

The proposed Site currently sits behind a “Premier” convenience store, which is in a row of terraced shop units within a residential area. To the east of the Site is the rear facade of a row of houses on Abberley Road. Residential flats are above the premier Convenience Store, and above the row of shops. Residential Houses surround the remainder of the site to the North, West and South.

The nearest Noise Sensitive Receptors (NSR’s) identified are located as follows:

- NSR1: First floor window of No. 18-20 Mackets Lane (Apartment above the premier convenience store) circa 13.5m from proposed plant; and
- NSR2: The rear façade of a row of houses on Abberley Road (residential dwellings East of the Site) circa 20m from proposed plant.

Development Proposals

The development proposals comprise of a ground floor extension across the existing rear yard, with a new 1st floor storage area. The proposals include the installation of a kitchen extract system which runs behind the parapet wall. The ducting system will bend 90° and then rise 2.5m within the 1st floor store area to the outlet.

Figure 1.1 Approximate redline boundary, NSRs and Continuous Measurement Position



1.2. Scope of Works

The following scope of works has been undertaken:

- Identify the nearest Noise Sensitive Receptors.
- An unattended Environmental Sound Survey to determine prevailing acoustic conditions within the proposed operational hours of the takeaway. Measurements to be taken at a representative location of the noise levels currently at the nearest receptors.
- Duct calculations and an assessment in accordance with BS 4142 have been undertaken to assess the potential impact of the kitchen extract system.

2. Standards, Guidance and Criteria

2.1. Local Authority Criteria

In the absence of local criteria, we have assumed:

- *The rating level, as defined in BS4142:2014+A1:2019 should be below the measured daytime and/or night-time background sound level at the closest sensitive premises at any time.*

2.2. BS 4142: 2014+A1: 2019

BS 4142 describes methods for rating and assessing industrial and/or commercial sound and includes, but is not limited to, the assessment of:

- Sound from industrial and manufacturing processes.
- Sound from fixed installations which comprise mechanical and electrical equipment.
- Sound from the (un)loading of goods and materials at industrial/commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes such as that from forklift trucks on or around an industrial and/or commercial site.

The methods described in BS 4142 use outdoor sound levels to assess the likely effects of sound on people who are typically outside residential premises. Although indoor effects can be indicated where the façade composition is known. A summary of the approach set out in BS 4142 is set out below:

Establish or predict the specific sound level of the source(s) by considering both the ambient (includes the source to be assessed) and residual (excludes the source to be assessed but includes all remaining sources) sound level;

- Measure the representative background sound levels, typically by measuring close to the receptor location;
- Rate the specific sound level to account for any distinguishing characteristics (see below);
- Estimate the impact by subtracting the background sound level from the rating level; and
- Consider the initial estimate of impact, as determined above, in the context of the noise and its environment.

The specific sound level is rated to account for distinguishing characteristics by using penalties for tonality, impulsivity, intermittency, and other sound characteristics.

The character corrections are flexible according to whether the acoustic character is just perceptible at the noise receptor, or is clearly perceptible or highly perceptible, and range from 0 to 6 dB for tonal noise, 3 to 9 dB for impulsive noise, and 3 dB for other non-tonal/impulsive acoustic characteristics.

An initial estimate of impact of the specific sound is obtained by subtracting the background sound level from the rating level. Typically, the greater the difference, the greater the magnitude of impact.

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

- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;
- At differences lower than +5 dB a low impact is likely, depending on the context. The lower the rating level is to the measured background sound level, the less likely it is that the specific sound source will have an impact.

The results of the initial assessment should then be considered considering all pertinent contextual factors.

3. Sound Survey

3.1. Methodology and Equipment

An unattended environmental sound survey was conducted between 10:45 Tuesday 23rd December and 18:30 Saturday 27th December 2025 to establish typical background noise levels at a representative location of NSR1.

Fifteen-minute continuous A-weighted ambient, maximum and background noise levels (L_{Aeq} , L_{AFmax} , L_{A90}) were measured at the position shown in Figure 1.1 and described below:

- Continuous Measurement Position 1 (CM1): 2m above first floor level and circa 7m from NSR1

A full time-history of unattended measured noise levels is presented in Appendix C.

Measurements were taken using Class 1 integrating/averaging sound level meters (SLMs) housed, where appropriate, in environmental protection apparatus. The SLMs were field calibrated before and after the survey, using a Class 1 calibrator, with no significant drift in calibration noted.

3.2. Survey Conditions and Observations

3.2.1. Meteorological Conditions

The weather conditions during the installation and collection of the continuous measurement SLMs were favourable, with minimal light rain and low wind speeds. Local weather data was monitored via weather apps throughout the survey concluding the conditions suitable for environmental measurements.

3.2.2. Site Observations

The Site visit indicated that the predominant noise sources at NSR1 and NSR2 was distant road traffic from the A562 road, along with the existing air conditioning plant and equipment within the yard, and the adjacent properties extraction system. Please see images below.

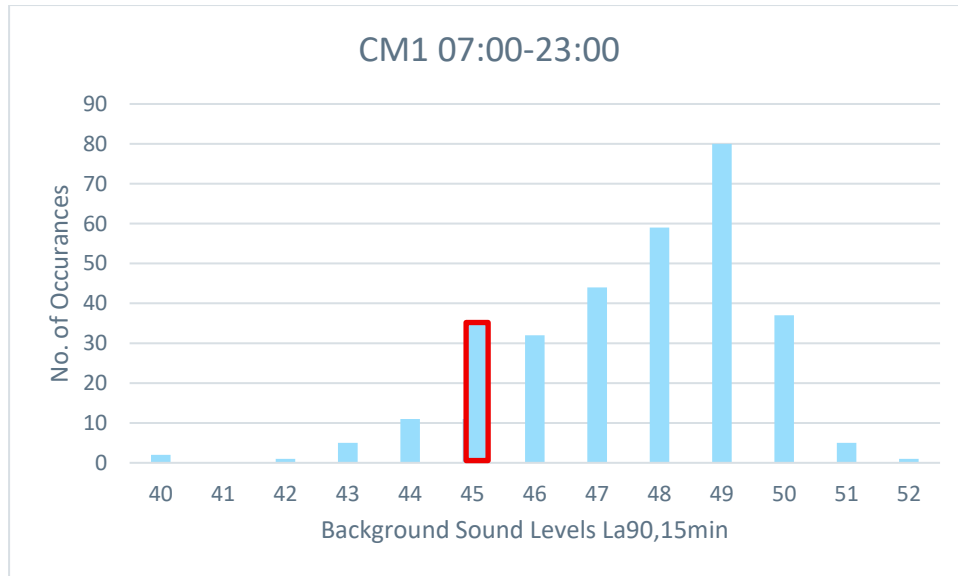


3.3. Results

3.3.1. Unattended Survey Results

The statistical analysis of background sound levels (L_{A90}) for daytime (07:00-23:00) are shown below:

Figure 3.1 Statistical analysis of the daytime background L_{A90} levels – CM1



These measurements were taken in free-field conditions with the lowest, most frequently occurring level chosen for the period: 46 dB $L_{A90,15mins}$ from 07:00 to 23:00.

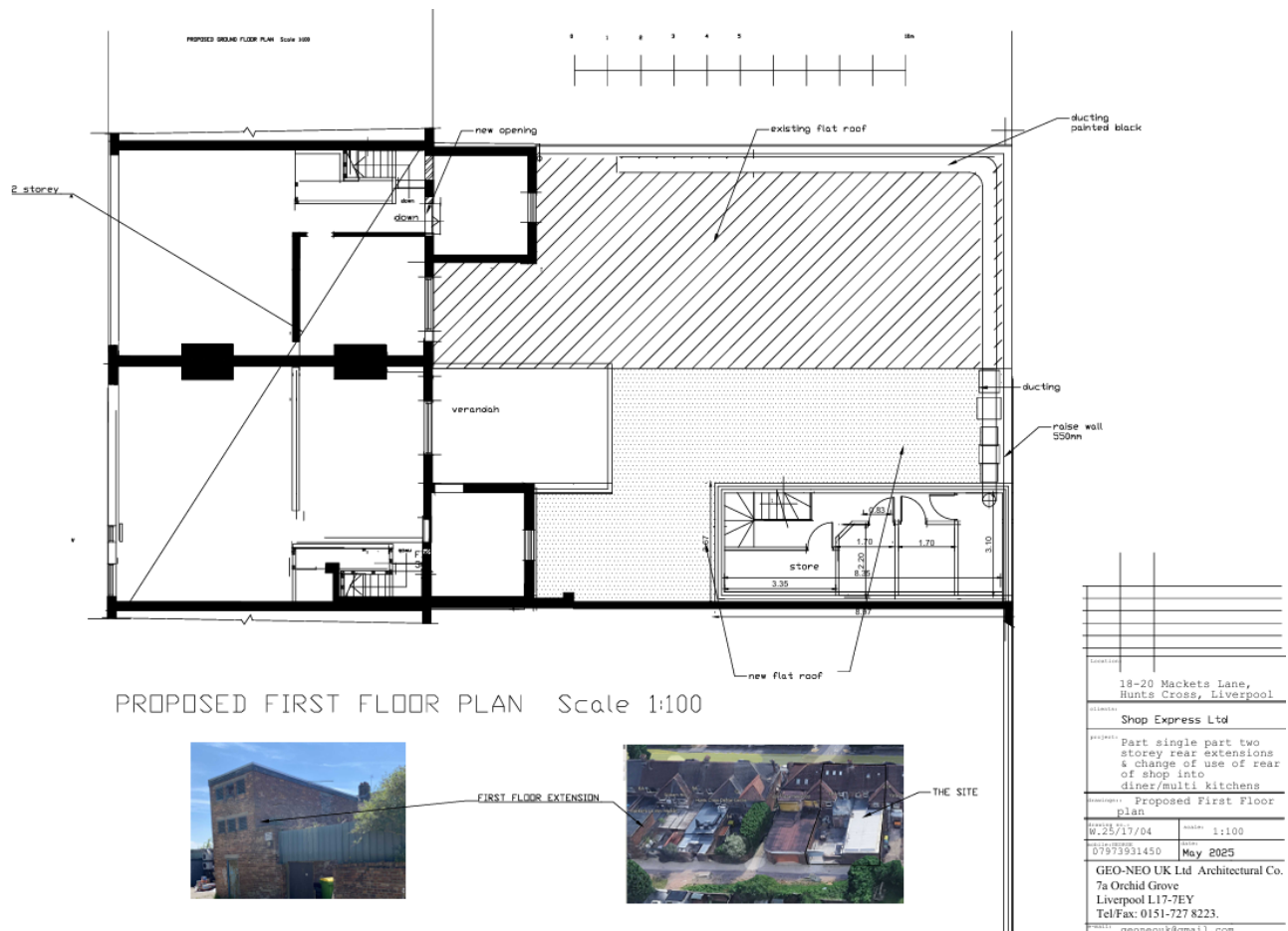
4. BS4142 Assessment

4.1. Proposed New Plant

The proposed extract ventilation system begins on the existing flat roof from the kitchen below. It runs to the rear of the flat roof and bends at the rear parapet wall running along to the new 2 storey extension. The system includes a fan, outlet and silencers which are situated behind the parapet wall, before the ducting continues vertically internally within the first floor extension to an outlet just above roof level of the first floor extension. The proposed products and associated sound levels are shown in appendix D.

The proposed ventilation plant inlet will be internal and therefore is not considered within the calculation. The fan system and outlet will be external and therefore associated levels have been summed together in Section 4.4. The proposed fan casing and outlet product information and associated sound levels are stated within appendix D.

Figure 4.1 Duct Drawing of Proposed Plant



4.2. Specific Sound Level

The predicted noise levels at NSR1 & NSR2, based on the plant being installed as per the architectural drawings in appendix 3, have been calculated. The detailed calculations are shown in Appendix E. The calculation assumes that a 1.5D straight through circular silencer is inserted on the vertical run on the atmospheric side of the fan. The minimum insertion loss values are set out below:

Table 4.1: Minimum insertion loss of silencer

Octave Band Centre Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Min. Insertion Loss (dB)	1	2	6	10	13	10	7	5

4.3. Rating Level

BS 4142 states that appropriate acoustic feature corrections should be applied to the source value where necessary. As the specific level is estimated to be 11 & 16dB below the background level for NSR1 & NSR2 during the daytime at the receptor no acoustic correction has been applied. The rating level at the receptor is therefore determined as $L_{Ar,Tr}$ 35 dB for NSR1 and as $L_{Ar,Tr}$ 30 dB for NSR2

4.4. Initial Numerical Impact Assessment

An assessment in accordance with BS 4142 for each NSR are presented in Table 4.1 and 4.2

Table 4.1, BS 4142 Assessment at NSR1

NSR1 BS 4142 Assessment	SPL (dBA)
	Daytime (07:00-23:00)
SPL at NSR1 from Outlet [A]	34
SPL at NSR1 from Fan Casing [B]	28
Specific Sound Level D = [A + B]	35
Acoustic Corrections* [E]	+0
Rating Level [D+E = F]	35
Background Sound Level [G]	46
Excess over Background [F-G]	-11
Initial Estimate of Impact	Low Impact

Table 4.2, BS 4142 Assessment at NSR2

NSR2 BS 4142 Assessment		SPL (dBA)
		Day time (07:00-23:00)
SPL at NSR1 from Outlet [A]		30
SPL at NSR1 from Fan Casing [B]		15
Specific Sound Level D = [A + B]		30
Acoustic Corrections* [E]		+0
Rating Level [D+E = F]		30
Background Sound Level [G]		46
Excess over Background [F-G]		-16
Initial Estimate of Impact		Low Impact

4.4.1. Discussion of Results

The INIA assessment indicates that the rating level associated with the proposed ventilation system is significantly below the prevailing background sound level at the nearest sensitive receptors NSR1 & NSR2, as such no further mitigation is required beyond the recommended silencer with min. performance values as stated in Table 4.1.

4.5. Uncertainty

Uncertainty is an unavoidable feature of measurements in the field, which can be subject to many factors; the weather typically being the most significant of which with respect to the measurement of sound. Uncertainty is also unavoidable in the prediction of sound levels, where naturally, before the scenario being considered becomes a reality, a number of assumptions need to be relied upon. There is also the uncertainty of people's reactions, which can be influenced by a number of factors, not just the magnitude or character of the sound in question.

In keeping with the scale of each project, Peninsular Acoustics aims to minimise uncertainty at each stage as far as reasonably practicable. With this in mind, the control measures listed in Appendix C have been followed, which themselves, have been derived from the guidance within BS 4142.

Crucially, measurements have been undertaken by suitably qualified staff, using state of the art, in calibration equipment, over suitable periods and avoiding adverse weather conditions.

The predictions have also been undertaken by suitably qualified staff, and by using a broad spread of source data obtained through archived specific sound level measurements.

5. Conclusions

Peninsular Acoustics has been commissioned by Mr Jalil Ali t to undertake a noise assessment to consider the potential impact associated with a proposed extract ventilation system at 18-20 Mackets Lane, Liverpool L25 0LQ.

An Environmental Sound Survey has been undertaken at a location representative of the nearby sensitive receptors to establish existing background noise levels.

An assessment in accordance with BS 4142 has demonstrated that the rating level associated with the proposed ventilation system is significantly below the representative background sound level at the nearest receptor therefore indicating [a low impact](#).

Limitations applicable to this report are contained in Appendix F.

Appendix A

Technical Terminology

Parameter	Description
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20µPa (20x10 ⁻⁶ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log ₁₀ (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
L _{eq,T}	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
L _{Max,T}	A noise level index defined as the maximum noise level during the period T. L _{Max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L _{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L _{90,T}	A noise level index. The noise level exceeded for 90% of the time over the period T. L ₉₀ can be considered to be the "average minimum" noise level and is often used to describe the background noise.
L _{10,T}	A noise level index. The noise level exceeded for 10% of the time over the period T. L ₁₀ can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
L _{Aeq,Tr}	Specific noise level. The equivalent continuous A-weighted sound pressure level at the assessment position produced

	by the specific noise source over a given reference time interval.
$L_{Ar,Tr}$	Rating noise level. The specific noise level plus any adjustments for characteristic features of the noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.
Facade	At a distance of 1m in front of a large sound reflecting object such as a building facade.
Fast/Slow Time Weighting	Averaging times used in sound level meters.
Octave Band	A range of frequencies whose upper limit is twice the frequency of the lower limit
Airborne Sound Insulation	Sound insulation that reduces transmission of airborne sound between buildings or parts of buildings
R_w	The single number quantity, which characterises the airborne sound insulating properties of a material or building element over a range of frequencies.
$D_{nT,w}$	The single number quantity, which characterises the airborne sound insulation between rooms over a range of frequencies, using noise spectrum 2 as defined in BS EN ISO 717-1:1997
C_{tr}	Correction term applied against the sound insulation single-number values (R_w , D_w and $D_{nT,w}$) to provide a weighting against low frequency performance.
Frequency (Hz)	The number of pressure variations (or cycles) per second that gives a sound its distinctive tone. The unit of frequency is the Hertz (Hz).
One-third octave band	A frequency band in which the upper limit is $2^{1/3}$ times the frequency of the lower limit.
Reverberation Time	The time, in seconds, taken for a sound in a room to decay by 60dB after a source has been stopped.
Reverberation Time	The time, in seconds, taken for a sound in a room to decay by 60 dB after a source has been stopped.
Sound Level	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure. The sound level is the sound pressure relative to a standard reference pressure of 20×10^{-6} Pascals on a decibel scale.

Appendix B

UNCERTAINTY

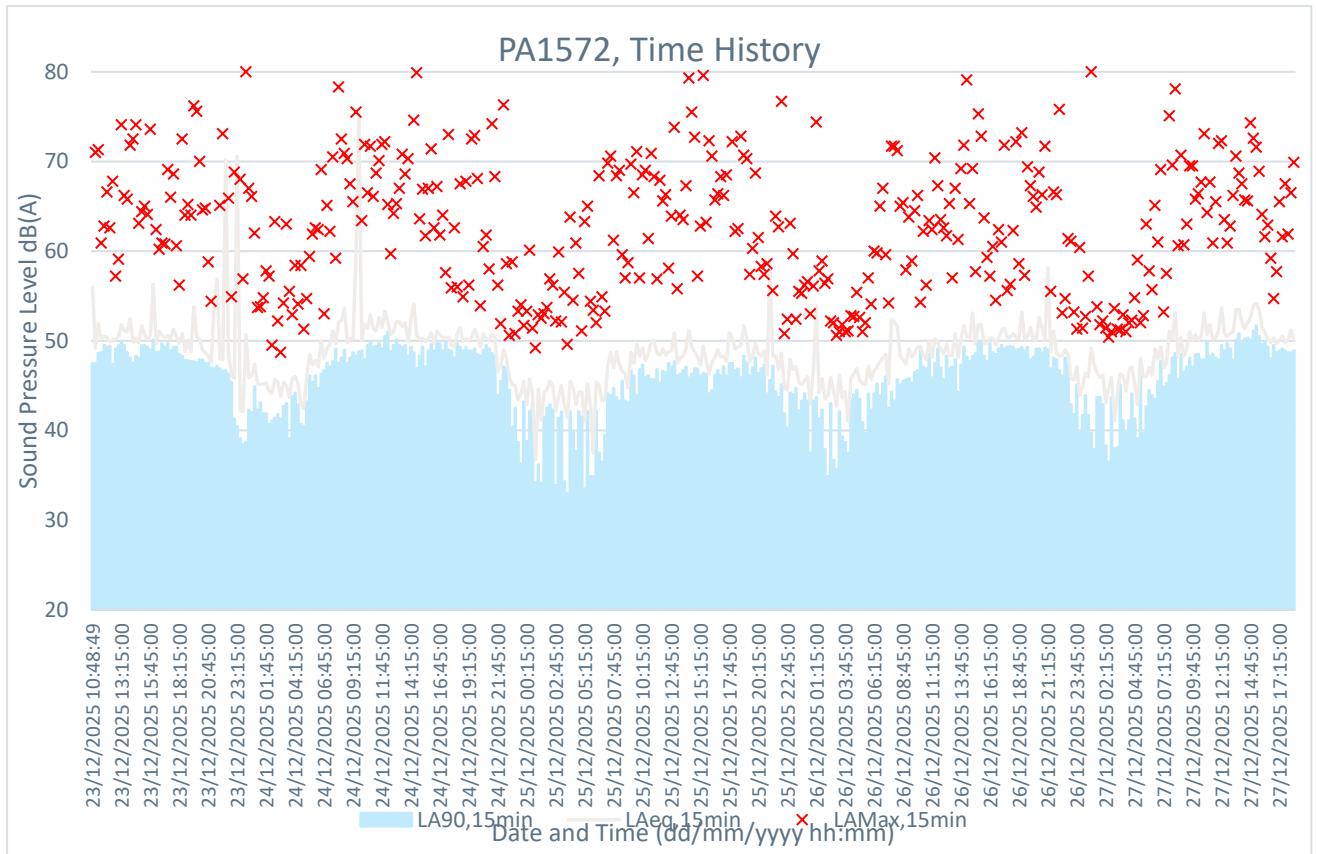
Uncertainty Control Measures	Applicable?	Adopted?/Comments
Measurement		
Only use in calibration Type/Class 1 equipment and check (and record) calibration level before and after measurements	✓	Yes
Measurements taken using the time and frequency weighting specified by the relevant standard?	✓	Yes
Detailed notes made, including details of the equipment, weather, survey positions (including approximate distances), contributing noise sources, presence of screening etc.?	✓	Yes
Photographs taken and recorded survey locations using GPS?	✓	Yes
Avoided standing waves/interference – listen for effects, taken spatial average from several locations or conducted a sweep	✓	Yes
Taken measurements of source at different distances to establish propagation	×	Not relevant. Source not installed
Taken measurements at different heights where relevant	×	Not relevant
Avoided just measuring in the “noisiest” parts of the site, and established how “quiet” it is, too, where relevant to the assessment	✓	Yes
Measured under different source operating conditions relevant to the assessment / adopt worst case if known	×	Not relevant. Source not installed
Measured more than one cycle/event	-	Not relevant to source
Determined the state of repair of any associated source, where relevant	×	Source not installed
Used a windshield and avoided windy conditions (i.e. gusts regularly exceeding 5 m/s)	✓	Yes
Avoided wet conditions (particularly in terms of rain on the windshield/microphone and on neighbouring surfaces)	✓	Yes
Avoided electrical and electromagnetic interference (such as from power cables and radio transmitters)	✓	Yes
Avoided extreme temperatures? Traffic conditions can be different in freezing conditions, whilst meters can overheat and fail in a case when in direct sunlight during the summer.	✓	Yes
Made measurements during different weather conditions? Particularly relevant in terms of wind direction for sites affected by aircraft movements, but also for sites affected by other distant, but significant, sources of noise, in different directions	-	Not considered necessary for this assessment

Where one source is dominant (such as a main road), have measurements been taken during conditions favourable to propagation (i.e. when wind direction is within +/-45° of the line between the source and receiver or during temperature inversion, such as on clear calm nights)	-	Not considered necessary for this assessment
Avoided tree/leaf (movement) sound where possible? Ideally take measurements the same distance from sources of such sound as any receptors of interest	✓	Yes – no significant wind present to cause dominant leaf movement
Avoided dawn chorus sound? Ideally take measurements the same distance from trees and bushes as any receptors of interest	✓	Yes
Measured outside the receptor in question where possible? It is worst case typically to measure under free-field conditions and apply +3 dB correction if necessary to convert to "façade" where applicable – for most planning (new residential development) assessments, free-field is preferable	✓	Yes, nearby and used free-field conditions
Avoided atypical traffic conditions (such as during school holidays and road works – road traffic incidents can significantly affect flows, but which can't be predicted and their occurrence can't always be established after the survey – check the data for anomalies)?	✓	Yes, although not relevant and reduced traffic would make assessment more worst-case
Avoided the presence of the engineer and/or the microphone resulting in atypical conditions (e.g. people stopping to talk, workers on site adjusting their way of working, etc.)?	✓	Yes
Data handling		
Was the data downloaded immediately after survey and process promptly whilst details are fresh?	✓	Yes
Were digital transfer methods used and was the data written down too?	✓	Yes
Was the time-history examined (in as fine a resolution as possible) for any unexpected events – preferably with active spectral data (i.e. in dBTRAIT)	✓	Yes
If removing any data (due to an atypical event, for example), was the data saved as a new file, with notes to the data provided within the corresponding Excel file?	✓	Yes, raw data separate from processed data
Prediction		
Was measurement data used at different distances to verify propagation?	×	No
Were measurements at different heights used to verify screening effects, where relevant?	×	No, not relevant

Were propagation calculation procedures relevant to the source and distance used?	✓	Yes, based on ISO 9613-2
Were detailed traffic flow data applicable to the assessment methodology used?	×	N/A
Were detailed sound source data (including octave-bands levels) used, accounting for size, height and directivity, where known?	✓	Yes, octave band data used
Were detailed topographical data and base mapping used?	×	No, no mapping used
Were different ground types identified	×	No ground absorption accounted for
Was an order of reflections of at least one applied?	×	No, no mapping used.
Was the 3D view feature of the modelling software used to check the accuracy of the model?	×	No, no mapping used
Were contour plots produced as a further means of identifying any abnormalities or errors in the model?	×	No, no mapping used

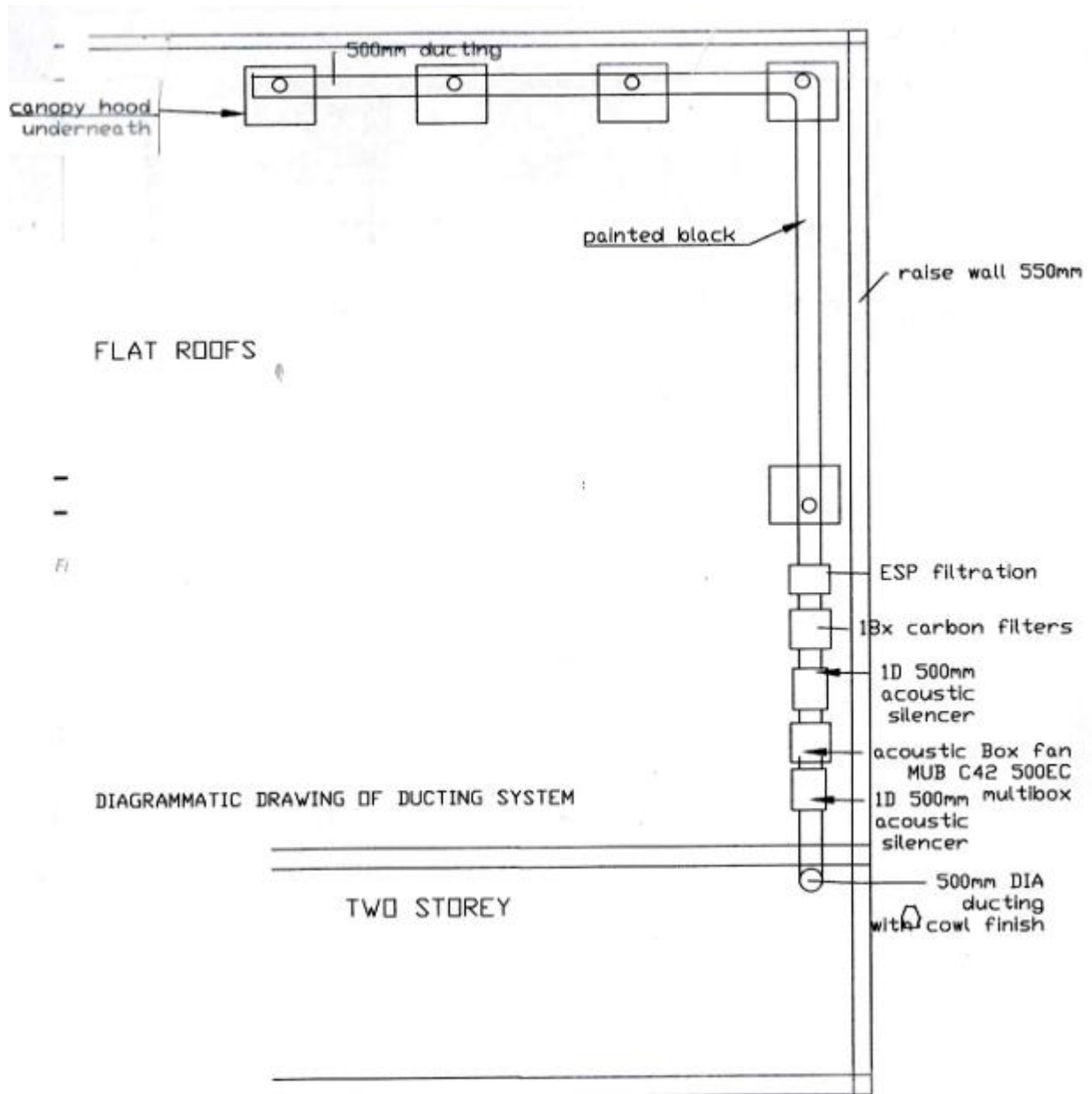
Appendix C

TIME-HISTORY OF MEASURED NOISE LEVELS



Appendix D

Proposed Ventilation System



Sound power level

Acoustic filter

A-filter ▾

Octave bands

Octave bands ▾

		63	125	250	500	1k	2k	4k	8k	Total
Inlet	dB(A)	46	72	65	71	72	68	65	57	78
Outlet	dB(A)	48	74	66	72	73	70	66	59	79
Surrounding	dB(A)	31	58	47	45	46	46	39	26	59
Sound pressure level at 3m (20m ² Sabine)	dB(A)	-	-	-	-	-	-	-	-	52
Sound pressure level at 3m free field	dB(A)	-	-	-	-	-	-	-	-	38

Appendix E

Specific Sound Level Calculations

All calculations in tables D.1 to DS.2 based off the following equation for a directivity factor of Q=1 or

$$Q=2: Lp = Lw + 10\log\left(\frac{Q}{4\pi r^2}\right)$$

Table D.1 Specific sound level at NSR1

Octave Bands	63	125	250	500	1k	2k	4k	8k
A-weighting Correction	-26	-16	-9	-3	0	1	1	-1
A-weighted Fan outlet	48	74	66	72	73	70	66	59
Linear Fan outlet Lw	74	90	75	75	73	69	65	60
A-weighted Surround	31	58	47	45	46	46	39	26
Linear surround Lw	57	74	56	48	46	45	38	27
Lp surround at R	26	43	25	17	15	14	7	-4
Lp outlet at R	30	48	31	27	22	20	19	16
Surround+Outlet	31	49	32	27	23	21	20	17
SPL surround at R								28
SPL outlet at R								34
SPL Outlet + Surround								35

Table D.2 Specific sound level at NSR2

Octave Bands	63	125	250	500	1k	2k	4k	8k
A-weighting Correction	-26	-16	-9	-3	0	1	1	-1
A-weighted Fan outlet	48	74	66	72	73	70	66	59
Linear Fan outlet Lw	74	90	75	75	73	69	65	60
A-weighted Surround	31	58	47	45	46	46	39	26
Linear surround Lw	57	74	56	48	46	45	38	27
Lp surround at R	13	30	12	4	2	1	-6	-17
Lp outlet at R	26	44	27	23	19	17	16	13
Surround+Outlet	28	46	28	24	19	18	16	13
SPL surround at R								15
SPL outlet at R								30
SPL Outlet + Surround								30

Appendix F

Report Limitations

This report has been prepared for the titled project or named part thereof and should not be used in whole or part and relied upon for any other project without the written authorisation of Peninsular Acoustics Limited. Peninsular Acoustics Limited accept no responsibility or liability for the consequences of this document if it is used for a purpose other than that for which it was commissioned. Persons wishing to use or rely upon this report for other purposes must seek written authority to do so from the owner of this report and/ or Peninsular Acoustics Limited and agree to indemnify Peninsular Acoustics Limited for any and all loss or damage resulting therefrom. Peninsular Acoustics Limited accepts no responsibility or liability for this document to any other party other than the person by whom it was commissioned.

The findings and opinions expressed are relevant to the dates of the site works and design drawings/specifications and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations Peninsular Acoustics Limited reserve the right to review the information, reassess any new potential concerns and modify our opinions accordingly.



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