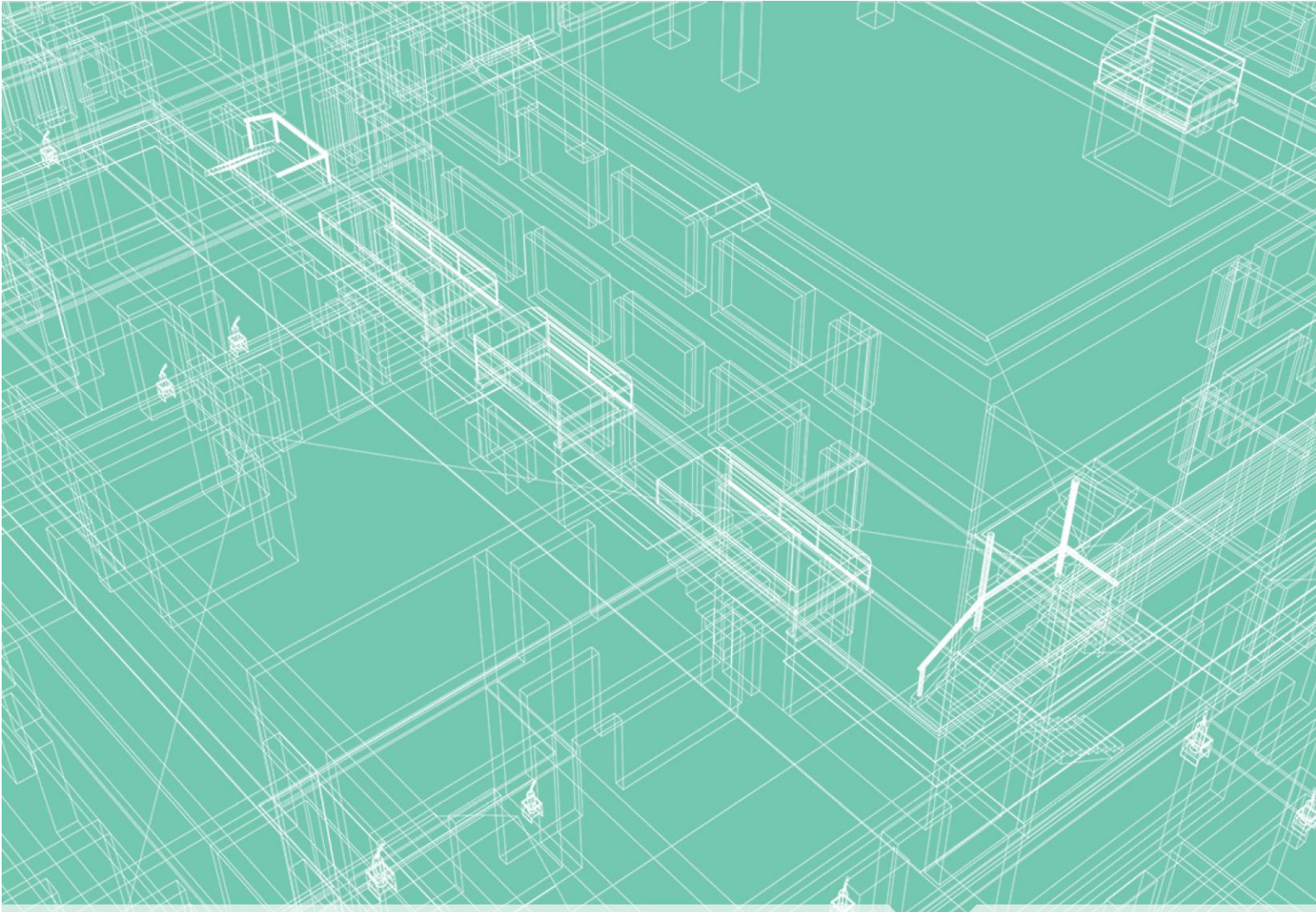

ACOUSTIC REPORT FOR DEVELOPMENT APPLICATION

231 WHALE BEACH ROAD

WHALE BEACH

JHA

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DOCUMENT CONTROL SHEET

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Key Contact	Karla Wilford

Prepared By

Company	JHA
Address	Level 23, 101 Miller Street, North Sydney NSW 2060
Phone	61-2-9437 1000
Email	@jhaengineers.com.au
Website	www.jhaservices.com
Author	Cameron Nurse
Checked	Jorge Reverter
Authorised	Mathew McGrory

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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 mixed development located at 231 Whale Beach Road, Whale Beach, NSW.

The proposal involves demolition of existing buildings and construction of a building with 5 premium residential units, 3 dedicated retail spaces and an associated underground carpark. An acoustic assessment has been undertaken and it is detailed in this report along with the findings and recommendations. It 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 external noise and vibration sources that will potentially affect the proposed development.
- Carry out noise surveys to determine existing ambient and background noise levels on site plus external noise sources that will potentially affect the proposed development.
- Establish the appropriate noise level and vibration criteria in accordance with the relevant standards, guidelines and legislation for the following issues:
  - Noise emissions from mechanical plant from the development to the surrounding receivers.
  - Noise emissions from traffic generated by the proposed development.
  - Noise emissions from retail spaces.
- Carry out a preliminary 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.
- Draft Traffic Report provided by TEF Consulting.

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

2 DESCRIPTION OF THE PROPOSAL

The proposed development site is located at 231 Whale Beach Road, Whale Beach, NSW. The proposed development will have 5 premium residential units, 3 dedicated retail spaces and an associated underground carpark.

The majority of surrounding buildings are residential use, with two commercial operations in the vicinity. Residential receivers are located West, North, and South of the site, while commercial receivers are located South and North-East of the Site. To the East is Whale Beach, this receiver is designated as Public Recreation.

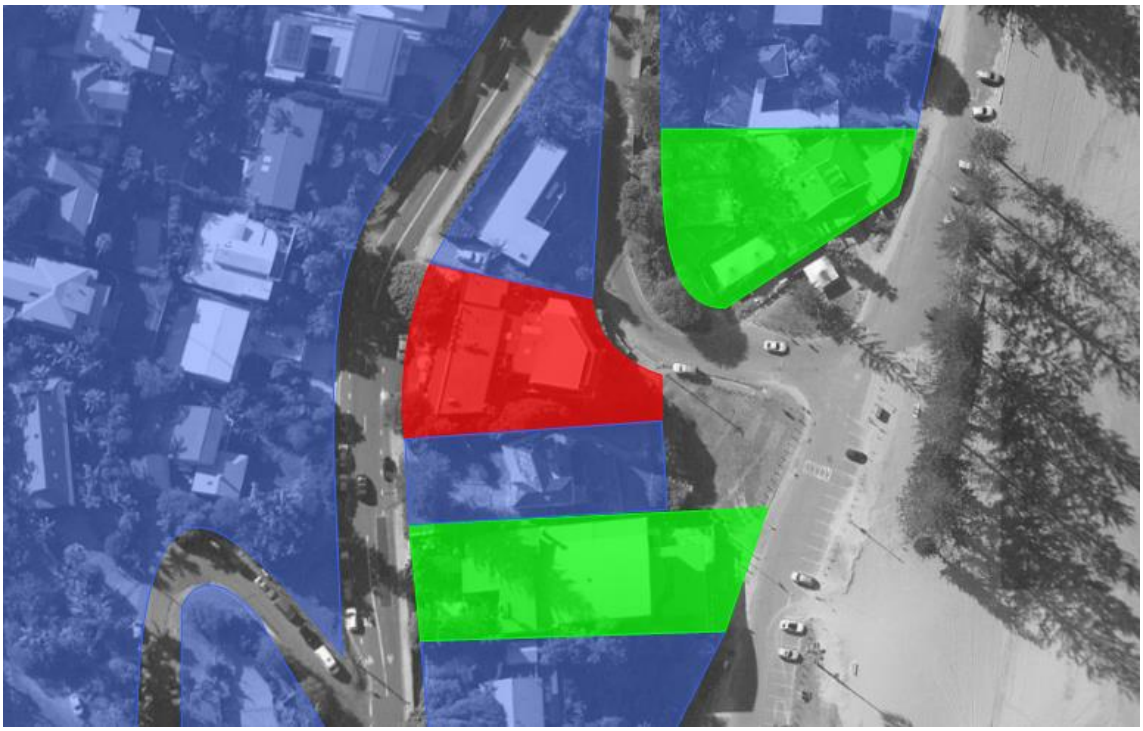


Figure 1: Aerial view of site showing the location of the proposed development site (red), commercial receivers (green), and residential receivers (blue).

There is intermittent traffic flow along Whale Beach Road. A summary of the nearest sensitive receivers surrounding the site location is shown in Table 1, including the approximate distances from the site boundary to receiver boundaries.

Sensitive Receiver	*Receiver Type*	*Distance (m)*
233 Whale Beach Road	Residential	5
229 Whale Beach Road	Residential	6
198 Whale Beach Road	Residential	15
24 The Strand	Commercial[1]	17
Whale Beach Surf Life Saving Club / Moby Dicks Restaurant	Commercial	22

Table 1: Nearest sensitive receivers surrounding the site location.

[1] As of January 2020, it is understood that a current Development Application (Mod2020/0004) has been submitted to the Northern Beaches Council for a commercial development at 24, The Strand, Whale Beach.

3 SITE MEASUREMENTS

3.1 GENERAL

Attended and unattended noise surveys were conducted in the locations shown in Figure 2 order to establish the ambient and background noise levels of the site and surrounds.

Long-term 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 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.

On Thursday the 16th January, 2020, short-term noise measurements were carried out during day-time. Short-term noise measurements were carried out 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.

JHA Consulting Engineers carried out the surveys, in accordance with the method described in the *'AS/NZ 1055:2018 Description and measurement of environmental noise'*.

The long term and short term noise monitoring locations are shown in Figure 2.

Figure 2: Long-term noise monitoring location (L1) and short-term noise monitoring locations (M1 – M4).

3.2 SHORT-TERM NOISE MONITORING

Short-term noise monitoring was carried out to obtain representative third-octave band noise levels of the site plus noise emissions from road traffic. Four short-term noise monitoring locations were chosen as representative 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 is 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*							
				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
		$L_{eq,15min}$	**59**	63	64	68	57	53	52	50	50
		$L_{10,15min}$	**59**	65	65	64	58	54	53	51	50
M2	16/01/2020 2:50pm – 3:05pm	$L_{90,15min}$	**52**	56	58	59	54	47	45	43	41
		$L_{eq,15min}$	**55**	62	63	62	56	50	48	46	44
		$L_{10,15min}$	**56**	64	65	64	58	51	50	49	46
M3	16/01/2020 3:10pm – 3:25pm	$L_{90,15min}$	**52**	56	57	58	53	49	46	44	41
		$L_{eq,15min}$	**58**	63	64	62	58	54	53	50	48
		$L_{10,15min}$	**60**	65	64	63	59	55	55	52	48
M4	16/01/2020 3:27pm – 3:42pm	$L_{90,15min}$	**52**	53	53	54	52	52	47	42	36
		$L_{eq,15min}$	**61**	61	62	60	58	57	57	54	48
		$L_{10,15min}$	**63**	62	62	62	61	58	59	55	49

Table 2: Results of short-term noise monitoring.

3.3 LONG-TERM NOISE MONITORING

The noise logger was located on the proposed development site – facing Surf Road – as shown in Figure 2. The location was secured and is considered to be representative of the typical ambient and background noise levels.

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 (shadowed in the Appendix A graphs). The background noise levels are shown in Table 3, together with the L_{Aeq} ambient noise levels measured for each period.

Location	*L_{Aeq} Ambient Noise Levels, dB(A)*			*L_{A90} Background Noise 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.
- Building
  - National Construction Code (NCC) 2019.
- Noise Emissions
  - NSW EPA Noise Policy for Industry (NPI) 2017.
- Traffic Noise
  - DECCW NSW Road Noise Policy (RNP) 2011.

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 (2014)

The Pittwater Council Local Environmental Plan (PW-LEP) 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).

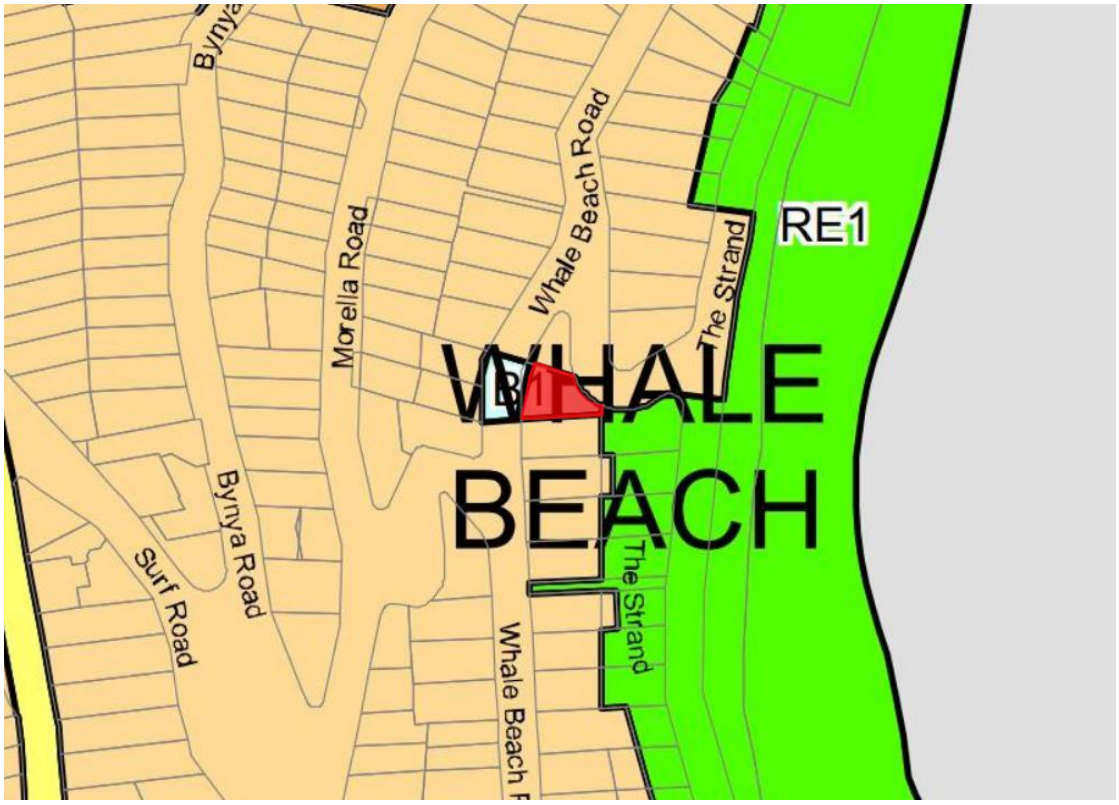


Figure 3: Land Zoning of the site (red shading) and surroundings.

4.3.2 PITTWATER COUNCIL DEVELOPMENT CONTROL PLAN (2014)

Section 4.4 of the Pittwater Council Development Control Plan (PW-DCP) provides the generic provisions for acoustic requirements as follows.

"...

C1.6 Acoustic Privacy

Outcomes

- *Noise is substantially contained within each dwelling and noise from any communal or private open space areas are limited.*
- *Noise is not to be offensive as defined by the Protection of the Environment Operations Act 1997, including noise from plant, equipment and communal or private open space areas.*

Controls

- *Noise-sensitive rooms, such as bedrooms, should be located away from noise sources, including main roads, parking areas, living areas and communal and private open space areas and the like.*

- *Walls and/or ceilings of dwellings that are attached to another dwelling/s shall have a noise transmission rating in accordance with Part F (5) of the Building Code of Australia. (Walls and ceilings of attached dwellings must also comply with the fire rating provisions of the Building Code of Australia).*
- *Noise generating plants including pool/spa motors, air conditioning units and the like shall not produce noise levels that exceed 5dBA above the background noise when measured from the nearest property boundary.*

Developments must comply in all respects with the Protection of the Environment Operations Act 1997, and other relevant legislation.

..."

4.4 NCC REQUIREMENTS

As per Pittwater Council DCP – refer Section 4.3.2 – walls and/or ceilings of dwellings that are attached to another dwelling/s shall have a noise transmission rating in accordance with Part F5 of the Building Code of Australia.

The National Construction Code (NCC) – formerly BCA – categorises apartments as a Class 2. The following table shows the minimum sound insulation performance requirements for separating elements between 'Sole-Occupancy-Units' and other spaces as per Part F5 of the NCC.

Building Element Separating			*Minimum Sound Insulation*		*Discontinuous Construction?*
			Airborne	*Impact*	
Floors	SOU (including ensuite)	SOU	$R_W + C_{tr} \geq 50$ dB	$L_{n,W} \leq 62$ dB	
Walls	SOU	Stairway / Public Corridor / Public lobby / Parts of different classification	$R_W \geq 50$ dB		
		Plant room / Lift Shaft	$R_W \geq 50$ dB		Required
Doors	SOU	Stairway / Public Corridor / Public Lobby	$R_W \geq 30$ dB		
Services	Habitable room in a SOU	Duct / Soil Pipe / Waste Pipe / Water Supply Pipe / Strom Water Pipe (including a duct or pipe that is located in a wall or floor cavity, serves or passes through more than one SOU)	$R_W + C_{tr} \geq 40$ dB		
	Non-habitable room or kitchen in a SOU		$R_W + C_{tr} \geq 25$ dB		

Table 4: Minimum sound insulation requirements between adjacent spaces, as set by the current NCC.

4.5 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 5 and Table 6 respectively. The PTNL's are determined in Table 7.

4.5.1 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 5 shows the intrusiveness criteria for the noise sensitive receivers.

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

Table 5: Determination of the intrusiveness criterion.

4.5.2 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 6 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 dB(A)*
Residential Receiver	Day	50 (60)[2]	58 $L_{Aeq,15min}$ (60-5+3)
	Evening	45 (55)[2]	53 $L_{Aeq,15min}$ (55-5+3)
	Night	40 (50)[2]	48 $L_{Aeq,15min}$ (50-5+3)
Commercial	When In Use	65	63 $L_{Aeq,15min}$ (65-5+3)
Passive Recreation (RE1)	When in use	50	48 $L_{Aeq,15min}$ (50-5+3)

Table 6: Determination of amenity criterion.

4.5.3 PROJECT NOISE TRIGGER LEVELS

The PNTL's are shown in Table 7 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.

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

4.6 TRAFFIC GENERATION NOISE

The NSW DECC Road Noise Policy (RNP) establishes criteria for traffic noise from:

- *Existing roads*
- *New road projects*
- *Road development projects*
- *New traffic generated by developments*

For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2dB above the existing noise levels. An increase of up to 2dB represents a minor impact that is considered barely perceptible to the average person.

In cases where existing traffic noise levels are above the noise assessment criteria, the primary objective is to reduce these through feasible and reasonable measures to meet the assessment criteria.

[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, where in this instance, the site is in close proximity to the Pacific Ocean), the amenity criterion has been increased by 10dB.

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 mechanical plant from the development to the surrounding receivers.
- Noise emissions from traffic generated by the proposed development.
- Noise emissions from the use of the retail premises.

The acoustic assessment has considered the following:

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

5.1 EXTERNAL NOISE EMISSIONS FROM ROOFTOP MECHANICAL PLANT

Noise from proposed development's rooftop mechanical plant room should be controlled to ensure external noise emissions are not intrusive and do not impact on the amenity of the sensitive receivers.

At this stage, all mechanical plant has been considered as operational continuously throughout the day, evening and night time periods.

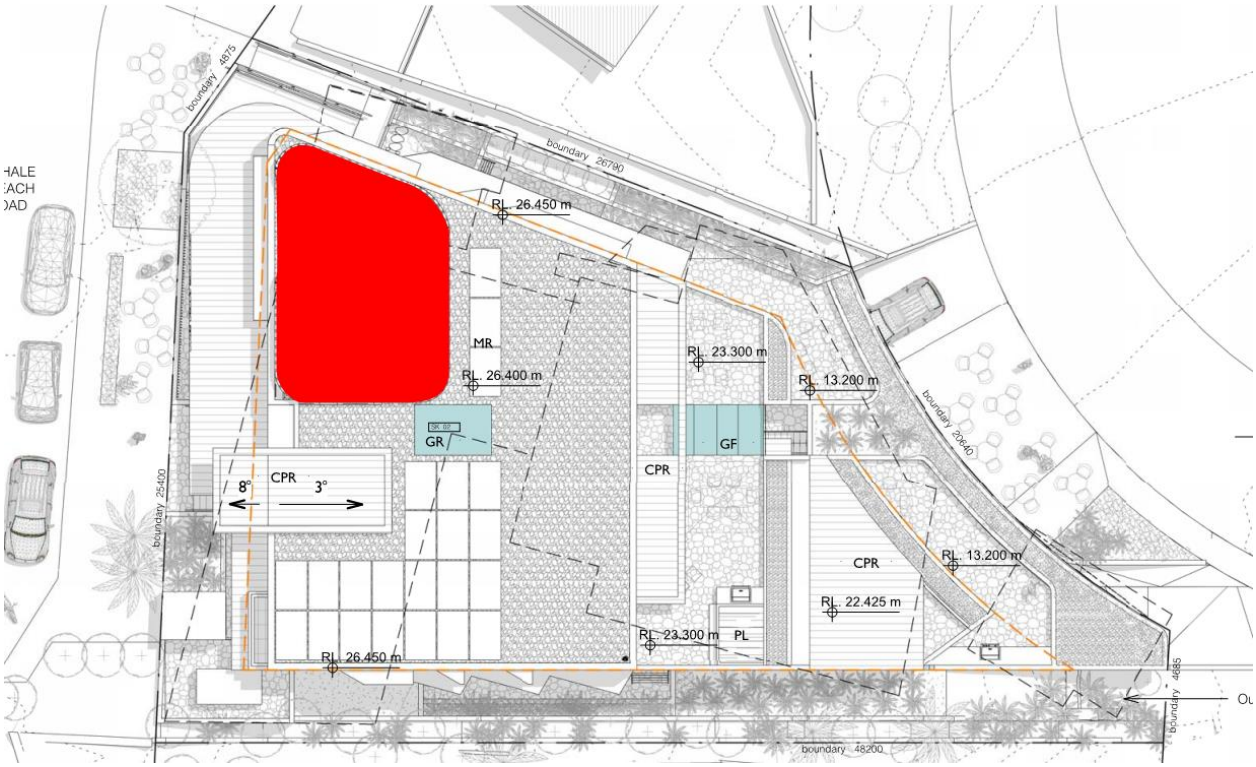


Figure 4: Preliminary location for roof top mechanical plant.

Further to the above, the location of the external mechanical plant are shown above in Figure 4. Preliminary roof-top plant sound power levels are presented in Table 8.

ID	Overall Sound Power Level, dB(A)
Condenser Units (Daikin RXYMQ9YA1) (x7)	84
Basement Car Park Exhaust Fan	83
Kitchen Exhaust Fans (x2)	100

Table 8: Preliminary Sound Power Levels of proposed Mechanical plant.

Noise impact assessment of the condenser units during night-time to the most affected residential receiver – 198 Whale Beach Road – is shown in Table 9.

Calculation	Overall A-Weighted Noise Level, in dB(A)
Sound Pressure Level of Condenser Units at 1m	76
Distance Attenuation (35m), dB	-31
$L_{Aeq,15min}$ resulting at residential receiver	45

Table 9: Proposed Condenser Units noise impact assessment.

Noise impact assessment of the carpark exhaust fan during night-time to the most affected residential receiver – 198 Whale Beach Road – is shown in Table 10. It shall be note that the carpark exhaust fan will be running under demand, therefore, it cannot be considered a continuous noise source.

Calculation	Overall A-Weighted Noise Level, in dB(A)
Sound Pressure Level Carpark Exhaust Fan at 1m	75
Distance Attenuation (35m), dB	-31
$L_{Aeq,15min}$ resulting at residential receiver	44

Table 10: Proposed Basement Car Park Exhaust Fan noise impact assessment.

Noise impact assessment of the kitchen exhaust fans during night-time to the most affected residential receiver – 198 Whale Beach Road – is shown in Table 11.

Calculation	Overall A-Weighted Noise Level, in dB(A)
Sound Pressure Level Kitchen Exhaust Fans at 1m (x2)	92
Distance Attenuation (35m), dB	-31
Additional Attenuation required, dB	-20
$L_{Aeq,15min}$ resulting at residential receiver	41

Table 11: Proposed Kitchen Exhaust Fans noise impact assessment.

Based on the calculations above, noise controls for the Kitchen Exhaust Fans shall be put in place. Among these noise controls, it is recommended a re-selection of low noise fans and/or provide an attenuator to the outlet.

A cumulative noise impact assessment of the proposed plant has been conducted to determine the noise impact of all plant running at the nearest residential receiver during night-time period.

Calculation	*Overall A-Weighted Noise Level, in dB(A)*
Condenser Units	45
Carpark Exhaust Fan	44
Kitchen Exhaust Fans	41
$L_{Aeq,15min}$ *resulting at residential receiver*	48
NPI Night-time Criterion Residential receiver / Complies?	48 / Yes

Table 12: Cumulative Roof-top mechanical plant noise impact assessment.

Noise controls will need to be incorporated with the design of the external mechanical plant room to ensure that the cumulative noise level from external plant to the most affected residential receiver meets the noise level criteria. Usual design noise controls that may need to be implemented will typically include, but are not limited to:

- Strategic location and selection of plant to ensure the cumulative noise levels at the receiver boundaries is met.
- Selection of appropriate quiet plant.
- Acoustic noise control measures to be put in place to minimise noise impacts such as:
  - In-duct attenuation
  - Noise enclosures as required
  - Sound absorptive panels
  - Acoustic louvres as required
  - Noise barriers as required

Acoustic assessment of all mechanical plant shall continue during the detailed design phase of the project in order to confirm any noise control measures. It shall be noted that the noise level emissions from the external mechanical plant cannot exceed the established PTNL's in Table 7.

5.2 TRAFFIC GENERATION NOISE

Noise impact of the traffic flows generated by the proposed development have to meet the NSW RNP criteria. The draft traffic report for the proposed development prepared by TEF Consulting (dated January 2020) provides an analysis of the additional traffic from the proposed development. This is summarised in the Table 13.

Road	*Morning Peak*		*Afternoon Peak*	
	Existing	*Generated*	*Existing*	*Generated*
Whale Beach Road	189	+28	189	+28
Surf Road	154	+12	154	+12

Table 13: Two-way existing peak hour traffic flows plus traffic generated by the proposed development.

As noted in Section 4.6, when considering land use redevelopment and the impact on sensitive land uses (residential / schools / hospitals / recreational) the NSW Road Noise Policy (RNP) states that an increase up to 2.0dB in relation to existing noise levels is anticipated to be insignificant. As shown in Table 14, the increase of traffic noise levels in due to the proposed development, is less than the maximum allowable increase of 2dB.

Road	*Morning Peak*	*Afternoon Peak*
	Increase $L_{Aeq,1hour}$, dB(A)	
Whale Beach Road	0.6 dB	0.6 dB
Surf Road	0.3 dB	0.3 dB

Table 14: Predicted noise level increase due to traffic movements from the proposed development.

Therefore, the traffic increase due to the proposed development will not result in any noticeable change in traffic noise levels and is expected to meet the NSW Road Noise Policy recommendations.

5.3 NOISE IMPACT FROM RETAIL PREMISES

5.3.1 GENERAL

At this stage, it is understood that activities likely to occur within the retail spaces are those typical of Hospitality. Figure 5 shows the location of the retail spaces and the distances to the nearest noise sensitive receivers.

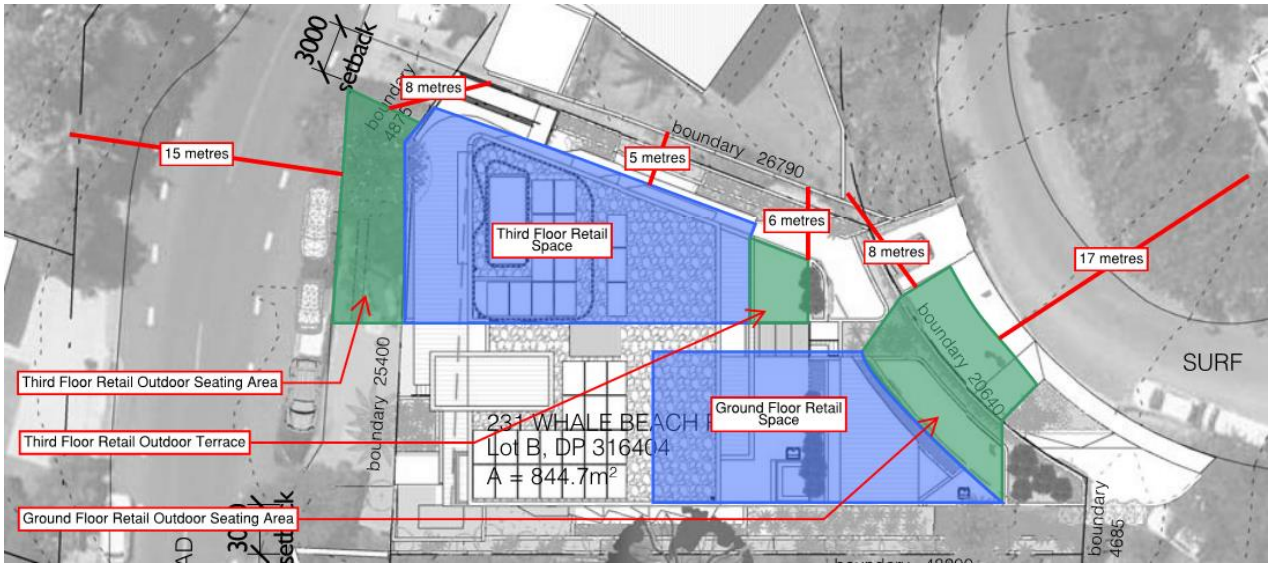


Figure 5: Location of retail premises and distances to nearest noise sensitive receivers.

The noise impacts from the retail spaces 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.

- The Ground Floor retail space faces Surf Road.
- The Third Floor retail space overlooks Whale Beach Road and the residential property at 233 Whale Beach Road.
- Based on Architectural drawings, the Ground Floor retail is assumed to have an operating capacity of 50 people internally (44 patrons and 6 staff members), 20 in the outdoor seating area; the Third Floor retail space is assumed to have an operating capacity of 48 people (44 people and 4 staff members) plus 24 in the outdoor seating area and 4 in the terrace.
- For noise breakout assessment plus Third Floor terrace noise assessment, it has been assumed noise levels based on "Normal" vocal effort. For the other outdoor seating spaces, it has been assumed noise levels are based on "Raised" vocal effort.
- Shortest distances between building façades and nearest noise sensitive receivers as per Figure 5.
- It is assumed that only half of the patrons will be speaking at any one time.
- No background music within the retail premises has been included in the assessments.
- The retail spaces have proposed operating hours from 7am until 10pm, hence the evening time criteria shall be used as the worst case scenario.
- All windows are closed for the noise breakout assessment.

The breakout noise impact assessments have 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)

5.3.2 GROUND FLOOR RETAIL

5.3.2.1 Outdoor Seating Area

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

Calculation	*Predicted Noise Level at nearest Receivers.*	
	233 Whale Beach Road (Residential)	*24 The Strand (Commercial)*
Sound Pressure Level of 10 people speaking w/ a 'Raised' vocal effort at 1m	75	75
Distance Attenuation, dB	-18	-25
Building Shielding, dB	-15	---
$L_{Aeq,15min}$ resulting at nearest receiver	42	50
NPI Evening-time Criterion / Complies?	53 / Yes	63 / Yes

Table 15: Noise impact assessment from Ground Floor outdoor seating area to nearest noise sensitive receivers.

The noise level criteria for the evening-time period at noise sensitive receivers will be achieved based on the predicted noise levels at the boundary of the residential receiver at 233 Whale Beach Road and the commercial receiver at 24 The Strand, as per results of Table 15.

5.3.2.2 Façade Breakout

Noise breakout from the Ground Floor Retail has the potential to impact the amenity of the nearest noise sensitive receivers on The Strand and Whale Beach Road. Due to the anticipated shielding provided by the proposed building façade, there is not expected to be any noticeable impact on 233 Whale Beach Road from the internal noise from the proposed Ground Floor retail space.

Predicted noise impact assessment for Ground Floor retail facing the nearest commercial receiver at 24 The Strand is summarised in Table 16.

Calculation	*Predicted Noise Level at nearest Receivers*
Reverberant Sound Pressure Level (25 people w/ "Normal' vocal effort @ 1m)	79
Minimum Composite Sound Reduction of Façade (R_{comp})	30
Correction for Surface Area of Façade (34m^2)	16
Correction for Distance to Receiver (r = 17m)	25
Resulting Sound Pressure Level at Commercial Receiver	26
Noise Criteria (Evening Time). Complies?	63 / Yes

Table 16: Noise impact assessment of Ground Floor retail at the boundary of nearest commercial receiver at 24 The Strand.

The noise level criteria for the evening-time period will be met based on the predicted noise levels at the boundary of the commercial receiver at 24 The Strand, as per results of Table 16.

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 the minimum composite sound insulation shown in Table 16.

5.3.3 THIRD FLOOR RETAIL

5.3.3.1 Outdoor Seating Area

Noise from the proposed outdoor seating area located on Whale Beach Road has the potential to impact on the adjacent noise sensitive receivers, including the residential receiver at 233 Whale Beach Road and the residential receiver at 198 Whale Beach Road.

Calculation	*Predicted Noise Level at nearest Receivers.*	
	233 Whale Beach Road	*198 Whale Beach Road*
Sound Pressure Level of 12 people w/ a 'Raised' vocal effort at 1m	76	76
Distance Attenuation, dB	-18	-24
Building Shielding, dB	-7	---
$L_{Aeq,15min}$ resulting at residential receiver	51	52
NPI Evening-time Criterion Residential receiver / Complies?	53 / Yes	53 / Yes

Table 17: Noise impact assessment from Third Floor retail outdoor seating area to adjacent noise sensitive receivers.

Based on the results of Table 17, the predicted noise level from the outdoor seating area will meet the evening time crtieria at the nearest noise sensitive receivers at 233 Whale Beach Road and 198 Whale Beach Road.

5.3.3.2 Terrace Space

Noise from the outdoor terrace has the potential to impact on the adjacent noise sensitive receivers, including the residential at 233 Whale Beach Road.

Calculation	*Calculated Noise Level at nearest Receivers*
	233 Whale Beach Road
Sound Pressure Level of 2 people w/ 'Normal' vocal effort @ 1m	61
Distance Attenuation (6m), dB	-16
$L_{Aeq,15min}$ *resulting at residential receiver*	45
NPI Evening-time Criterion Residential receiver / Complies?	53 / Yes

Table 18: Noise Impact assessment from Third Floor retail terrace to the boundary of 233 Whale Beach Road.

Based on the results of Table 18, the predicted noise level from the Third Floor retail terrace will meet the evening time crtieria based on 2 patrons speaking with a 'Normal' vocal effort.

5.3.3.3 Façade Breakout

Table 19 and Table 20 show the predicted noise break-out impact assessments for each of the nearest receivers located at 233 Whale Beach Road and 198 Whale Beach Road.

Calculation	*Calculated Noise Level at nearest Receivers*
Reverberant Sound Pressure Level (24 people w/ "Normal' vocal effort @ 1m)	75
Minimum Composite Sound Reduction of Façade (R_{comp})	33
Correction for Surface Area of Façade ($40m^2$)	16
Correction for Distance to Receiver (r = 5m)	14
Resulting Sound Pressure Level at Residential Receiver	30
Noise Criteria (Evening Time). Result. Complies?	53 / Yes

Table 19: Noise impact assessment from Third Floor retail to the boundary of residential receiver at 233 Whale Beach Road.

Calculation	*Predicted Noise Level at nearest Receivers*
Reverberant Sound Pressure Level (24 people w/ "Normal' vocal effort @ 1m)	75
Minimum Composite Sound Reduction of Façade (R_{comp})	33
Correction for Surface Area of Façade ($25m^2$)	14
Correction for Distance to Receiver (r = 15m)	24
Resulting Sound Pressure Level at Residential Receiver	18
Noise Criteria (Evening Time). Result. Complies?	53 / Yes

Table 20: Noise impact assessment from Third Floor retail to the boundary of residential receiver at 198 Whale Beach Road.

The predicted noise level at the boundary of the residential receivers at 233 Whale Beach Road and 198 Whale Beach Road is predicted to be 30dB(A) and 18dB(A) respectively. This result meets the NPI noise level criteria for evening time period.

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 the minimum composite sound insulation shown in Table 19 and Table 20.

6 SUMMARY AND CONCLUSIONS

A noise assessment has been carried out for the proposed mixed use development at 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 have been 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.

As per Pittwater Council DCP – refer Section 4.3.2, walls and/or ceilings of dwellings that are attached to another dwelling/s shall have a noise transmission rating in accordance with Part F5 of the Building Code of Australia.

At this stage, a preliminary mechanical plant selection has been made. The noise impact assessment shows that noise level criteria at the most affected residential receiver will be meet if noise control measures will be applied to the kitchen exhaust fans. The minimum attenuation required for the outlet / noise radiated of the fans in order to meet the noise level criteria is 20dB. Mechanical assessment shall continue during the design stage, when final external mechanical plant selection will be made.

Traffic noise impact due to the likely generated vehicle movements of the proposed development – based on the information provided in the traffic report – is anticipated to be insignificant, as the noise levels will not increase more than 2dB at the sensitive noise receivers.

Noise impact from anticipated external patron noise generated by proposed outdoor seating spaces have been assessed to the nearest sensitive receivers. For use of the Ground Floor retail space outdoor seating area, with a capacity of 20 patrons, the evening time criteria will be met at the nearest noise sensitive receivers. For the Third Floor retail space, the outdoor seating area will meet the evening time criteria with a capacity of 24 patrons; and for the outdoor terrace, the evening criteria will be met with a capacity of 4 patrons.

Noise break-out impacts from the Retail Spaces have been predicted at the nearest receivers. Source noise levels have been based on worst-case scenarios associated with the activities likely to occur within the retail spaces. A minimum composite Sound Insulation Index of 30dB is required for the Ground Floor Retail Space and a minimum composite Sound Insulation Index of 33dB is required for the Third Floor Retail Space. In order to achieve the noise level criteria at the noise sensitive receivers, the façade will need to be designed to meet the minimum composite sound insulation.

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.

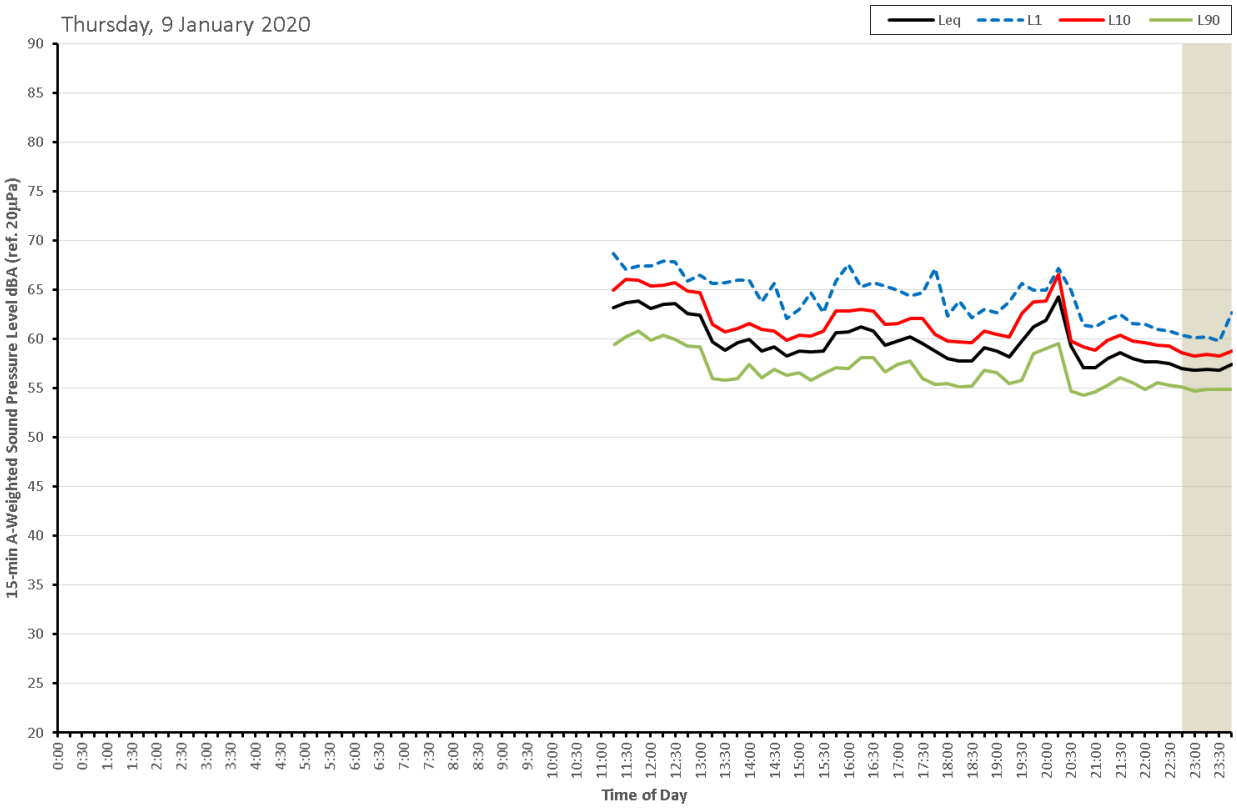
APPENDIX A: LONG TERM NOISE MONITORING

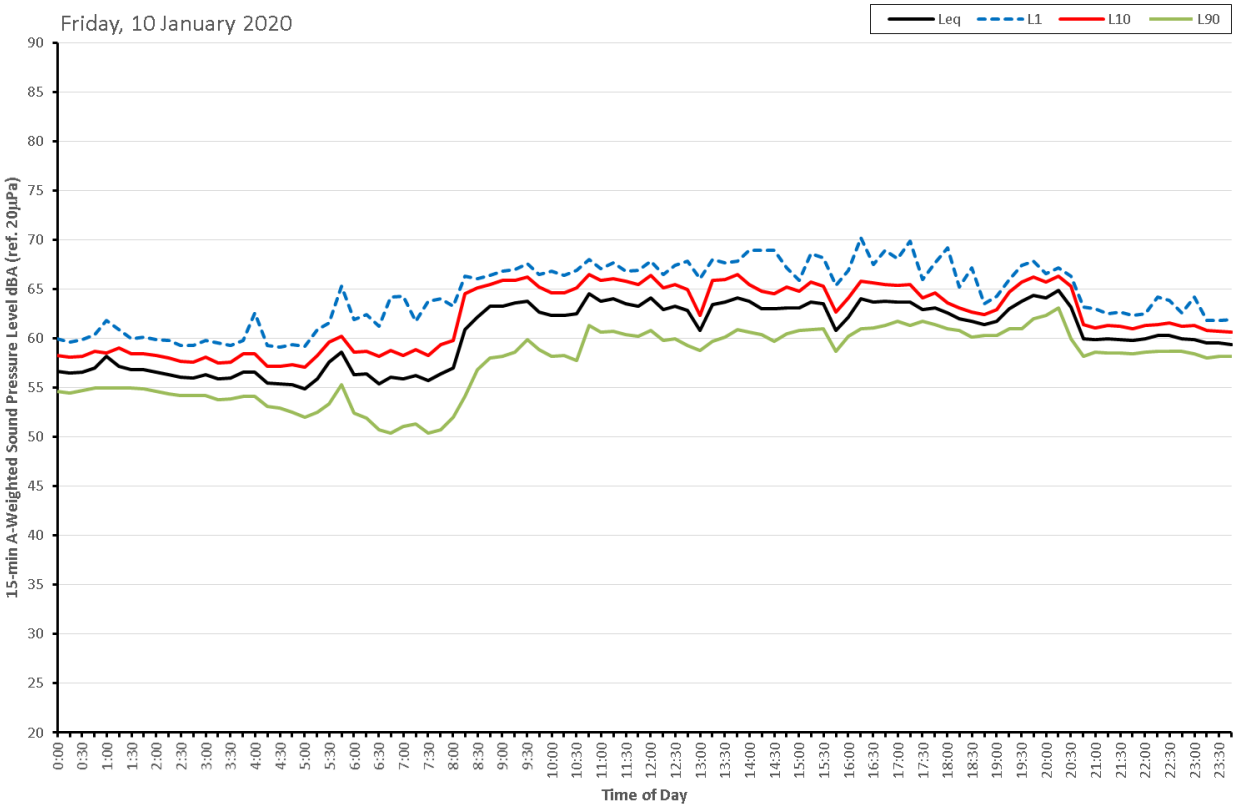
L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

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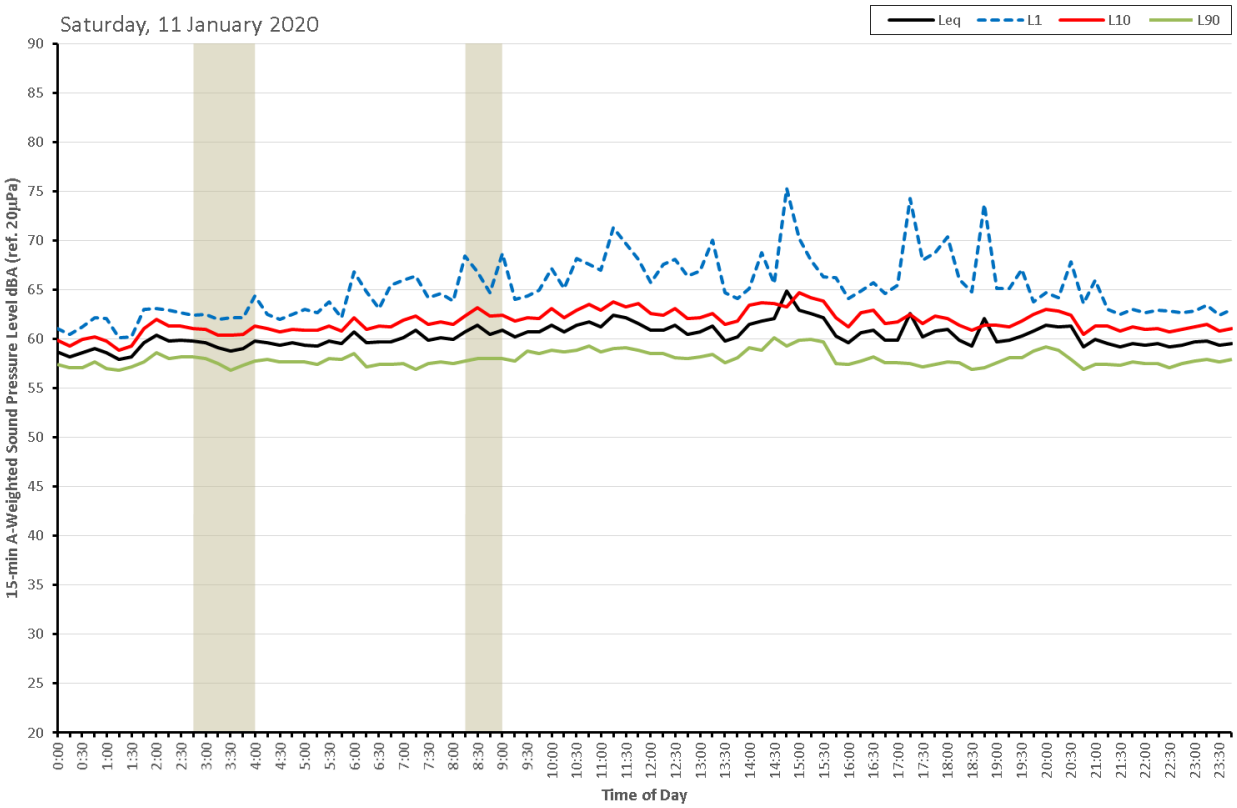
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day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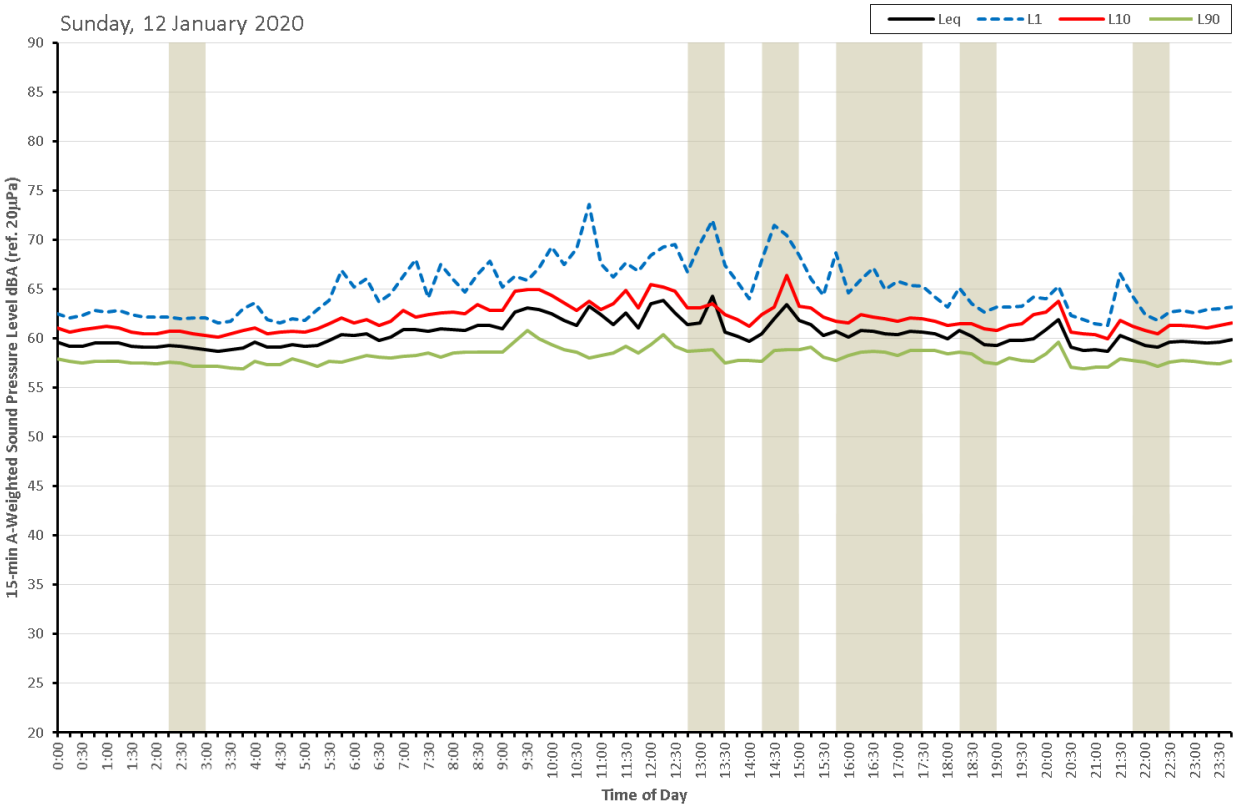
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day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Leq
L1
L10
L90
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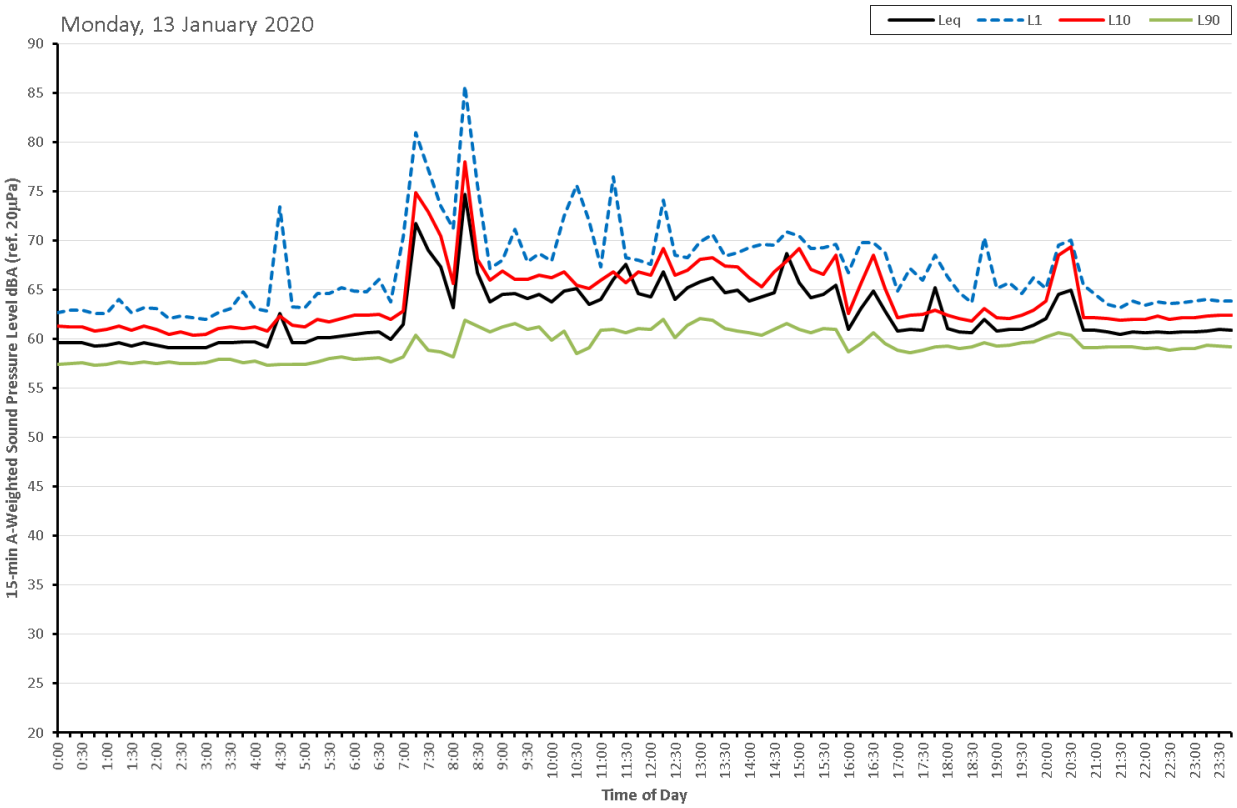
Time of Day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Leq
L1
L10
L90
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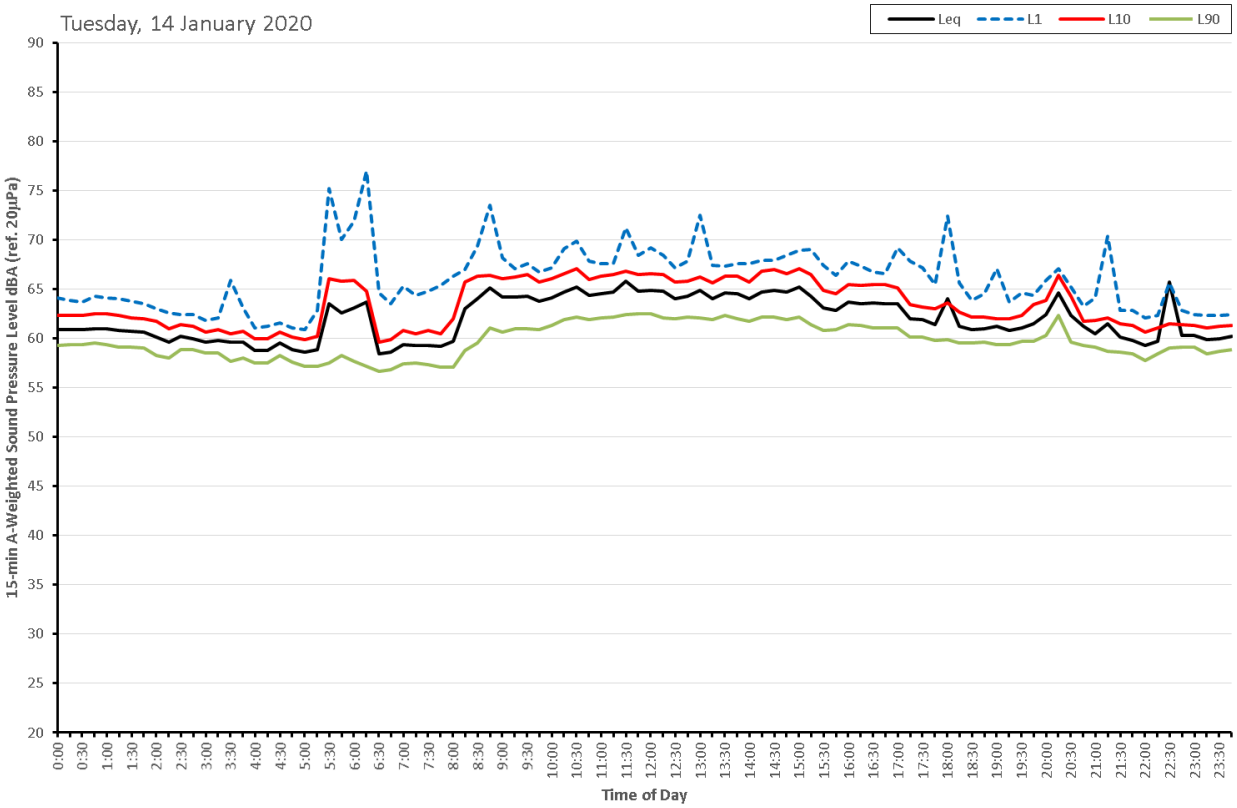
Time of Day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Leq
L1
L10
L90
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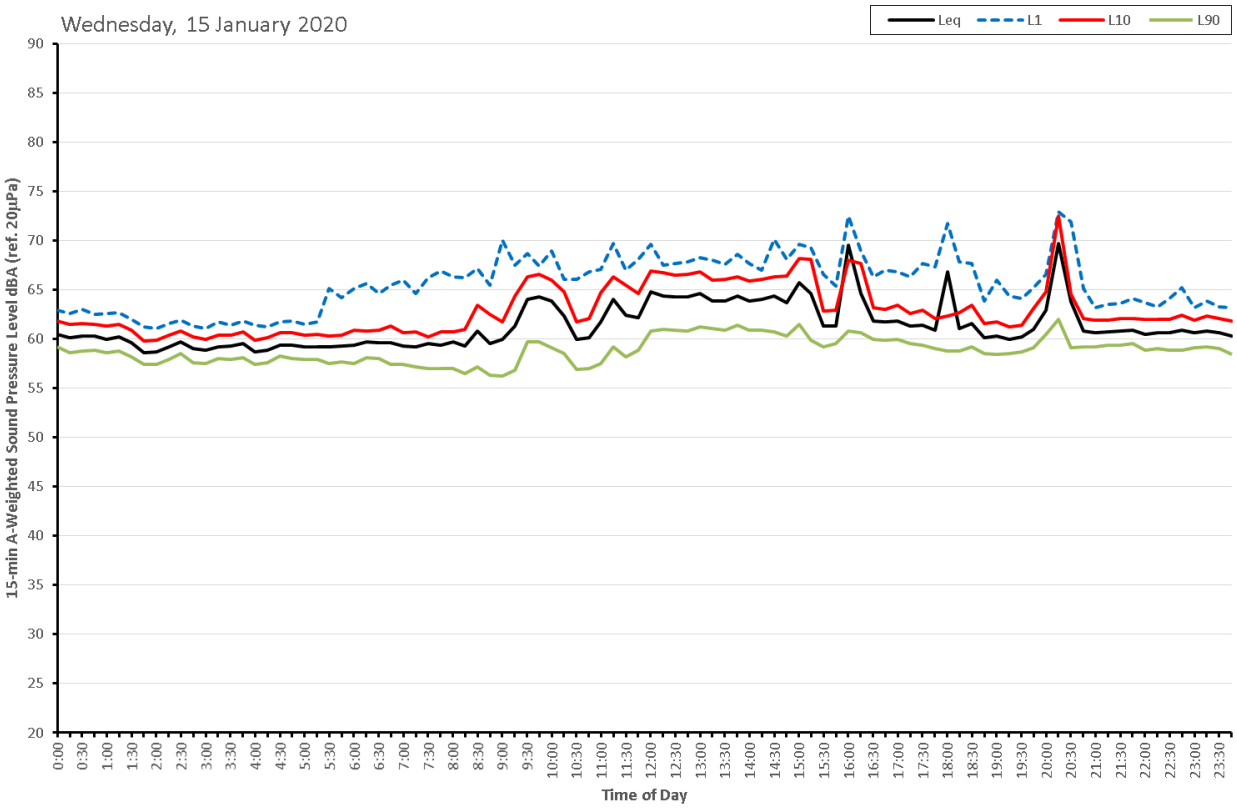
Time of Day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L1
L10
L90
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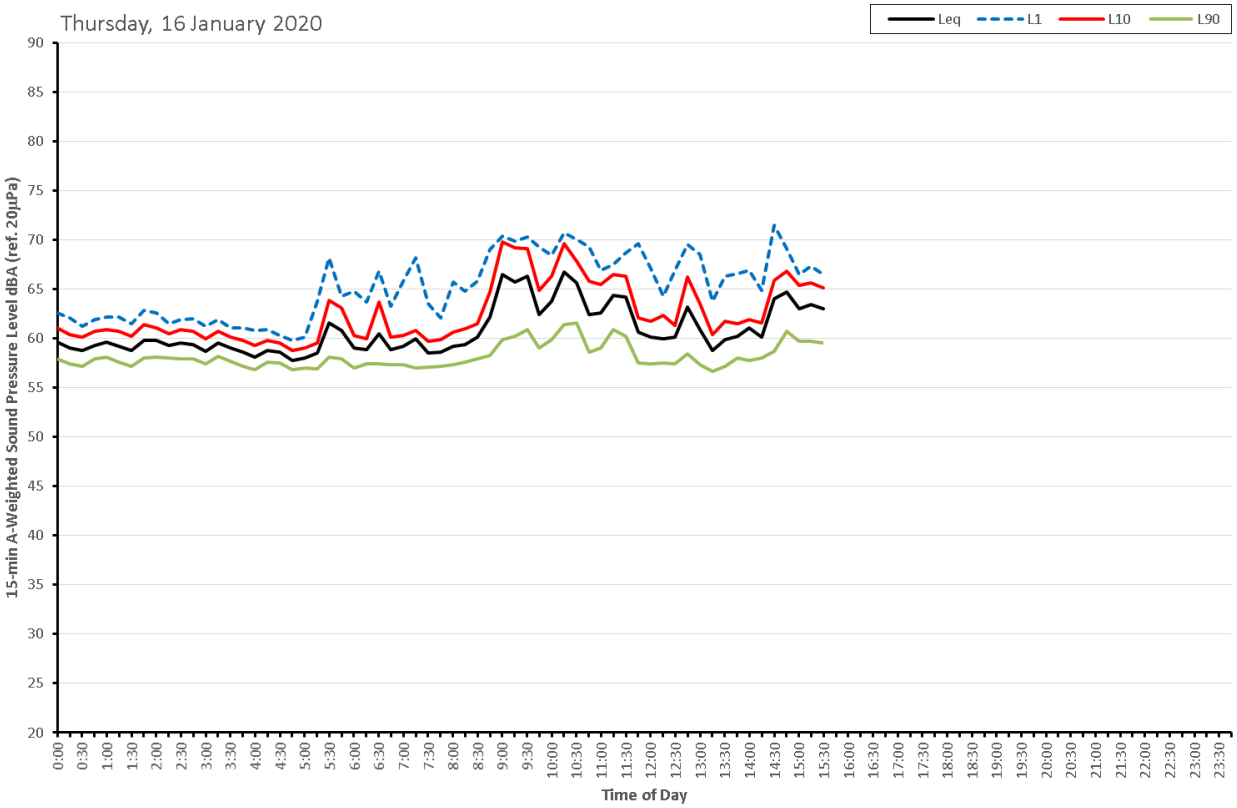
Time of Day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Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day