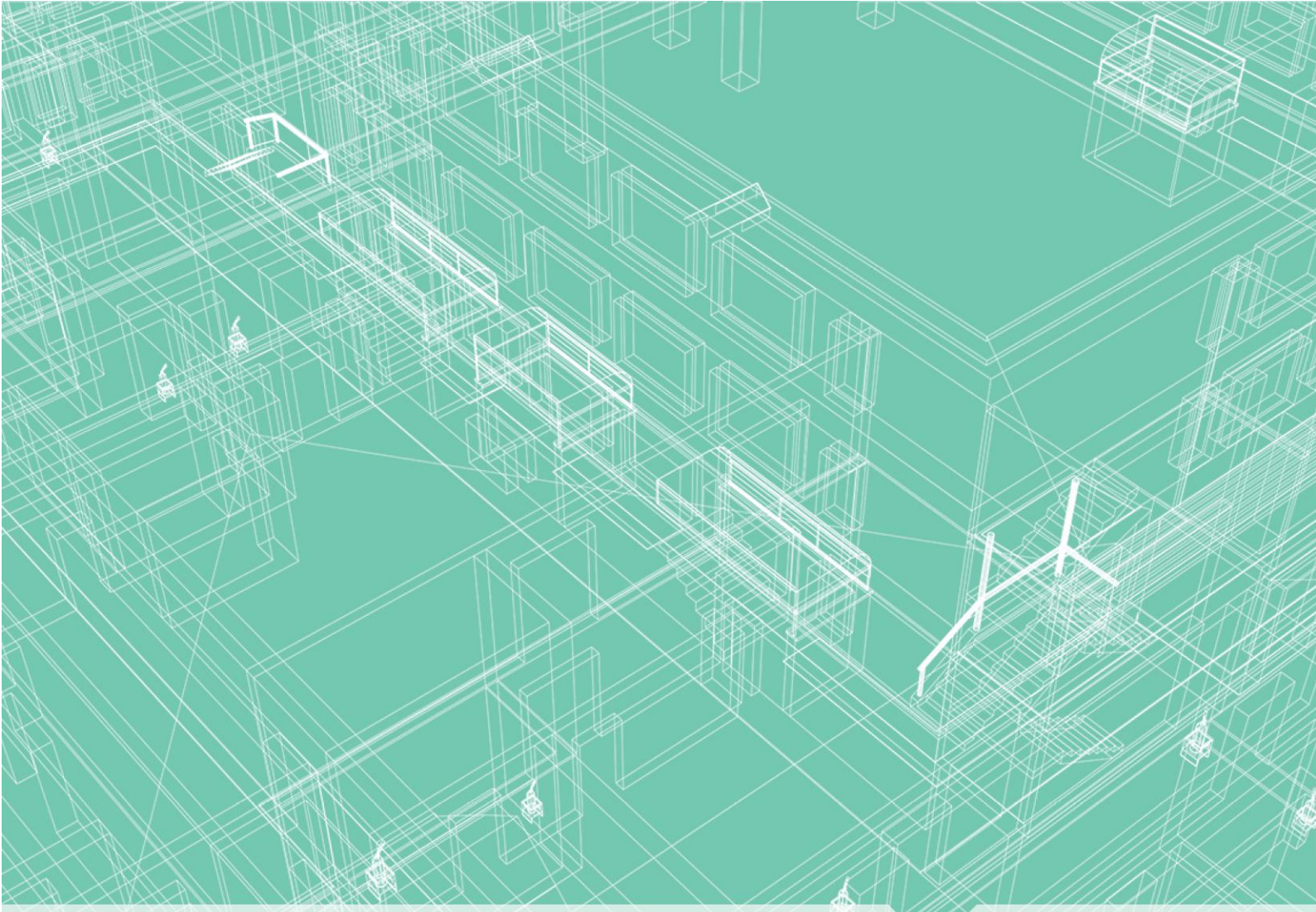

ACOUSTIC REPORT FOR DEVELOPMENT APPLICATION

RETAIL 1, 231 WHALE BEACH ROAD

WHALE BEACH

JHA

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DOCUMENT CONTROL SHEET

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CONTENTS

1 INTRODUCTION

JHA Consulting Engineers has been engaged by Richard Cole Architecture to provide an acoustic assessment for the proposed Retail 1 located on the Ground Floor of 231 Whale Beach Road, Whale Beach, NSW.

The proposal involves a hospitality retail space (Retail 1) in a new building consisting of 5 premium residential units, retail spaces and an associated underground carpark. Demolition of the existing building and construction of the other spaces within the new building are detailed in a separate Acoustic Report for Development Application[1].

For the proposed Retail 1, an acoustic assessment has been undertaken and it is detailed in this report along with the findings and recommendations. This report has been prepared as part of the Development Application to be submitted to the Northern Beaches Council.

The objectives of this acoustic assessment are:

- Identify the noise and vibration sources from the proposed development that will potentially affect the noise sensitive receivers nearby.
- Establish the appropriate noise level and vibration criteria in accordance with the relevant standards, guidelines and legislation for the following issues:
  - Noise emissions from patrons and staff.
  - Noise emissions from mechanical plant from the development to the surrounding receivers.
- Carry out an acoustic assessment to determine whether the relevant criteria can be achieved and, where applicable, comment on noise control measures required to achieve compliance with the relevant noise level criteria.

This report provides:

- A statement of compliance with the relevant statutory criteria for the proposed use development within the vicinity of the nearest potentially affected receivers.
- Recommendations for noise mitigation measures for the proposed development in order to meet the relevant criteria when compliance is not achieved.

The following documentation has been used for the preparation of this report:

- Architectural drawings of the proposed development provided by Richard Cole Architecture.
- Noise data collected on site through the use of a noise logger and a hand held spectrum analyser.

This document and related work has been prepared following JHA Consulting Engineers Quality Management System, which is based on AS/NZS ISO 9001:2015 and ISO 14001:2015 Environmental Management Systems.

[1] Acoustic Report for Development Application. 231 Whale Beach Road, Whale Beach. Ref: 190351-AC-DA [B], prepared by JHA Engineers, dated 05/02/2020.

2 DESCRIPTION OF THE PROPOSAL

Whale Beach is a suburb in Sydney located approximately 40 kilometres north of the Sydney Central Business District (CBD) and it belongs to the Local Government Area (LGA) of Northern Beaches Council.

The proposed development is located on the Ground Floor of 231 Whale Beach Road, Whale Beach, NSW. Figure 1 shows the approximate footprint of Retail 1 in the new building. Residential receivers are located to the North, South and West of the site, while a commercial receiver is located to the South of the site. To the East is Whale Beach which is designated as Public Recreation. The receiver to the North-East is currently under development and will be considered as a residential receiver for the noise impact assessments as it has the most stringent noise criteria.

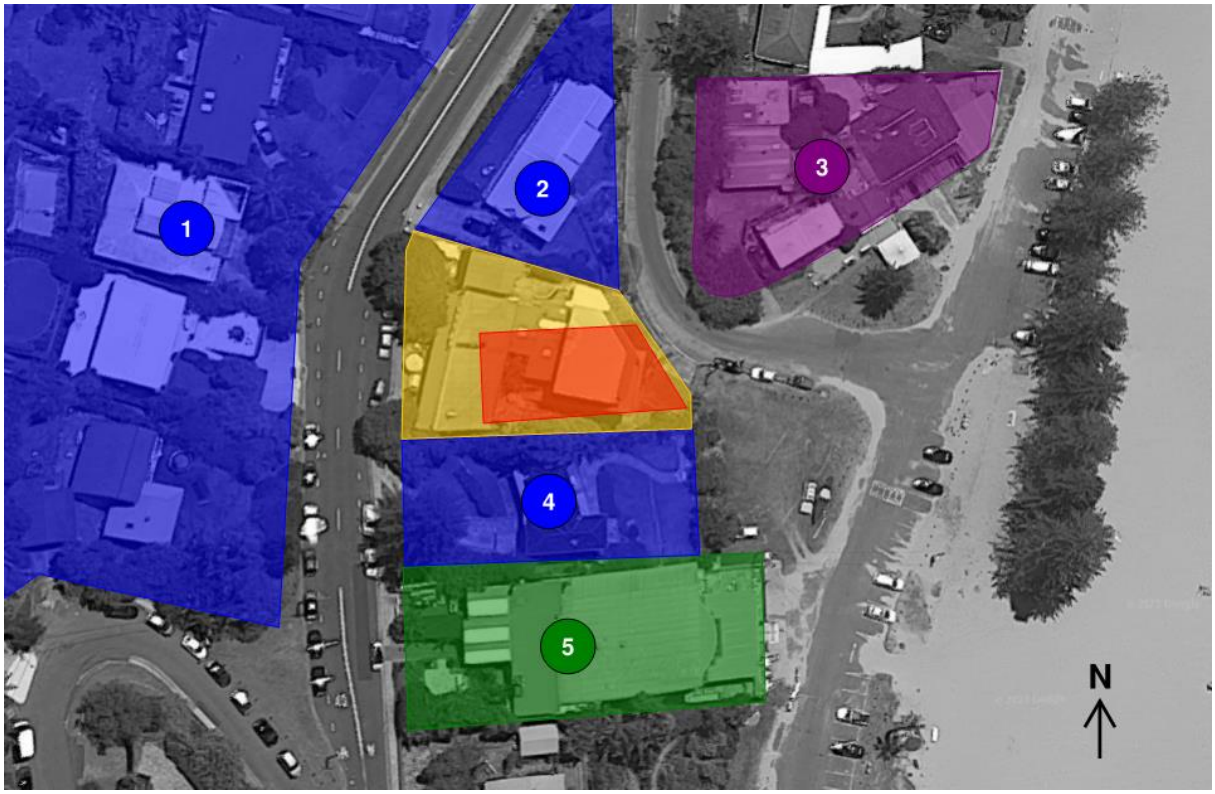


Figure 1: Aerial view showing the location of the proposed Retail 1 (orange) in the site of the new building (yellow), residential receivers (blue), commercial receiver (green) and assumed residential receiver (purple).

A summary of the nearest noise sensitive receivers surrounding the site is shown in Table 1, including the approximate distances from the site boundary to the noise sensitive receiver boundaries.

ID	*Sensitive Receiver*	*Receiver Type*	*Distance (m)*
1	196 Whale Beach Road	Residential	20
2	233 Whale Beach Road	Residential	7
3	24 The Strand	Residential	19
4	229 Whale Beach Road	Residential	< 5
5	Whale Beach Surf Life Saving Club / Moby Dicks Restaurant	Commercial	21

Table 1: Nearest sensitive receivers surrounding the site location.

3 SITE MEASUREMENTS

3.1 GENERAL

Attended and unattended noise surveys were conducted for the noise impact assessment of the entire building and the noise data has been used in this report. The noise surveys were carried out at the locations shown in Figure 2 to establish the ambient and background noise levels of the site and surroundings. The noise surveys were conducted in accordance with the method described in the AS/NZ 1055:2018 *'Acoustics – Description and measurement of environmental noise'*.

Figure 2: The locations of the unattended (L1) and attended noise monitoring (M1 – M4).

3.2 ATTENDED NOISE MONITORING

Attended noise surveys were carried out on Thursday 16th January 2020 during day-time with a NTi XL-2 hand-held Sound Level Meter (SLM) (Serial Number A2A-13742-E0). The calibration of the SLM was checked before and after each use and no deviations were recorded.

The SLM microphone was mounted 1.5 metres above the ground and a windshield was used to protect the microphone. Measurements were undertaken in the free-field – i.e. more than 3 metres away from any building façade or vertical reflective surface. Weather conditions were calm and dry during the attended noise monitoring.

Four short-term noise monitoring locations were chosen as follows:

- Location M1: Outside 24 The Strand.
- Location M2: Outside the Whale Beach Surf Life Saving Club.
- Location M3: At the location of the installed noise monitor.
- Location M4: Whale Beach Road at the proposed site boundary.

From observations during the site visit, it was noted that at location M4, ambient and background noise levels were dominated by traffic noise from Whale Beach Road. At locations M1 to M3, ambient and background noise levels were dominated by the Pacific Ocean. A summary of the results of the short-term noise monitoring are shown in Table 2.

Location	*Date and Time*	*Parameter*	*Sound Pressure Level, dB re 20μPa*									
			Overall dB(A)	*Octave Band Centre Frequency, Hz*								
				31.5	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*
M1	16/01/2020 2:33pm – 2:48pm	$L_{90,15min}$	**52**	56	59	59	53	48	46	43	41	53
		$L_{eq,15min}$	**59**	63	64	68	57	53	52	50	50	61
		$L_{10,15min}$	**59**	65	65	64	58	54	53	51	50	64
M2	16/01/2020 2:50pm – 3:05pm	$L_{90,15min}$	**52**	56	58	59	54	47	45	43	41	51
		$L_{eq,15min}$	**55**	62	63	62	56	50	48	46	44	56
		$L_{10,15min}$	**56**	64	65	64	58	51	50	49	46	58
M3	16/01/2020 3:10pm – 3:25pm	$L_{90,15min}$	**52**	56	57	58	53	49	46	44	41	59
		$L_{eq,15min}$	**58**	63	64	62	58	54	53	50	48	66
		$L_{10,15min}$	**60**	65	64	63	59	55	55	52	48	70
M4	16/01/2020 3:27pm – 3:42pm	$L_{90,15min}$	**52**	53	53	54	52	52	47	42	36	44
		$L_{eq,15min}$	**61**	61	62	60	58	57	57	54	48	50
		$L_{10,15min}$	**63**	62	62	62	61	58	59	55	49	52

Table 2: Results of short-term noise monitoring.

3.3 UNATTENDED NOISE MONITORING

Unattended noise monitoring was carried out from Thursday 9th January 2020 to Thursday 16th January 2020 with a Rion NL-52 noise logger (Serial Number 00175549). The noise logger recorded L_{A1}, L_{A10}, L_{Aeq} and L_{A90} noise parameters at 15-minute intervals during the measurement period. The calibration of the noise logger was checked before and after use and no deviations were recorded.

The noise logger was located on the south-eastern corner of the proposed site. The location was secure and considered to be representative of the typical ambient and background noise levels. The noise logger microphone was mounted 1.5 metres above the ground and a windshield was used to protect the microphone. Weather conditions were monitored during the unattended noise monitoring period.

The detailed results of the long-term noise monitoring are presented graphically in Appendix A. Weather conditions were monitored during the duration of the noise survey and were typically calm and dry. As stated in the NSW EPA Noise Policy for Industry (NPI) 2017, any data likely to be affected by rain, wind or other extraneous noise has been excluded from the calculations (shaded in the Appendix A graphs).

The Assessment Background Levels (ABLs) have been established in general accordance with the methodology described in the NSW NPI, i.e. 10th percentile background noise level (L_{A90}) for each period of each day of the ambient noise survey. The median of these levels is then presented as the RBLs (Rating Background Levels) for each assessment period.

The RBLs are shown in Table 3 together with the ambient noise levels (L_{Aeq}) measured for each day period.

Location	*L_{Aeq} Ambient Noise Levels, dB(A)*			*Rating Background Levels, dB(A)*		
	Day 7am-6pm	*Evening 6pm-10pm*	*Night 10pm-7am*	*Day 7am-6pm*	*Evening 6pm-10pm*	*Night 10pm-7am*
L1	64	61	60	57	58	57

Table 3: Results of long-term noise monitoring.

4 RELEVANT NOISE STANDARDS AND GUIDELINES

4.1 STANDARDS AND GUIDELINES

The following standards and guidelines are considered relevant to the project and have been referenced in developing the project noise level criteria.

- Regulatory Framework:
  - Environmental Planning and Assessment (EP&A) Act 1979.
  - Protection of the Environmental Operations (POEO) Act 1997.
- Planning Northern Beaches Council:
  - Pittwater Council Local Environmental Plan (PW-LEP) 2014.
  - Pittwater Council Development Control Plan (PW-DCP) 2014.
- Noise Emissions:
  - NSW EPA Noise Policy for Industry (NPI) 2017.
  - NSW Liquor & Gaming Noise Condition.

4.2 REGULATORY FRAMEWORK

4.2.1 ENVIRONMENTAL PLANNING AND ASSESSMENT (EP&A) ACT 1979

The Environmental Planning and Assessment Act 1979 (EP&A Act) provides the regulatory framework for the protection of the environment in NSW. The EP&A Act is relevantly about planning matters and ensuring that "environmental impact" associated with the proposed development is properly considered and reasonable before granting development consent to develop.

The assessment of "environmental impact" relies upon the identification of acceptable noise criteria which may be defined in a Development Control Plan, or derived from principles using guidelines like NSW EPA Noise Policy for Industry (NPI 2017) or Noise Guide for Local Government (NGLG 2013).

4.2.2 PROTECTION OF THE ENVIRONMENTAL OPERATIONS (POEO) ACT 1997

The Protection of the Environment Operations (POEO) Act 1997 has the objective to protect, restore and enhance the quality of the NSW environment. Abatement of noise pollution is underpinned by the definition of "offensive noise" as follows:

"... (a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:

> *(i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or,*
>
> *(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or*

(b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances, prescribed by the regulations. ..."

4.3 PLANNING NORTHERN BEACHES COUNCIL

4.3.1 PITTWATER COUNCIL ENVIRONMENTAL PLAN

The Pittwater Council Local Environmental Plan (PW-LEP 2014) sets the Land Zoning of the site and surroundings (6370_COM_LZN_015_010_20140623) as shown in Figure 3. The proposed development land category is B1 (Neighborhood Centre).

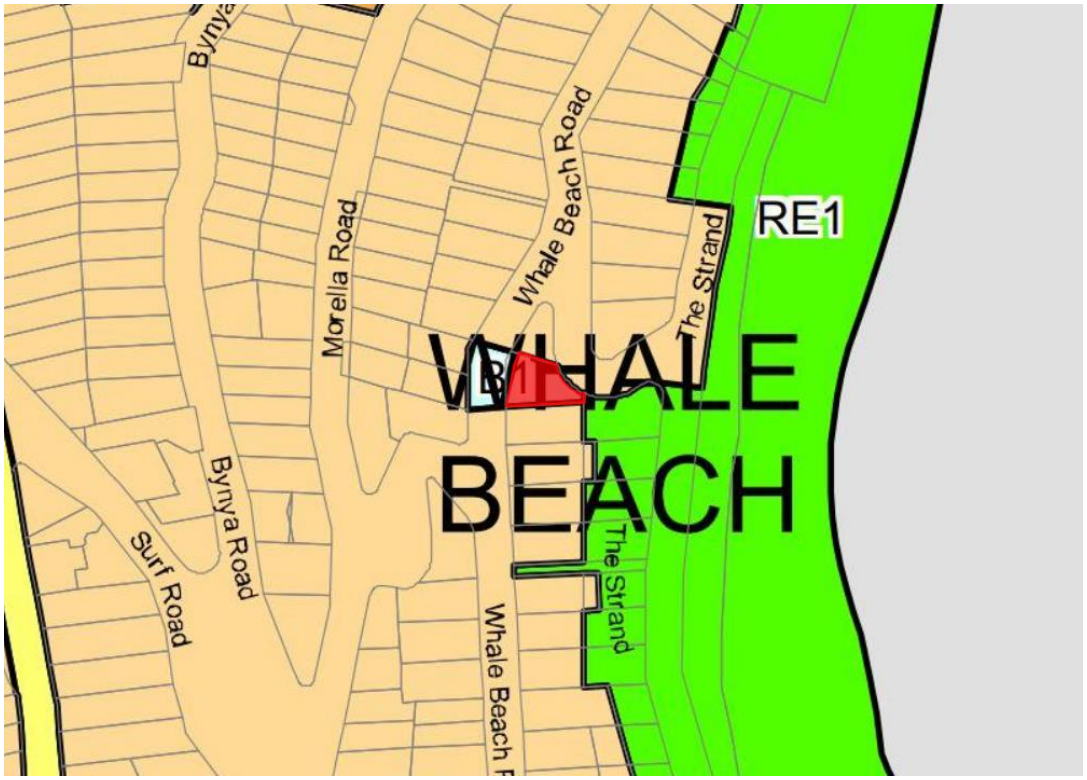


Figure 3: Land Zoning of the site (red shading) and surroundings.

4.3.2 PITTWATER COUNCIL DEVELOPMENT CONTROL PLAN

The Pittwater Council Development Control Plan (PW-DCP 2014) has been reviewed for any relevant noise requirements or criteria for the proposed development. There are no specific noise level criteria, but rather sections of the PW-DCP 2014 provide general generic planning strategies.

4.4 NSW EPA NOISE POLICY FOR INDUSTRY

The NSW EPA Noise Policy for Industry (NPI) 2017 assesses noise from industrial noise sources - scheduled under the POEO. Mechanical noise from the development shall be addressed following the recommendations in the NSW NPI. The use of the noise monitoring procedures and background noise assessment methodology are commonly recommended by other relevant guidelines.

The assessment is carried out based on the existing ambient and background noise levels addressing the following:

- Intrusiveness Criteria, to control intrusive noise into nearby sensitive receivers.
- Amenity Criteria, to maintain the noise level amenity for particular land uses.

These criteria are established for each assessment period (day, evening and night) and the more stringent sets the Project Noise Trigger Level (PNTL's). The intrusiveness and amenity criterions are presented in Table 4 and Table 5 respectively. The PTNL's are determined in Table 6.

4.4.1 INTRUSIVENESS CRITERIA

The NSW NPI defines the intrusiveness criteria as follows:

"The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the L_{Aeq} descriptor), measured over a 15 minute period, and does not exceed the background noise level by more than 5 dB when beyond a minimum threshold."

Based on the intrusiveness criteria definition and the estimated background noise levels on site, Table 4 shows the intrusiveness criteria for the noise sensitive receivers.

Indicative Noise Amenity Area	*Period*	*Rating Background Level $L_{A90,period}$ dB(A)*	*Intrusiveness Criterion $L_{Aeq,15min}$ dB(A)*
Environmental Living (E4)	Day	57	62
	Evening	58	63
	Night	57	62

Table 4: Determination of the intrusiveness criterion.

4.4.2 AMENITY CRITERIA

The NSW NPI states the following to define the amenity criteria:

"To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level within an area from all industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 where feasible and reasonable. The recommended amenity noise levels will protect against noise impacts such as speech interference, community annoyance and some sleep disturbance."

Based on the amenity criteria definition and the land zoning, Table 5 shows the amenity criteria for the noise sensitive receivers.

Indicative Noise Amenity Area	*Period*	*Amenity Noise Level $L_{Aeq,period}$ dB(A)*	*Adjusted Amenity Criterion $L_{Aeq,15min}$ dB(A)*
Residential Receiver	Day	50 (60)[2]	58 (60-5+3)
	Evening	45 (55)[1]	53 (55-5+3)
	Night	40 (50)[1]	48 (50-5+3)
Commercial	When In Use	65	63 (65-5+3)
Passive Recreation (RE1)	When in use	50	48 (50-5+3)

Table 5: Determination of amenity criterion.

4.4.3 PROJECT NOISE TRIGGER LEVELS

The PNTL's are shown in Table 6 and have been obtained in accordance with the requirements of the NSW NPI. These shall be assessed to the most affected point on or within the noise sensitive receiver boundary.

[2] As per NSW NPI, where existing background noise levels are significantly higher than recommended amenity levels (and are unlikely to change in the future – in this instance, the site is in close proximity to the Pacific Ocean), the amenity criterion has been increased by 10dB.

Indicative Noise Amenity Area	*Period*	*Intrusiveness Criterion, $L_{Aeq,15min}$ dB(A)*	*Amenity Criterion, $L_{Aeq,15min}$ dB(A)*
Residential Receiver	Day	62	58
	Evening	63	53
	Night	62	48
Commercial	When In Use	---	63
Passive Recreation (RE1)	When in use	---	48

Table 6: Determination of PNTL's (light grey highlight) for noise sensitive receivers.

4.5 NSW LIQUOR & GAMING NOISE CONDITION

A licensed venue may be subject to a liquor licence condition limiting noise impacts on the nearby receivers. Standard NSW Liquor & Gaming noise conditions are as follows:

"The L_{A10} noise level emitted from the licensed premises shall not exceed the background noise level in any octave band frequency (centred on 31.5Hz to 8kHz inclusive) by more than 5dB between 7.00am and midnight at the boundary of any affected residence.*

The L_{A10} noise level emitted from the licensed premises shall not exceed the background noise level in any octave band frequency (centred on 31.5Hz to 8kHz inclusive) between 12.00 midnight and 7.00am at the boundary of any affected residence.

Notwithstanding compliance with the above, noise from the licensed premises shall not be audible within any habitable room in any residential premises between the hours of 12.00 midnight and 7.00am.

** For the purpose of this condition, the L_{A10} can be taken as the average maximum deflection on a sound level meter of noise emitted from the licensed premises."*

For assessment purposes, the corresponding measured background noise levels and noise criteria in octave bands are detailed in Table 7. As the development is proposed to operate from 7am to 10pm, only the evening time (6pm to 10pm) criterion is included.

Evening (6pm to 10pm)	*Sound Pressure Level, dB re 20µPa*									
	Overall dB(A)	*Octave Band Centre Frequency, Hz*								
		31.5	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*
Background Noise Level	**58**	62	65	65	59	54	52	49	47	59
Noise Level Criteria (Background + 5dB)	**63**	67	70	70	64	59	57	54	52	64

Table 7: NSW Liquor & Gaming noise criteria at the boundary of noise receivers.

5 NOISE IMPACT ASSESSMENT AND RECOMMENDATIONS

Based on the expected operations of the proposed development, the following items have been considered within the acoustic assessment:

- Noise emissions from patrons and staff.
- Noise emissions from mechanical plant from the development to the surrounding receivers.

The acoustic assessment has considered the following:

- Noise levels are continuous over the assessment time period to provide the worst-case scenario.
- Distance attenuation, building reflections and directivity.
- Lowest measured background noise levels at the nearest noise sensitive receiver have been used to provide a worst-case scenario.

5.1 PATRON AND STAFF NOISE EMISSIONS

Noise emissions from the use of proposed development have the potential to impact on nearby receivers. Figure 4 shows the location of the indoor and outdoor seating areas of Retail 1 and the distances to the boundaries nearest noise sensitive receivers.

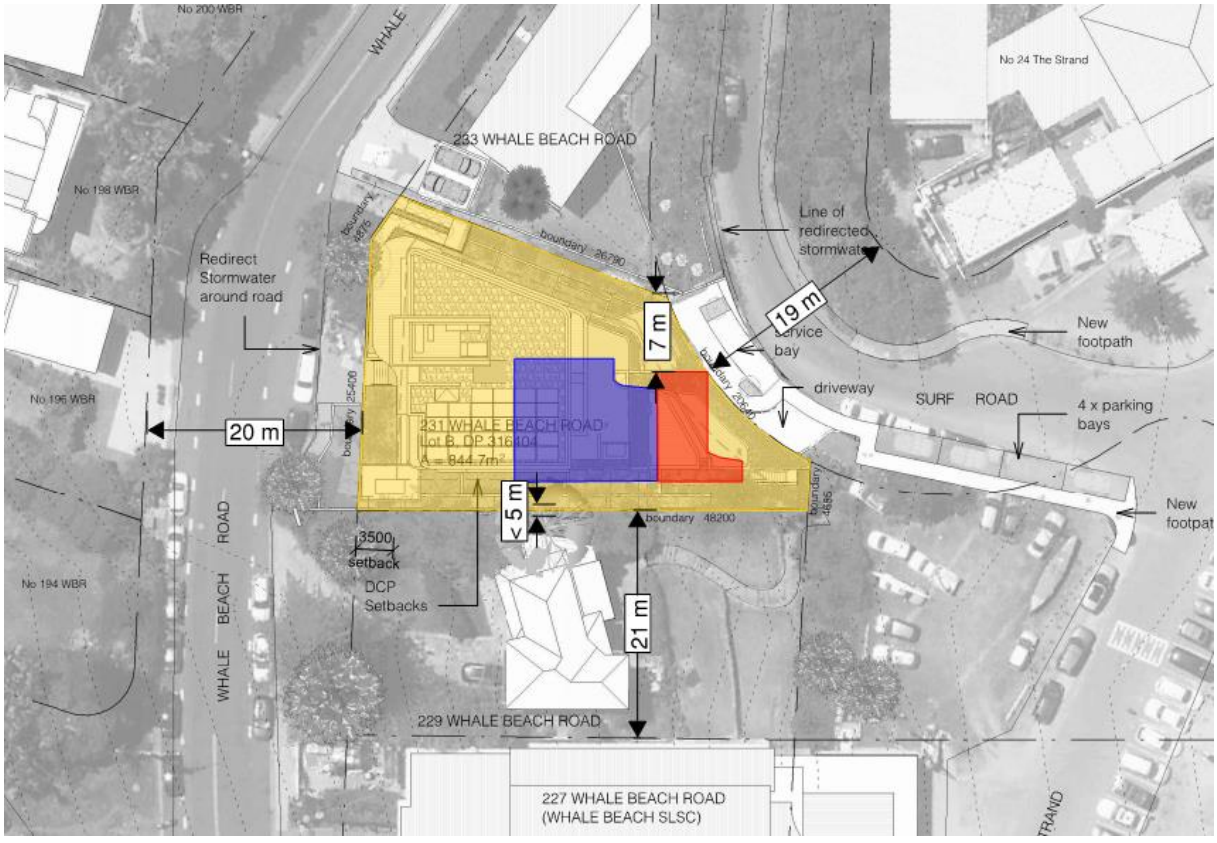


Figure 4: New building site (yellow) with location of the outdoor (red) and indoor (blue) seating areas of Retail 1 plus distances to the boundaries of the nearest noise sensitive receivers.

It is understood that activities likely to occur within Retail 1 are those typical of hospitality and hence the key noise source will be patrons and staff. The noise of patrons will be highly variable as there are several factors which will drive the noise emissions. Among these factors are: the type of premise and its function, total number of patrons, etc.

It should be noted that the vocal effort of each patron will vary across the seating areas and the assessment period, changing also the number of patrons. Therefore, the Hayne[3] methodology to predict crowd noise levels has been adapted for the noise assessment purposes as it provides a single representative vocal effort to characterise the range of emissions of all patrons within the crowd. Predicted noise levels are well correlated with patron noise measurements conducted at a range of premises.

The noise impacts from the seating areas have been assessed at the nearest noise sensitive receivers, using the methodology and assumptions given below. The assessments have been made considering the proposed layout as shown on the current architectural drawings. The following assumptions have been made for the assessment.

- Retail 1 frontage faces Surf Road.
- The assumed distances between the proposed development and the noise sensitive receiver boundaries are as per Figure 4.
- The noise assessments consider the Retail 1 to be at full capacity of 188 people – 30 patrons in the outdoor seating area, 140 patrons in the indoor area plus 18 staff overall. The staff is assumed to be split between the two seating areas based on the ratio of patrons – 3 staff in the outdoor area and 15 staff in the indoor area.
- For the outdoor seating area, it has been assumed that noise levels are based on "Raised" vocal effort. For the indoor seating area, it has been assumed that noise levels are based on "Normal" vocal effort.
- For every two patrons, only one is assumed to be speaking at any given time.
- The noise associated with the seating areas has been evenly distributed around the areas.
- No background music in Retail 1 has been included in the assessments.
- As per the architectural drawings, a 1.8m high paling fence is erected along the southern boundary between the proposed site and 229 Whale Beach Road.
- Retail 1 has proposed operating hours from 7am to 10pm, hence the evening time (6pm to 10pm) criteria has been used as the worst-case scenario.
- All windows of the indoor seating area are assumed to be closed.
- The eastern façade of the indoor seating area is assumed to not be openable / operable.

5.1.1 OUTDOOR SEATING AREA

Noise from the proposed outdoor seating area to be located on Surf Road has the potential to impact on adjacent noise sensitive receivers, including the residential receivers at 229 Whale Beach Road, 233 Whale Beach Road and 24 The Strand.

For the purpose of predicting noise levels from patrons in the outdoor seating area, the assumed spectra of sound power levels for 17 patrons and staff (out of 35 people in total) as per Hayne are detailed in Table 8.

[3] Hayne et al. Prediction of noise from small to medium sized crowds. Proceedings of the Annual Conference of the Australian Acoustical Society 2011.

	Sound Power Level, dB re 1pW								
	Overall dB(A)	Octave Band Centre Frequency, Hz							
		31.5	63	125	250	500	1k	2k	4k	8k
L_{W10} of 17 patrons and staff	88	71	75	79	84	89	83	79	74	68

Table 8: Octave Band Sound Power Levels to be generated by patrons in outdoor seating area.

Table 9, Table 10 and Table 11 summarise the predicted noise levels at 229 Whale Beach Road, 233 Whale Beach Road and 24 The Strand, respectively, based on the NSW Liquor & Gaming noise criteria.

Calculation	Sound Pressure Level, dB re 20µPa									
	Overall dB(A)	Octave Band Centre Frequency, Hz								
		31.5	63	125	250	500	1k	2k	4k	8k
L_{W10} of 17 patrons and staff	88	71	75	79	84	89	83	79	74	68
Divergence attenuation (5m)		-22	-22	-22	-22	-22	-22	-22	-22	-22
Barrier attenuation (1.8m)		-7	-7	-7	-9	-10	-12	-15	-18	-21
L_{10} resulting at 229 Whale Beach Road (residential)	56	42	46	50	53	57	49	42	34	25
Liquor & Gaming Criteria until 10pm / Complies?	63 / Yes	67 / Yes	70 / Yes	70 / Yes	64 / Yes	59 / Yes	57 / Yes	54 / Yes	52 / Yes	64 / Yes

Table 9: Predicted noise levels at 229 Whale Beach Road receiver due to noise emissions from the outdoor seating area.

Calculation	Sound Pressure Level, dB re 20µPa									
	Overall dB(A)	Octave Band Centre Frequency, Hz								
		31.5	63	125	250	500	1k	2k	4k	8k
L_{W10} of 17 patrons and staff	88	71	75	79	84	89	83	79	74	68
Divergence attenuation (7m)		-25	-25	-25	-25	-25	-25	-25	-25	-25
L_{10} resulting at 233 Whale Beach Road (residential)	57	43	47	51	56	61	55	51	46	40
Liquor & Gaming Criteria before 10pm / Complies?	63 / Yes	67 / Yes	70 / Yes	70 / Yes	64 / Yes	59 / Yes*	57 / Yes	54 / Yes	52 / Yes	64 / Yes

Table 10: Predicted noise levels at 233 Whale Beach Road receiver due to noise emissions from the outdoor seating area.

Calculation	Sound Pressure Level, dB re 20μPa								
	Overall dB(A)	Octave Band Centre Frequency, Hz							
		31.5	63	125	250	500	1k	2k	4k	8k
L_{W10} of 17 patrons and staff	88	71	75	79	84	89	83	79	74	68
Divergence attenuation (19m)		-34	-34	-34	-34	-34	-34	-34	-34	-34
L_{10} resulting at 24 The Strand (residential)	52	34	38	42	47	52	46	42	37	31
Liquor & Gaming Criteria before 10pm / Complies?	63 / Yes	67 / Yes	70 / Yes	70 / Yes	64 / Yes	59 / Yes	57 / Yes	54 / Yes	52 / Yes	64 / Yes

Table 11: Predicted noise levels at 24 The Strand receiver due to noise emissions from the outdoor seating area.

Based on the predicted noise levels in the above tables, noise emissions from the outdoor seating area will meet the evening time NSW Liquor and Gaming noise criterion at the residential noise sensitive receivers around the outdoor seating area. In order to meet the noise criteria at 229 Whale Beach Road, the paling fence shall have a minimum surface mass of 12kg/m^2 plus a minimum height of 1,800mm. The paling fence shall be continuous with no gaps and shall be close fitting to the ground. Any impervious material such lapped and capped timber, corrugated sheet steel, masonry or a combination of these are acceptable. All bracing and structural support required to comply with loadings and building regulations shall be provided and reviewed by a structural engineer.

A minor exceedance at 500Hz octave band is noted in the predicted noise levels at the 233 Whale Beach receiver. However, this exceedance can be categorised as negligible as it will not be discernible by the average listener.

5.1.2 INDOOR SEATING AREA

Noise breakout from the proposed indoor seating area has the potential to impact on the nearest noise sensitive receiver at 24 The Strand. Due to the anticipated sound insulation performance of a typical masonry building façade, there is not expected to be any noticeable noise impact on 233 Whale Beach Road and 229 Whale Beach Road. Furthermore, there are no direct line of sight of the eastern façade with these noise sensitive receivers.

The breakout noise impact assessment has been based on the following methodology:

$$L_{ext} = L_{int} - R_{comp} + 10\log_{10}(S) - 20\log_{10}(r) - 14$$

Where:

- L_{ext}: is the predicted sound pressure level at the receiver, dB(A).
- L_{int}: is the internal noise level – Patron Noise level, dB(A).
- R_{comp}: is the composite sound reduction for the façade, dB.
- S: is the surface area of the façade, m^2.
- r: is the distance to the receiver boundary from the façade, m.

For the purpose of predicting noise levels from patrons in the indoor seating area, the assumed spectra of sound power levels for 78 patrons and staff (out of 155 people in total) as per Hayne are detailed in Table 8.

	Sound Power Level, dB re 1pW								
	Overall dB(A)	Octave Band Centre Frequency, Hz							
		31.5	63	125	250	500	1k	2k	4k	8k
L_{W10} of 78 patrons and staff	98	85	87	92	93	95	94	90	86	81

Table 12: Octave Band Sound Power Levels to be generated by patrons in the indoor seating area.

The Sound Pressure Levels for patrons and staff within the indoor seating area have been derived from the above Sound Power Levels and are shown in Table 13.

	Sound Pressure Level, dB re 20μPa								
	Overall dB(A)	Octave Band Centre Frequency, Hz							
		31.5	63	125	250	500	1k	2k	4k	8k
L_{10} of 78 patrons and staff (free field @1m)	90	77	79	84	85	87	86	82	78	73
L_{10} of 78 patrons and staff (reverberant field @1m)	93	80	82	87	88	90	89	85	81	76

Table 13: Octave Band Sound Pressure Levels to be generated by patrons in the indoor seating area.

Table 14 summarise the predicted noise levels at 24 The Strand based on the NSW Liquor & Gaming noise criteria.

Calculation	Sound Pressure Level, dB re 20μPa									
	Overall dB(A)	Octave Band Centre Frequency, Hz								
		31.5	63	125	250	500	1k	2k	4k	8k
L_{10} of 78 patrons and staff	93	80	82	87	88	90	89	85	81	76
Maximum composite sound reduction of façade (R_{comp})		10	12	16	21	26	30	32	37	40
Correction for surface area of façade		16	16	16	16	16	16	16	16	16
Distance attenuation (19m)		26	26	26	26	26	26	26	26	26
L_{10} resulting at 24 The Strand (residential)	41	46	46	47	43	40	35	29	20	12
Liquor & Gaming Criteria before 10pm / Complies?	63 / Yes	67 / Yes	70 / Yes	70 / Yes	64 / Yes	59 / Yes	57 / Yes	54 / Yes	52 / Yes	64 / Yes

Table 14: Predicted noise levels at 24 The Strand receiver due to noise emissions from the indoor seating area.

Based on the predicted noise levels in the above table, noise emissions from the indoor seating area will meet the evening time NSW Liquor and Gaming noise criterion at the residential noise sensitive receiver at 24 The Strand. In order to achieve the noise level criteria during the evening time, the façade, other external building

elements and ventilation openings will need to be designed to provide a minimum composite sound insulation of R_W30 and shall not be openable / operable.

5.2 NOISE EMISSIONS FROM EXTERNAL MECHANICAL PLANT

Noise emissions from the external mechanical plant have been previously assessed in the Acoustic Report for the entire building. It is understood that plant selection and location for Retail 1 have not been changed. Therefore, based on the previous assessment, noise emissions from the external mechanical plant for Retail 1 will comply with the noise level criteria if the proposed noise controls detailed in the Acoustic Report are put in place. These noise controls are a re-selection of low noise fans and / or provide a sound attenuator to the outlet of the kitchen exhaust fan.

6 SUMMARY AND CONCLUSIONS

A noise assessment has been carried out for the proposed Retail 1 on the Ground Floor of 231 Whale Beach Road, Whale Beach, NSW. This report forms part of the documentation package to be submitted to Northern Beaches Council as part of the Development Application.

This report establishes relevant noise level criteria, details the acoustic assessment and provides comments and recommendations for the proposed development.

Ambient and background noise surveys were undertaken at the existing site to establish the appropriate noise criteria in accordance with the relevant guidelines.

The noise assessment has adopted methodology from relevant guidelines, standards and legislation to assess noise impact. The noise impacts have been predicted at the nearest noise sensitive receiver boundaries, taking in account distance attenuation, building reflections and directivity.

Noise impacts from patron noise generated by the proposed outdoor and indoor seating areas have been assessed to the nearest noise sensitive receivers. Source noise levels have been based on worst-case scenarios associated with the activities likely to occur within Retail 1. To meet the evening time noise criteria - assuming a capacity of 33 patrons and staff, the paling fence on the southern boundary of the proposed development shall have a minimum surface mass of 12kg/m^2 and a minimum height of 1,800mm. The evening time criteria will be met at 233 Whale Beach Road and 24 The Strand, although minor exceedances at 500Hz octave band are noted in the predicted noise levels at 233 Whale Beach. These exceedances can be categorised as negligible as it will not be discernible by the average listener.

For the indoor seating area, assuming a total capacity of 155 patrons and staff, the evening time criteria will be met at the nearest noise sensitive receivers provided that the façade meets a minimum composite Sound Insulation Index of R_W30 and shall not be openable / operable.

Noise impacts from the external mechanical plant were previously assessed in a separate Acoustic Report. As plant selection and location have not changed, noise emissions from the plant will comply with the noise level criteria if noise controls are implemented as detailed in the Report. The noise controls include re-selecting low noise fans and / or providing a sound attenuator to the outlet of the kitchen exhaust fan.

The information presented in this report shall be reviewed if any modifications to the features of the development specified in this report occur, including and not restricted to selection of mechanical plant, modification to the building and the introduction of any noise sources.

Based on the information presented in this report, relevant objectives will be satisfied and therefore approval is recommended to be granted.

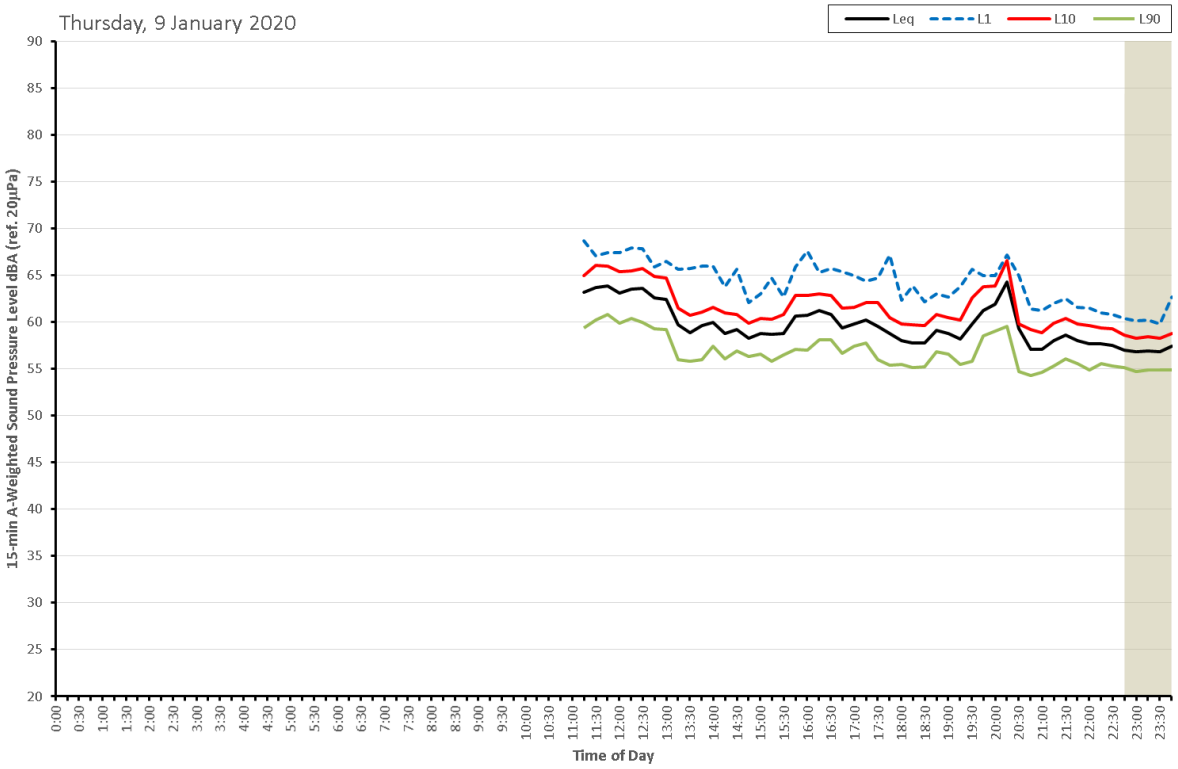
APPENDIX A: LONG TERM NOISE MONITORING

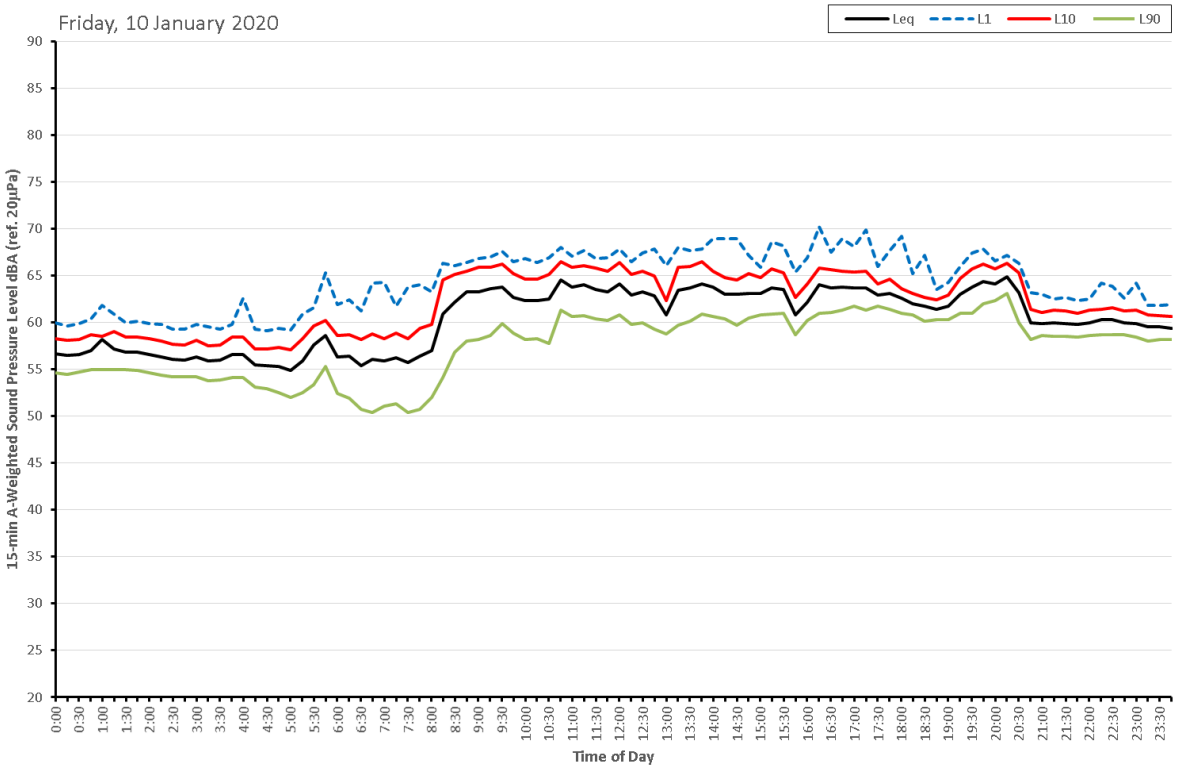
L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

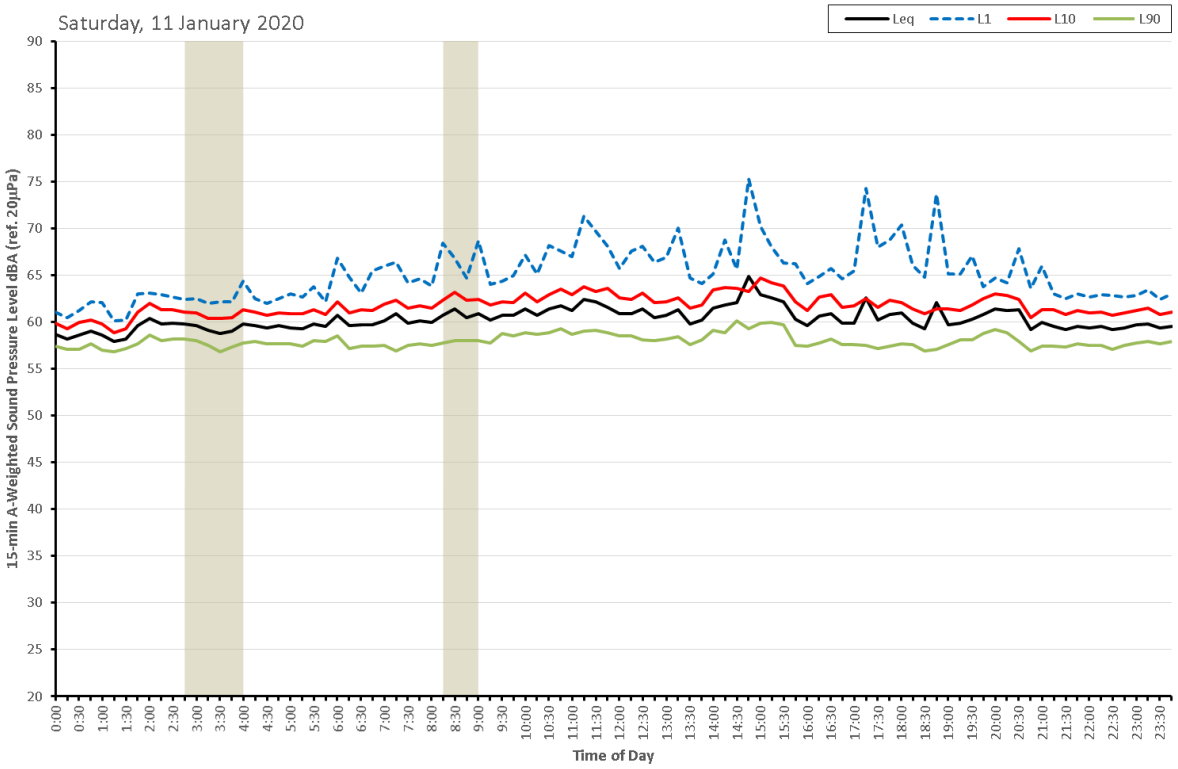
L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

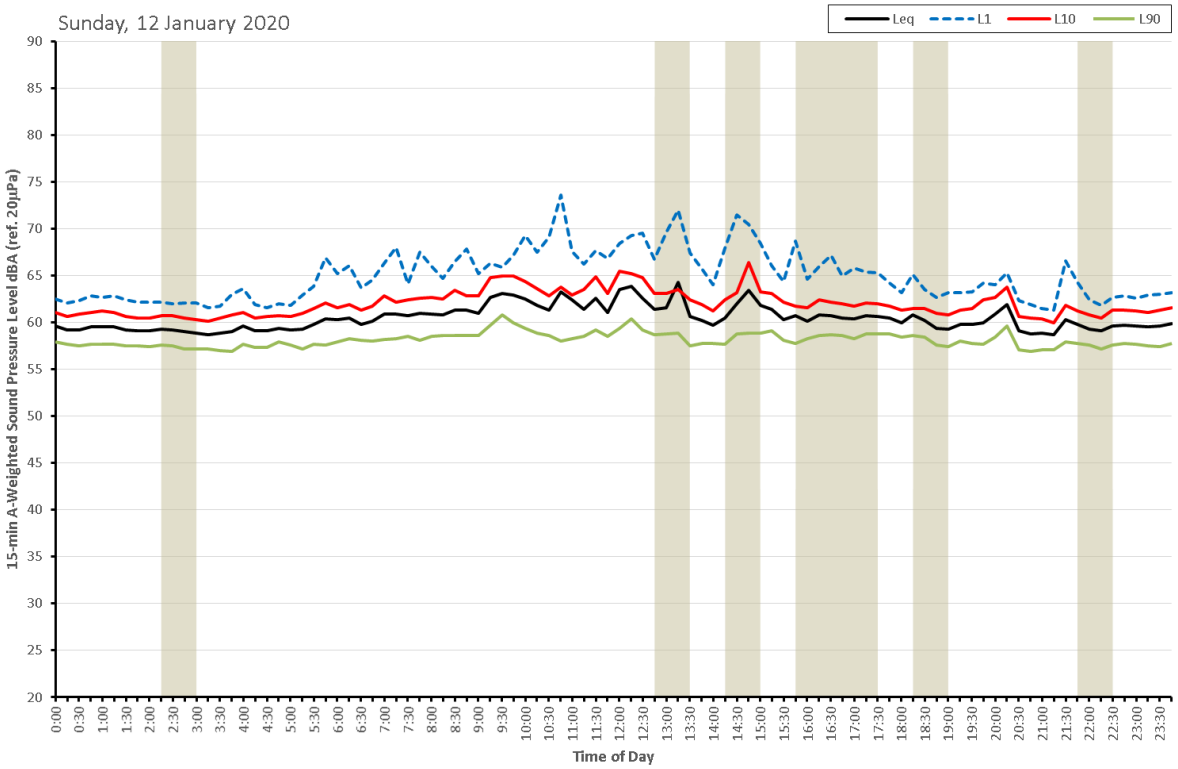
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.


Thursday, 9 January 2020
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day


Friday, 10 January 2020
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day


Saturday, 11 January 2020
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day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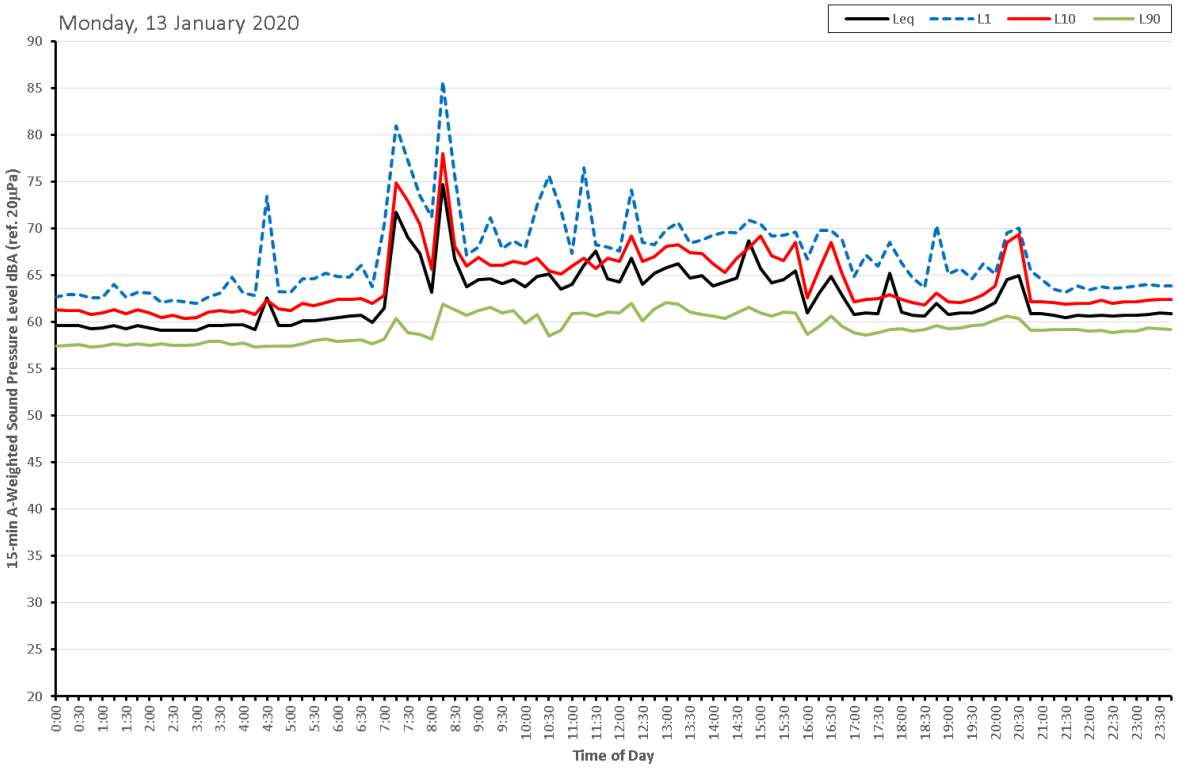
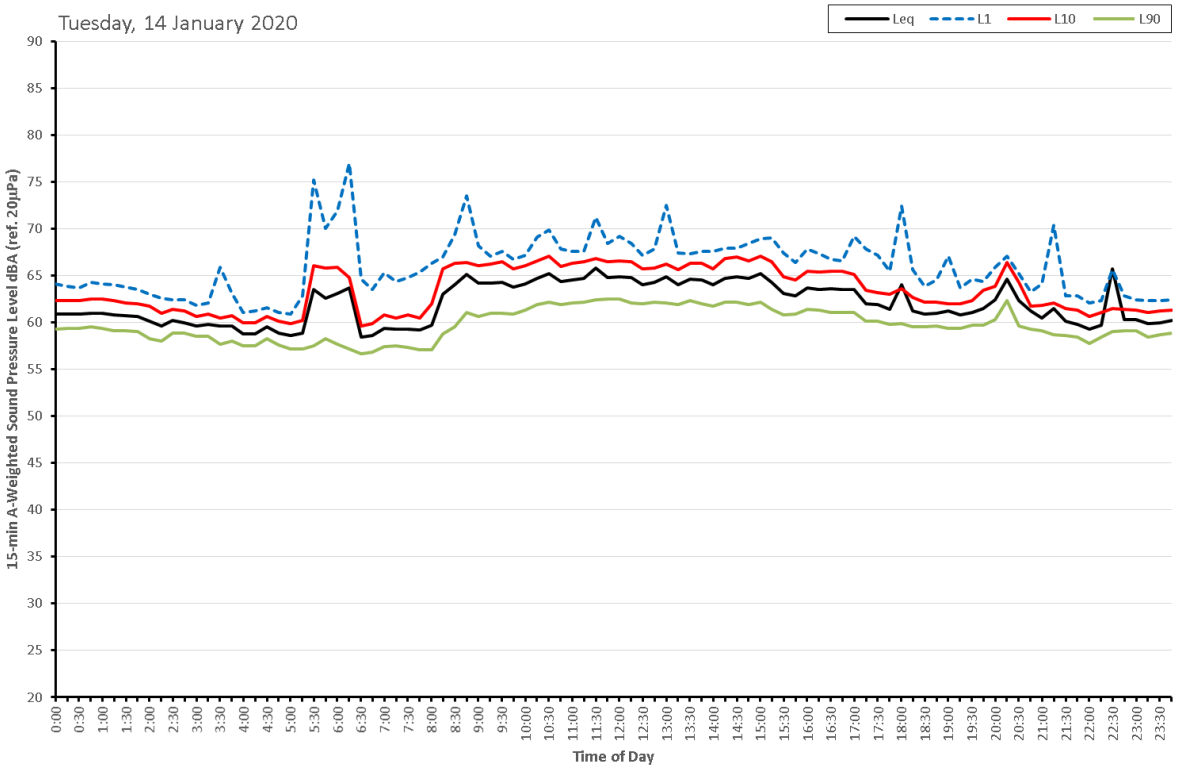
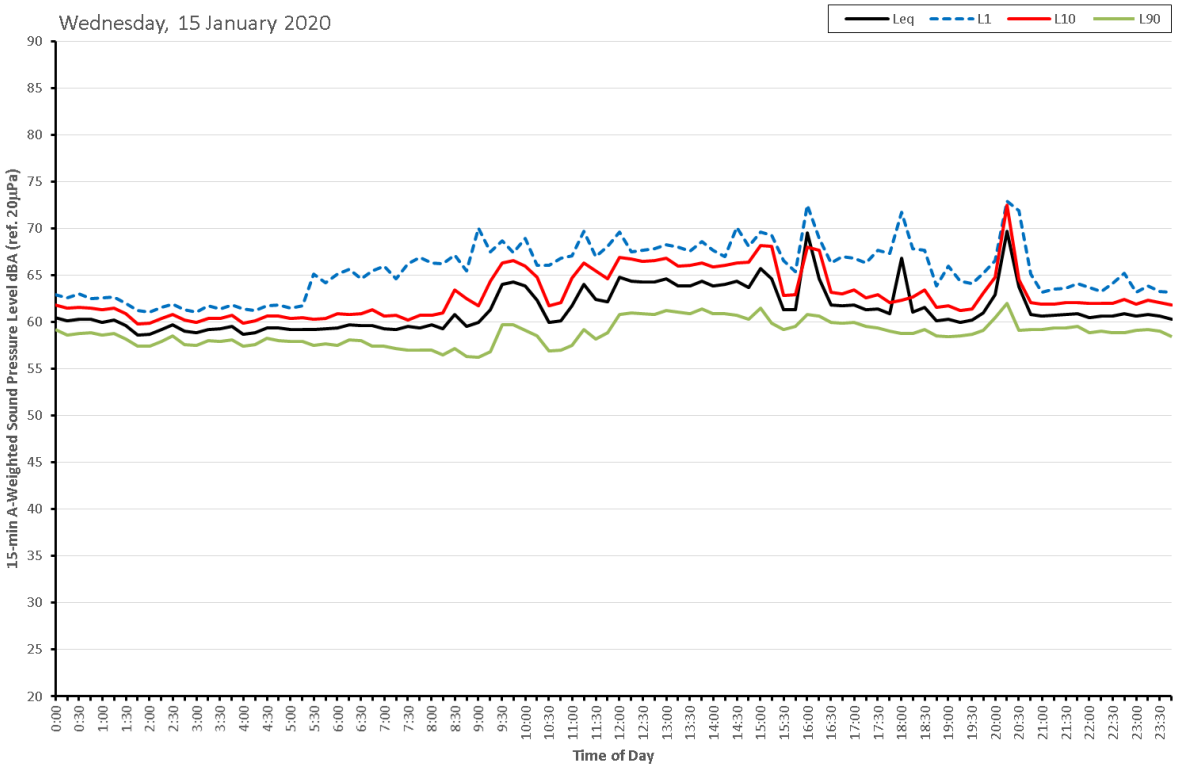
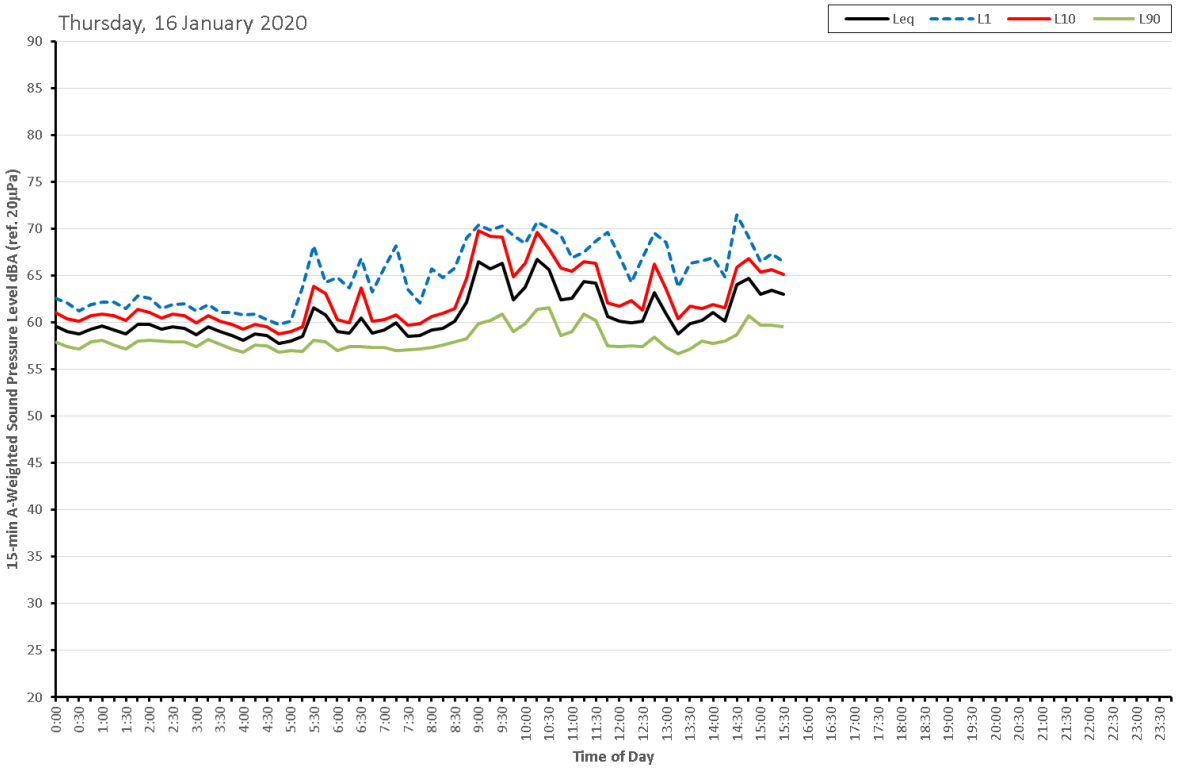
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day


Monday, 13 January 2020
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day


Tuesday, 14 January 2020
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day


Wednesday, 15 January 2020
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day


Thursday, 16 January 2020
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day