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ACOUSTICS

Amspec Limited

35 King Street, Manchester

Plant Noise Assessment



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35 KING STREET, MANCHESTER

Plant Noise Assessment

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1. Introduction

Peninsular Acoustics Ltd has been commissioned by Amspec Ltd (hereafter referred to as 'The Client') to undertake an acoustic assessment for the installation of 1no. air conditioning unit (AC) to the roof top deck of 35 King Street, Manchester, M2 7AT (hereafter referred to as 'the Site').

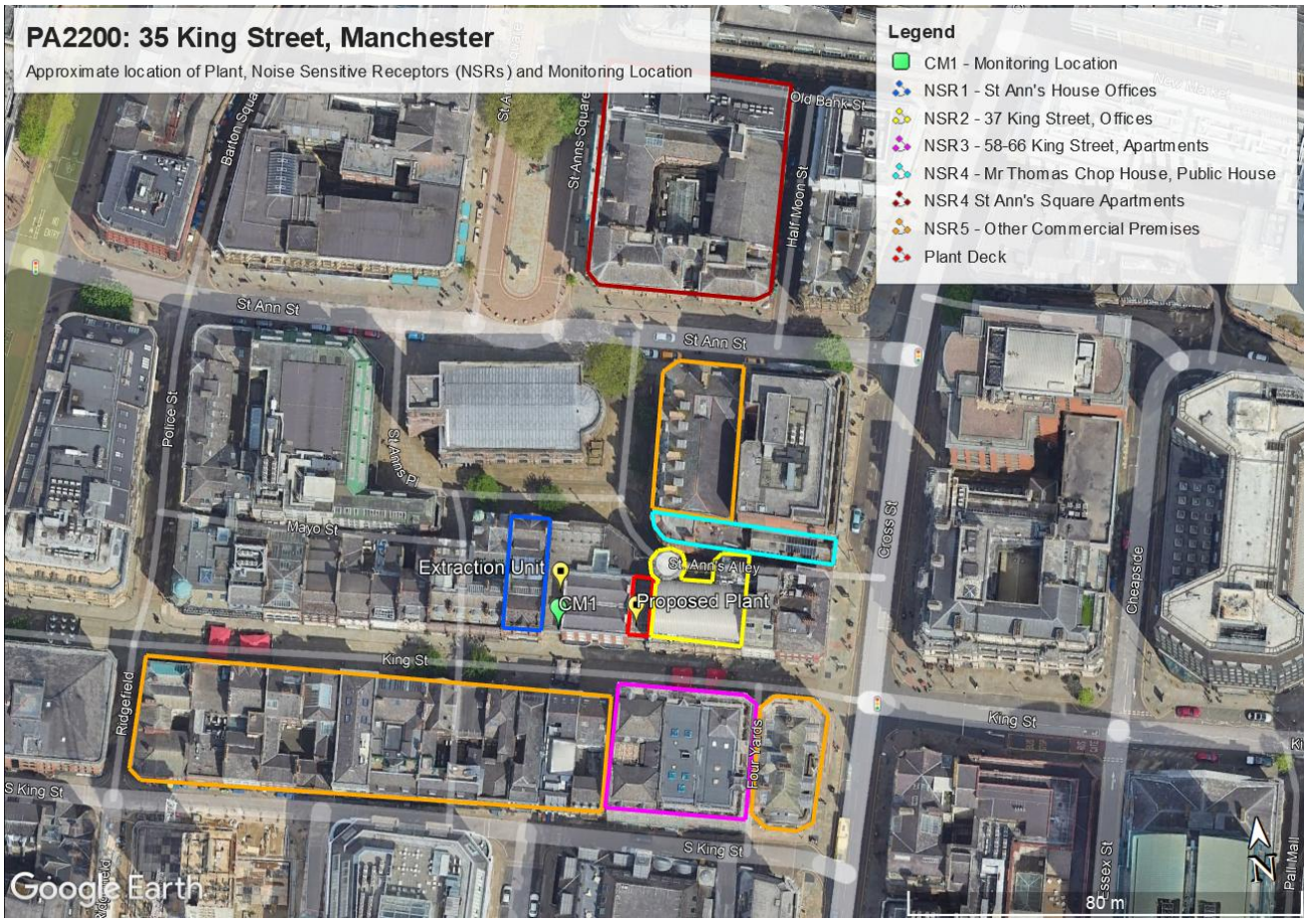
This report is necessarily technical in nature and therefore, to assist the reader, an acoustics glossary is provided in Appendix A.

1.1. Site Description

The Site is located in the city centre of Manchester overlooking King Street and St Anns Church. The Site is surrounded mostly by commercial premises with some of these premises housing offices in the upper floors. The nearest noise sensitive receptors to the site have been adopted from the Sandy Brown Report No. 024609-R02-D which assessed the existing roof top plant, as shown in Figure 1.

Commercial premises nearby include a public house down St Anns Alley and restaurants down King Street both which utilise outdoor spaces for eating and drinking during seasonal periods.

Figure 1: Site Boundary



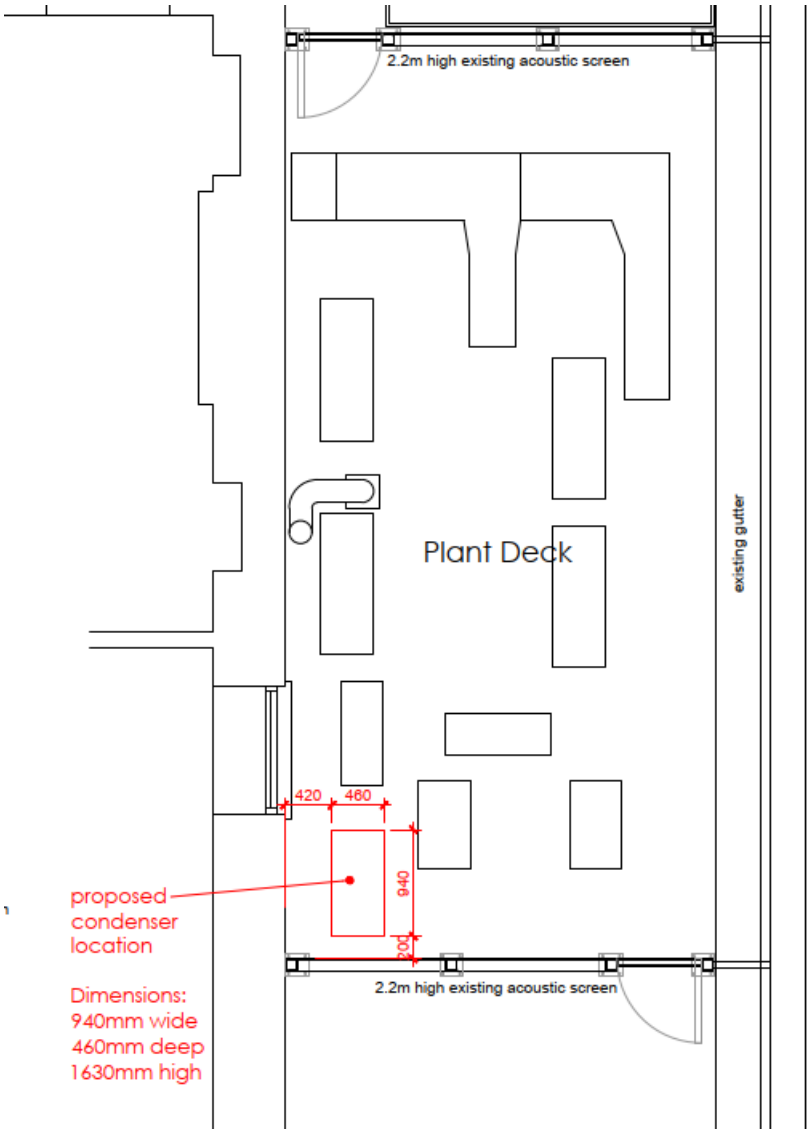
1.2. Development Proposals

The client proposes to install one AC unit on the existing rooftop plant deck, which incorporates an acoustic enclosure and currently houses five condenser units. Sandy Brown was previously commissioned to discharge planning Conditions 6A and 6B associated with planning permission 139242/FO/2024 related to the installation of the five existing roof top plant items.

Figure 1 shows the approximate location of the existing plant where the proposed AC unit would be installed.

The specifications of the AC unit are provided in Table 3 and the proposed location of the unit is shown in Figure 2

Figure 2: Proposed Location of AC Unit



Operational times of the AC unit have not been provided; therefore, in support of a worst-case assessment, it is assumed that the unit could operate during daytime and night-time periods.

1.3. Noise Sensitive Receptors

The nearest noise sensitive receptors to the roof top plant deck have been identified as follows:

- NSR 1: 58-66 King Street, circa 15m south of rooftop plant highlighted in pink in Figure 1, and;
- NSR 2: St Ann's Square apartments circa 60m north of rooftop plant as shown in dark red in Figure 1.

1.4. Scope of Works

The following scope of works has been undertaken:

- Nearby Noise Sensitive Receptors (NSRs) have been identified using satellite images, client information and site observations;
- Baseline environmental background sound levels have been established through an unattended environmental sound survey.
- Based upon information provided by the Client, calculations have been undertaken to predict plant noise emissions at the facades of NSR's;
- An assessment has been undertaken in accordance with Local Authority Criteria and BS 4142 to determine the predicted sound levels at the nearest Noise Sensitive Receptors (NSRs);

1.5. Design Criteria

Local Authority Criteria

Manchester City Council (MCC) stipulates the following in regard to plant noise egress:

'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location'.

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 fixed installations which comprise mechanical and electrical equipment.

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.

The general principles of a BS 4142 assessment are to establish the sound level, consider the features and provide a rating level whereby the specific sound level is artificially increased to account for distinguishing characteristics by using penalties for tonality, impulsivity, intermittency, and other sound characteristics ranging from +3 dB to +9 dB depending on the feature.

2. Survey Procedure and Equipment

2.1. Methodology

Unattended noise monitoring was undertaken on the rooftop of 35 King Street, on the deck adjacent to the rooftop plant enclosure, at a location representative of the nearest Noise Sensitive Receptors (NSRs). Background sound levels were measured continuously between 28 May and 1 June 2026. The monitoring position (CM1) is shown in Figure 1.

2.2. Equipment

Sound levels were measured using a Class 1 SLM housed in environmental protection apparatus. The SLM was field calibrated before and after the survey using a Class 1 calibrator, with no significant drift in calibration levels recorded (> ± 0.5dB). The equipment was setup in free-field conditions to capture $L_{Aeq,}$ $L_{AFmax,}$ and L_{eq} at a minimum.

Full details of the noise measurement equipment used are available upon request but have been calibrated to traceable standards within the 12 – 24 months prior to the survey being undertaken.

2.3. Site Survey Notes

During the survey period, meteorological conditions were monitored with steady wind speeds of less than 5 m/s and no periods of precipitation recorded throughout the survey at position CM1, therefore results are considered representative and suitable for assessment purposes.

At CM1 the dominant noise sources were noted to be pedestrians passing through King Street and the occasional tram pass by down Cross Street. Occasional construction noise and works were also observed during setup and collection located at St Anns square and temporary works along king street.

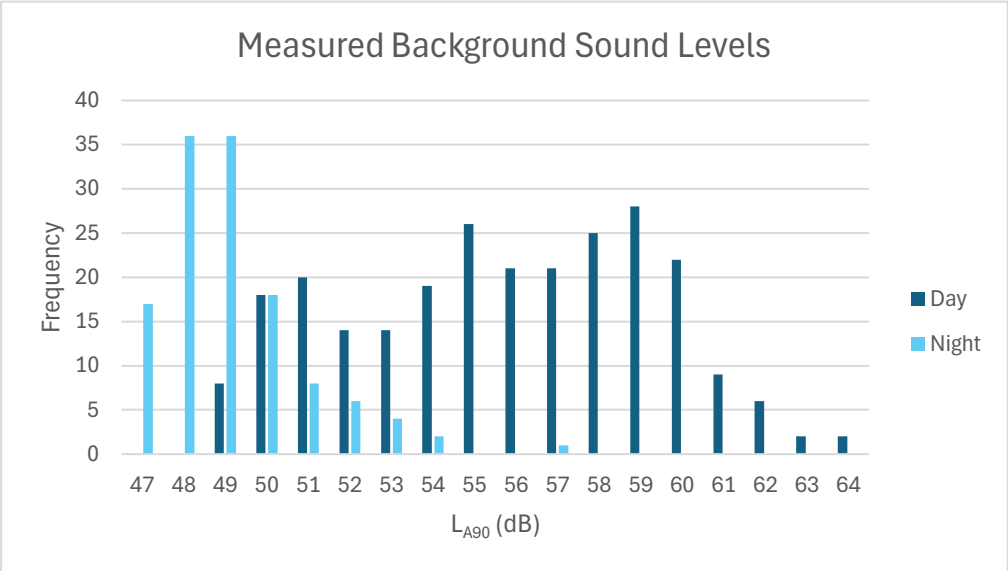
2.4. Results

The unattended survey results are presented in Table 1. Measurements were taken in 15-minute intervals. A histogram is provided in Figure 3 to show the spread of measured background sound levels and a Time History is provided in Appendix B.

Table 1: Measured Background Sound Levels L_{A90}

Measurement Period	Representative Background Sound Level $L_{A90,15min}$
Day **07:00 – 23:00**	54 dB
Night **23:00 – 07:00**	48 dB

Figure 3: Histogram of measured BackgroundSound Levels



The representative sound levels in free field conditions measured from the rooftop of 35 King Street, and hereby adopted to inform the assessment as follows:

- 51dB $L_{A90,15min}$ Daytime
- 45dB $L_{A90,15min}$ Nighttime

3. Plant Noise Assessment

3.1. Criteria

Based on the free field representative sound levels the noise level from the operation of the new plant should not exceed the limits set out in Table 2.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. In this case these limits would apply at 58-66 King Street, St Ann's House and 37 King Street.

Table 2: Plant noise limits at 1m from the nearest noise sensitive premises

Time Period	Rating Level, $L_{Ar,Tr}$(dB)
Day (07:00-23:00)	46
Night (23:00-07:00)	40

3.2. Source Sound Levels

Noise data has been derived from the manufacturers data sheet, provided by the client presented in Table 3 whereby the worst-case sound pressure levels from manufacturers data sheets have been used.

Table 3: Proposed plant Sound Pressure Levels

Unit name	Sound Pressure Level $L_{pA\ at\ 1m}$ (dB)	Number to be installed
SAMSUNG AC200KXAPNH/EU	60	1

3.3. Predicted Sound Levels

Calculations have been performed following the ISO 9613 procedure to determine the specific sound level at receptors, accounting for the following:

- Ground Reflections
- Distance Attenuation
- Screening Loss

The predicted noise egress calculations are provided in Appendix C

A representative spectrum has been used for the proposed plant based off the installed units and broadband sound pressure level of the proposed plant.

3.4. BS 4142 Initial Numerical Impact Assessment

In accordance with BS 4142 an initial numerical impact assessment (INIA) has been undertaken.

BS 4142 describes methods by which character corrections can be applied to sound, based on the audible presence of acoustic characteristics such as impulsivity, intermittency, tonality, or any other character of a given sound that may make it readily apparent against a given acoustic environment.

No corrections have been applied for tonality or impulsivity based off existing plant not exhibiting these characteristics. In addition, predictions of specific sound levels are low, therefore no character correction has been applied, as it can be assumed that plant will not be audible at the receptors.

Table 4 demonstrates a BS 4142 compliant INIA of proposed plant units at the Site.

Table 4 Initial Numerical Impact Assessment

Results	NSR 1		NSR 2	
	Day	Night	Day	Night
Calculated Specific Sound Level dB $L_{Aeq, T}$	37	37	28	28
Acoustic Feature Correction dB	+0	+0	+0	+0
Rating Level dB $L_{Ar, Tr}$	37	37	28	28
Background Sound Level dB $L_{A90, T}$	51	45	51	45
Rating over Background dB	-14	-8	-23	-17
Estimation of Impact	Low	Low	Low	Low

The BS 4142 assessment indicates that sound from the plant will be lower than background sound level at the closest NSRs during daytime and night-time periods

3.5. Summary

Impact from the proposed plant is predicted to be significantly below the background sound level at each receptor. This is indicative that noise from the plant units will not be audible at nearby receptors. Consequently, a Low impact is determined in accordance with BS 4142, and no further mitigation or considerations from an acoustic perspective need be given to the external plant.

The results also demonstrate that the plant is compliant with the local authority requirements.

3.6. 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 D 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 using source data provided by the client.

Notwithstanding this, naturally some uncertainty remains. Given the sheer number of factors involved, however, it is not feasible to place a numerical value on the level of uncertainty, without resulting in an unhelpful range of possible outcomes.

It is the professional position of Peninsular Acoustics that uncertainty has been kept to a realistic minimum and that the outcome of this assessment is sufficiently representative and robust.

4. Conclusion

Peninsular Acoustics Ltd has been commissioned by Amspec Ltd, to conduct an acoustic assessment for the installation of one new Outdoor Air Condition (AC) unit to the roof top deck of 35 King Street, Manchester.

An unattended environmental sound survey has been undertaken at the Site which has determined prevailing background sound levels at a location representative of the closest NSRs.

Calculations have been used to determine noise impact of proposed plant units at the nearest residential receptors.

The results of the assessment have shown an overall impact of 'Low' in accordance with BS 4142 on nearby residential amenity and meet local authority criteria of being -5dB below background sound level.

Therefore, it can be concluded that proposals at the Site do not pose a risk of an adverse noise impact on nearby residential amenity.

The limitations of this report are presented in Appendix E.

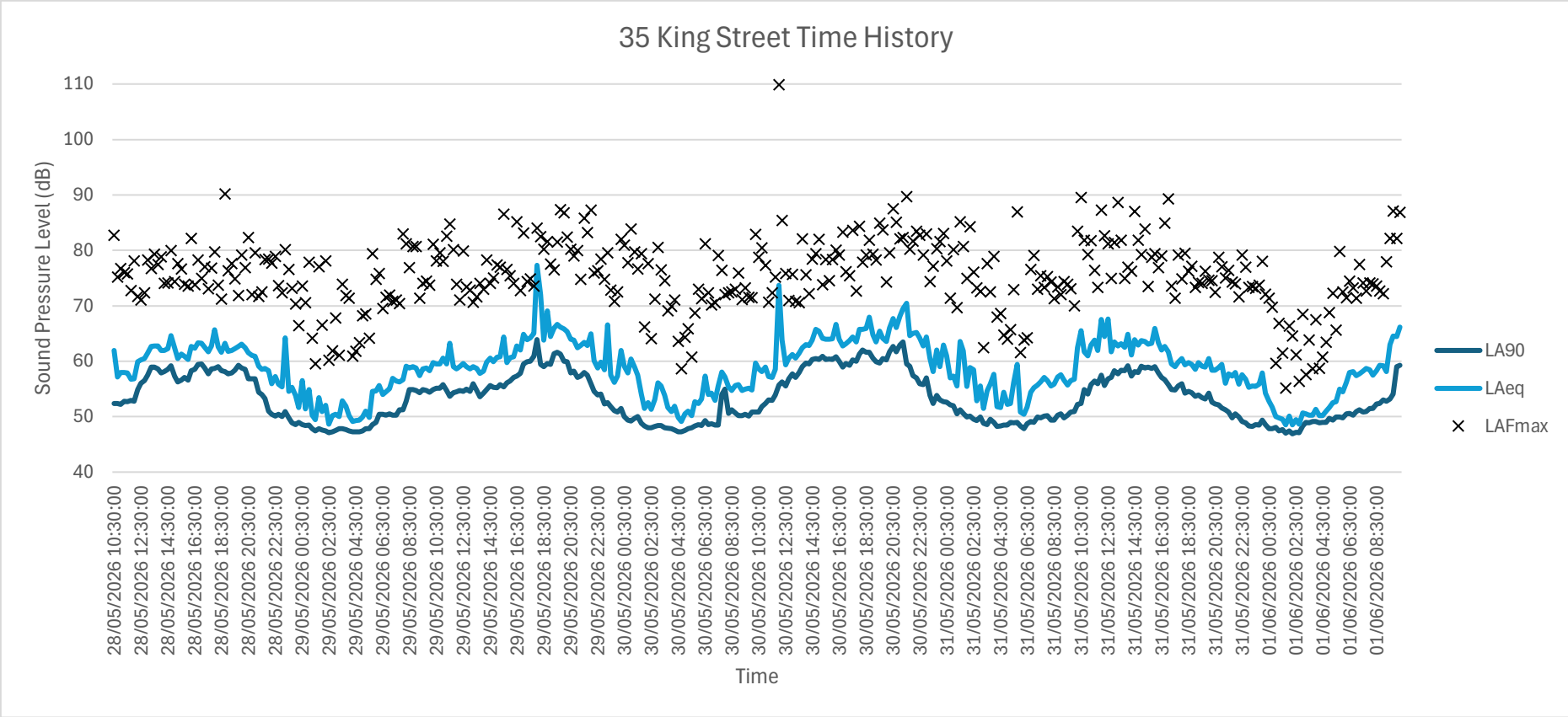
Appendix A

Technical Terminology

Term	Description
Sound Pressure	A measured sound pressure level that is independent of any contributions due to reflections from nearby surfaces and is therefore representative of the direct path only.
Sound Pressure 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 log10 (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.
$L_{eq,T}$	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.
$L_{AFmax,T}$	A noise level index defined as the maximum noise level during the period T. LMax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq 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. L90 can be considered to be the "average minimum" noise level and is often used to describe the background 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.

Appendix B

Time History


35 King Street Time History
Sound Pressure Level (dB)
110
100
90
80
70
60
50
40
28/05/2026 10:30:00
28/05/2026 12:30:00
28/05/2026 14:30:00
28/05/2026 16:30:00
28/05/2026 18:30:00
28/05/2026 20:30:00
28/05/2026 22:30:00
29/05/2026 00:30:00
29/05/2026 02:30:00
29/05/2026 04:30:00
29/05/2026 06:30:00
29/05/2026 08:30:00
29/05/2026 10:30:00
29/05/2026 12:30:00
29/05/2026 14:30:00
29/05/2026 16:30:00
29/05/2026 18:30:00
29/05/2026 20:30:00
29/05/2026 22:30:00
30/05/2026 00:30:00
30/05/2026 02:30:00
30/05/2026 04:30:00
30/05/2026 06:30:00
30/05/2026 08:30:00
30/05/2026 10:30:00
30/05/2026 12:30:00
30/05/2026 14:30:00
30/05/2026 16:30:00
30/05/2026 18:30:00
30/05/2026 20:30:00
30/05/2026 22:30:00
31/05/2026 00:30:00
31/05/2026 02:30:00
31/05/2026 04:30:00
31/05/2026 06:30:00
31/05/2026 08:30:00
31/05/2026 10:30:00
31/05/2026 12:30:00
31/05/2026 14:30:00
31/05/2026 16:30:00
31/05/2026 18:30:00
31/05/2026 20:30:00
31/05/2026 22:30:00
01/06/2026 00:30:00
01/06/2026 02:30:00
01/06/2026 04:30:00
01/06/2026 06:30:00
01/06/2026 08:30:00
Time
LA90
LAeq
LAFmax

Appendix C

Specific Sound Level Calculations

Proposed AC Unit NSR: 58-66 King Street									
	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	dBA
Sound pressure level at 1m	69	63	60	57	54	53	47	39	60
Additional source directivity; Q = 8	9	9	9	9	9	9	9	9	
Total sound pressure level at 1m	78	72	69	66	63	62	56	48	69
Losses									
Distance attenuation - Point source, r=14m	23	23	23	23	23	23	23	23	
Screening Loss - Path Difference, =0.15m	5	6	7	9	11	13	16	19	
Total losses	28	29	30	32	34	36	39	42	
Sound pressure level after losses	50	43	39	34	29	26	17	6	37
Total sound pressure level at receptor	50	43	39	34	29	26	17	6	37
Criteria - Daytime									46
Difference									-9
Criteria - Nighttime									40
Difference									-3

Proposed AC Unit NSR: St. Ann's Square apartments									
	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	dBA
Sound pressure level at 1m	69	63	60	57	54	53	47	39	60
Additional source directivity; Q = 2	9	9	9	9	9	9	9	9	
Total sound pressure level at 1m	78	72	69	66	63	62	56	48	69
Losses									
Distance attenuation - Point source, r=54m	35	35	35	35	35	35	35	35	
Screening Loss - Path Difference, =0.02m	5	5	5	5	6	7	8	10	
Total losses	40	40	40	40	41	42	43	45	
Sound pressure level after losses	38	32	29	26	22	20	13	3	28
Total sound pressure level at receptor	38	32	29	26	22	20	13	3	28
Criteria - Daytime									46
Difference									-18
Criteria - Nighttime									40
Difference									-12

Appendix D

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	×	N/A
Taken measurements of source at different distances to establish propagation.	x	N/A used manufacturers data to inform assessment
Taken measurements at different heights where relevant	x	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	x	N/A used manufacturers data to inform assessment
Measured more than one cycle/event	x	N/A used manufacturers data to inform assessment
Determined the state of repair of any associated source, where relevant	✓	N/A plant under assessment not yet 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)	✓	No
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?	✓	Yes

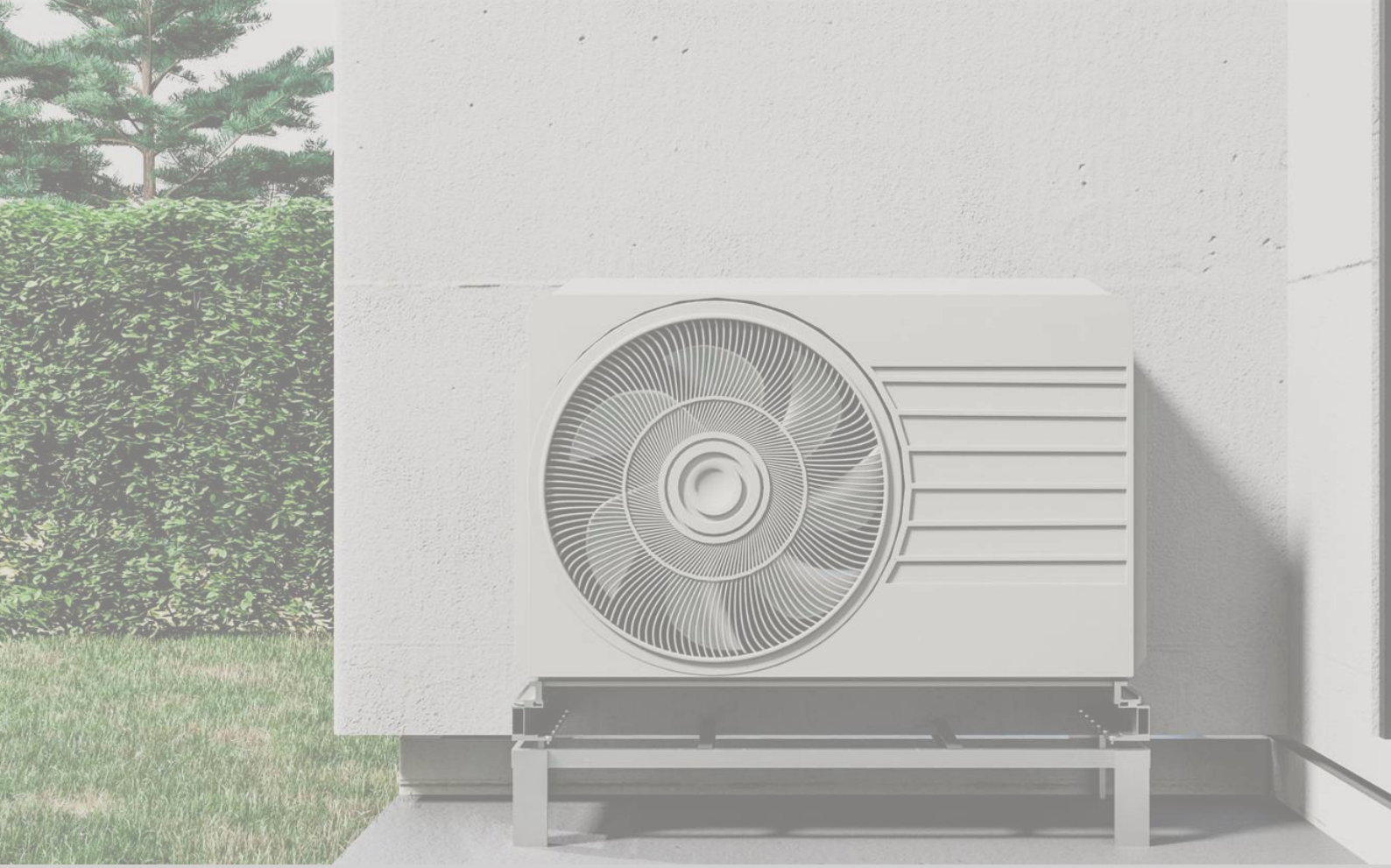
Uncertainty Control Measures	Applicable?	Adopted?/Comments
Ideally take measurements the same distance from sources of such sound as any receptors of interest	✓	Meausrements taken at a screened location therefore it is expected background sound levels are lower than those experienced at the receptor
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	✓	Not possible to measure at the receptors.
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
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	✓	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?	✓	Not applicable no atypical events observed and therefore no data removed.
Prediction		
Was measurement data used at different distances to verify propagation?	✓	Not possible to measure source at different distances
Were measurements at different heights used to verify screening effects, where relevant?	✓	Not possible to measure source at different heights
Were propagation calculation procedures relevant to the source and distance used?	✓	Yes
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?	✓	No octave band data available in manufacturer specifications. Representative spectrum used based off Broadband sound levels

Appendix E

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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