



142-150 Narrow Neck Rd, Katoomba (SSD-86456706)

Noise and Vibration Impact Assessment

Project No.	P00248a
Revision	003
Issued	13 January 2026
Client	Management 7BBH Pty Ltd

E-LAB Consulting

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Document QA and Revisions

ISSUE	DATE	COMMENTS	ENGINEER	REVIEWER
1	09/10/2025	Draft Issue	Kanin Mungkarndee	Brandon Notaras
2	29/10/2025	For SSDA	Kanin Mungkarndee	Brandon Notaras
3	13/01/2026	For SSDA	Kanin Mungkarndee	Brandon Notaras

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Authorised by:

E-LAB Consulting



Brandon Notaras | Director

Acoustics & Vibration



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1 EXECUTIVE SUMMARY

This Noise and Vibration Impact Assessment has been prepared by E-LAB Consulting on behalf Management 7BBH Pty Ltd for a State Significant Development Application (SSD-86456706) located at 142-150 Narrow Neck Rd, Katoomba.

The purpose of this Noise and Vibration Impact Assessment is to identify relevant noise and vibration criteria, assess these impacts from the development on surrounding receivers and to address the Secretary's Environmental Assessment Requirements (SEARs) for the project issued on 23 June 2025 which identified the following specific assessment requirements.

Table 1: SEARs requirements and report section reference

ITEM	DESCRIPTION OF REQUIREMENT	SECTION REFERENCE (THIS REPORT)
10	Noise and Vibration	
	<ul style="list-style-type: none"> ▪ Provide a noise and vibration impact assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented. 	<p>Refer to Section 7 for operational assessment and Section 8 for operational mitigation measures.</p> <p>Refer to Section 9 and 10 for construction assessment and Section 11 for construction mitigation measures.</p>

This report concludes that the proposed residential development is acceptable and warrants approval subject to the implementation of the mitigation measures outlined in Section 8 and 11.

Following implementation of the mitigation measures, the remaining impacts are appropriate.



2 PROJECT OVERVIEW

2.1 PROPOSED DEVELOPMENT

The proposed development comprises a mixed-use residential and serviced accommodation precinct in the vicinity of the Planetary Health Precinct at Katoomba. It includes the construction of 218 residential units (with a 15% residential GFA affordable housing allocation) and 52 serviced apartments, supported by 2 restaurants and Information centre, private wellness facilities for residents and their guests, and high- quality landscaped open spaces.

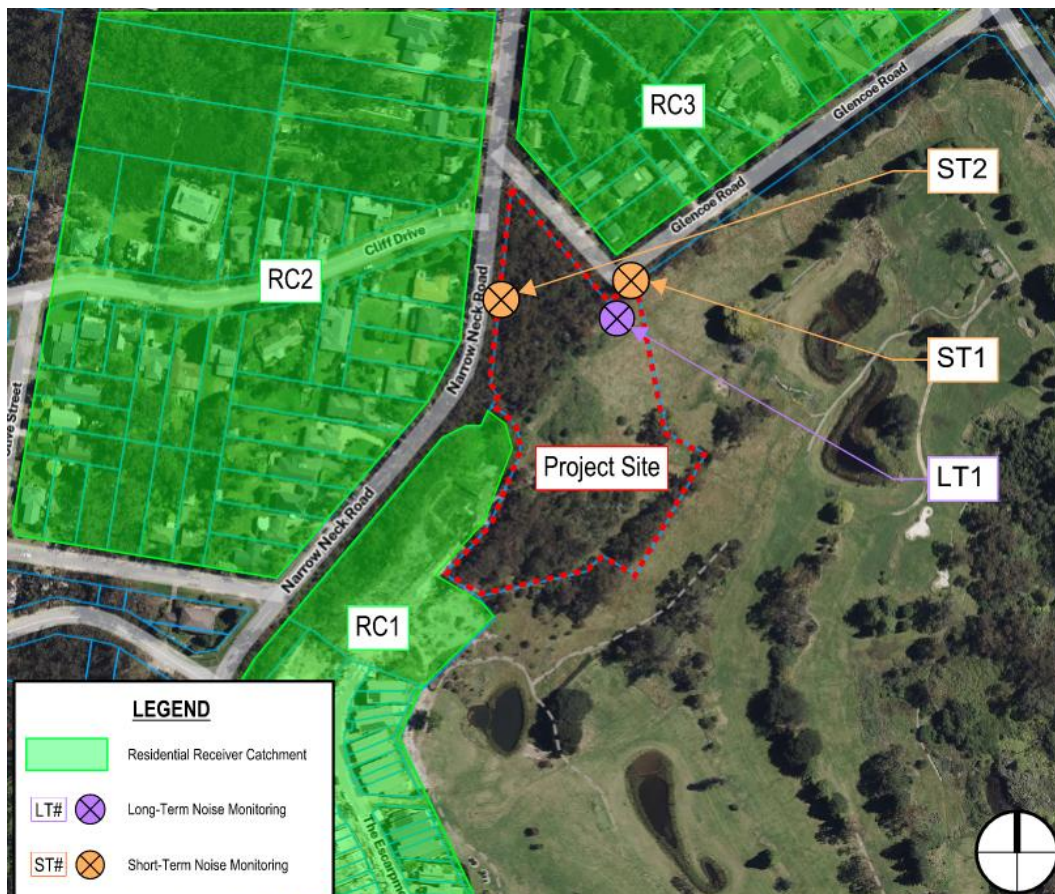
The design integrates medium density, environmentally responsive buildings on the R3-Zoned site, arranged around shared courtyards, pedestrian linkages, and green corridors that connect to the surrounding natural landscape. Basement parking is proposed to each building. The development is conceived as a model of sustainable living and regenerative urban design, combining housing diversity, eco-tourism, and community wellbeing within a framework consistent with the Blue Mountains' Planetary Health objectives and State planning policies for resilient, low impact development.

2.2 SITE DESCRIPTION

The location of the proposed development, noise monitoring and measurement locations, and surrounding noise-sensitive receivers are presented in Figure 1. Noise and vibration sensitive receivers have been delineated into receiver catchments (RCs) as shown in Figure 1.

- RC1 –Residential receivers adjoining the site to the south-west
- RC2 – Residential receivers along Narrow Neck Rd to the west
- RC3 – Residential receivers along Glencoe Rd to the north

Figure 1: Acoustic site plan identifying the surrounding noise-sensitive receivers and noise monitoring locations



3 METHODOLOGY

To assess the noise and vibration impacts of the proposed development, the following process was carried out:

- Identify and classify the surrounding noise and vibration sensitive receivers surrounding the proposed development
- Identify and classify the noise and vibration sources generated by the proposed development, together with external noise and vibration sources impacting on the proposed development
- Carry out site noise investigations to quantify the background noise levels local to the proposed development
- Determine the project noise and vibration criteria applicable to the proposed development in accordance with the requirements listed in the SEARs
- Assess the operational and construction noise and vibration impacts of the noise and vibration sources generated by the proposed development to the surrounding noise-sensitive receivers, together with any impacts on the occupants of the proposed development
- Provide details of mitigation measures required to alleviate noise and vibration impacts to achieve the project noise and vibration criteria

The following operational noise and vibration assessments were conducted as part of this noise and vibration impact assessment:

- Noise impact from traffic generation as a result of the development
- Noise emissions associated with the development's restaurants
- Noise emission from mechanical plant and equipment serving the development

The following construction noise and vibration assessments were conducted as part of this noise and vibration impact assessment:

- Noise generated during the construction of the development and associated impacts on the surrounding noise sensitive receivers
- Vibration generated during the construction of the development and associated impacts on the surrounding vibration sensitive receivers

The noise and vibration assessments conducted as part of this report have been assessed to the noise and vibration criteria established in the following guidelines, standards and policies:

- NSW EPA's Noise Policy for Industry 2017, dated October 2017 (NPI)
- NSW EPA's Road Noise Policy, dated March 2011 (RNP)
- NSW's State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP 2021)
- NSW EPA's Interim Construction Noise Guideline, dated July 2009 (ICNG)
- Assessing vibration: A Technical Guideline 2006 (AVTG)
- British Standard BS5228 – Part 1:1997 "Noise and Vibration Control on Construction and Open Sites."
- British Standard BS7358:1993 "Evaluation and Measurement for Vibration in Buildings"
- German Standard DIN4150 – Part 3: "Structural vibration in buildings – Effects on structures"



4 NOISE SURVEYS

4.1 NOISE MEASUREMENT EQUIPMENT

The following instrumentation was used for noise measurement and analysis:

- Bruel and Kjaer 2250 Integrating Sound Level Meter (S/N: 3031115)
- Bruel and Kjaer type 1 microphone – comprising of:
 - ZC 0032 preamplifier (S/N: 31930)
 - 4189 capsule (S/N: 3334640)
- Bruel and Kjaer Sound calibrator Type 4231 (S/N: 3029638)
- Pulsar MODEL 105 Type 1 Calibrator (S/N: 96085)
- NSRT mk3 Sentry Noise Logger

All instrument systems are laboratory calibrated using instrumentation traceable to Australian National Standards and certified within the last two years thus conforming to Australian Standards. The measurement system was also field calibrated prior to and after noise surveys. Calibration drift was found to be less than 0.2dB during measurements. No adjustments for instrument drift during the measurement period were warranted.

4.2 SHORT-TERM NOISE MONITORING

Attended short-term noise measurements were conducted at position ST1 and ST2 as shown in Figure 1 on the 9 September 2025 to determine the environmental noise characteristics in the area. Results have been summarised in Table 2.

Table 2: Attended noise monitoring results

LOCATION	TIME	MEASURED L _{Aeq} dB(A)	MEASURED L _{A90} dB(A)	COMMENTS
ST1	2:56pm to 3:11pm	43	39	<ul style="list-style-type: none"> ▪ Primarily noise from general environment and nature sounds (e.g. birds chirping, wind and trees rustling) ▪ Intermittent noise from residential houses along Glencore Rd (e.g. leaf blower) ▪ No cars passing by over the duration of measurement
ST2	2:37pm to 2:52pm	59	47	<ul style="list-style-type: none"> ▪ Primarily noise from general environment and nature sounds (e.g. birds chirping, wind and trees rustling) ▪ Noise from infrequent cars passing by

Furthermore, the octave band background noise spectrum for the above measurements are provided in Table 3.

Table 3: Single octave band spectrums

MEASUREMENT LOCATION	SINGLE OCTAVE BAND NOISE LEVELS – dB,L ₉₀								
	31.5HZ	63HZ	125HZ	250HZ	500HZ	1KHZ	2KHZ	4KHZ	8KHZ
ST1	12	23	29	30	36	37	36	35	30
ST2	32	38	42	48	52	55	53	46	38



4.3 LONG-TERM NOISE MONITORING

4.3.1 Background Noise

Background noise levels and subsequent Rating Background Noise Level (RBL) have been established for nearby residential receivers in accordance with the Noise Policy for Industry 2017 using the results of the noise monitoring at location LT1. Noise monitoring was conducted between 24 to 31 May 2022.

The description of time of day presented in Table 4 is outlined within the NPI and described as follows:

- Day – the period from 7:00am to 6:00pm Monday to Saturday, 8am to 6pm on Sundays and public holidays
- Evening – the period from 6:00pm to 10:00pm
- Night – the period from 10:00pm to 7:00am, or 10:00pm to 8:00am on Sundays and public holidays.

The noise monitoring results are presented in Table 4.

Table 4: Unattended noise monitoring results

LOCATION	MEASURED RATING BACKGROUND NOISE LEVELS- dB(A)		
	DAY	EVENING	NIGHT
LT1	35 ¹	32	31

Note 1: the Daytime RBL has been adjusted to match the minimum assumed RBL as per the NPI, being 35dB(A)

The local ambient noise environment is typical of an Suburban residential environment (as classified by the NPI). Please note that any adverse weather affected data (in accordance with the NPI) or extraneous noise sources during the period of logging has been excluded from the calculations. Appendix A provides a graphical summary of the long-term noise measurements.



5 OPERATIONAL NOISE AND VIBRATION CRITERIA

5.1 INTERNAL NOISE LEVELS

5.1.1 SEPP (Transport and Infrastructure) 2021

For developments with residential accommodation which are adjacent to a busy road whereby the consent authority considers is likely to be adversely affected by road noise or vibration, SEPP (Transport and Infrastructure) 2021 provides the following acoustic criteria within Clause 2.120.

2.120 Impact of road noise or vibration on non-road development

- (1) *This section applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 20,000 vehicles (based on the traffic volume data published on the website of TfNSW) and that the consent authority considers is likely to be adversely affected by road noise or vibration—*
 - (a) *residential accommodation,*
 - (b) *a place of public worship,*
 - (c) *a hospital,*
 - (d) *an educational establishment or centre-based child care facility.*
- (2) *Before determining a development application for development to which this section applies, the consent authority must take into consideration any guidelines that are issued by the Planning Secretary for the purposes of this section and published in the Gazette.*
- (3) *If the development is for the purposes of residential accommodation, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded—*
 - (a) *in any bedroom in the residential accommodation—35 dB(A) at any time between 10 pm and 7 am,*
 - (b) *anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway)—40 dB(A) at any time.*
- (3A) *Subsection (3) does not apply to a building to which State Environmental Planning Policy (Housing) 2021, Chapter 3, Part 7 applies.*
- (4) *In this section, freeway, tollway and transitway have the same meanings as they have in the Roads Act 1993.*

It is understood that all surrounding roads (e.g. Narrow Neck Rd, Glencore Rd and Stuarts Rd) are not considered as a road which triggers a mandatory noise assessment under clause 2.120 of SEPP (Transport and Infrastructure) 2021.

Subsequently, an acoustic assessment of road noise in accordance with SEPP (Transport and Infrastructure) 2021 is not required and non-special façade constructions are expected to be suitable.



5.2 TRAFFIC NOISE GENERATION

The L_{Aeq} noise level or the “equivalent continuous noise level” correlates best with the human perception of annoyance associated with traffic noise.

Road traffic noise impact is assessed in accordance with the RNP. The criterion (Table 3 – Road Traffic Noise Assessment Criteria for Residential Land Uses) divides land use developments into different categories and lists the respective criteria for each case. The category that is relevant to the proposed use of the site is shown below in Table 5.

Table 5: NSW RNP – traffic noise assessment criteria

ROAD CATEGORY	TYPE OF PROJECT/LAND USE	ASSESSMENT CRITERIA – dB(A)	
		DAY (7AM – 10PM)	NIGHT (10PM – 7AM)
Local Roads	6. Existing residences affected by additional traffic on existing local roads generated by land use developments	L_{Aeq} , (1 hour) 55	L_{Aeq} , (1 hour) 50

In the event that the traffic noise at the site is already in excess of the criteria noted above, the RNP states that the primary objective is to reduce the existing level through feasible and reasonable measures to meet the criteria above.

If this is not achievable, Section 3.4.1 of the RNP states that for existing residences affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise should be limited to 2 dB above that of the corresponding ‘no build option’.

Also, the inherent quality of noise from vehicles on public roads arriving to and departing from the site would be indistinguishable from other traffic noise on public roads.

5.3 NOISE EMISSIONS

5.3.1 NSW EPA Noise Policy for Industry (NPI) 2017 – Industrial Noise (Plant and Equipment)

The NSW EPA’s Noise Policy for Industry (NPI) 2017 has been implemented to assess the noise impacts of mechanical plant and equipment, as well as other industrial noise sources on the surrounding receiver catchments.

The NPI sets out a framework for the derivation of project noise trigger levels that are used to assess the potential impacts of noise from industry (and industrial noise sources) and indicate the noise level at which feasible and reasonable noise management measures should be considered.

This policy applies to noise sources from activities listed in Schedule 1 of the POEO Act and those regulated by the EPA. This includes noise sources from mechanical plant and equipment within the proposed development, for which this policy will be applied.

The project noise trigger level provides a benchmark for assessing a proposal, where if exceeded, indicates a potential noise impact on the community and so triggers a management response such as additional mitigation measures. The project noise trigger level is the lower (the more stringent) value of the project intrusiveness noise level and project amenity noise level determined in Sections 2.3 and 2.4 of the NPI, respectively.

Project Intrusiveness Noise Level

The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (in terms of L_{Aeq}) measured over a 15-minute period does not exceed the background noise level by more than 5 dB when beyond a minimum threshold. The project intrusiveness noise level is only applicable to surrounding residential receivers.

To account for the temporal variation of background noise levels, the method outlined in Fact Sheet A of the NPI establishes a method in determining the Rating Background Noise Level (RBL) to be used in the assessment.



The intrusiveness noise level is determined as follows:

$$L_{Aeq,15min} \text{ (Intrusiveness Criteria)} = \text{Rating Background Noise Level (RBL)} + 5 \text{ dB(A)}$$

Where the RBLs established in accordance with Fact Sheet A are lower than the values presented in Table 6 for each assessment period, the values presented in Table 6 shall be used for that particular assessment period. These result in the minimum intrusiveness noise levels provided in Table 6.

Table 6: Minimum assumed RBLs and project intrusiveness noise levels

TIME OF DAY	MINIMUM ASSUMED RBL - dB(A)	MINIMUM PROJECT INTRUSIVENESS NOISE LEVELS - $L_{Aeq,15min}$ dB(A)
Day	35	40
Evening	30	35
Night	30	35

Table 7 provides the project intrusiveness noise levels applicable to each of the surrounding residential noise-sensitive receivers.

Table 7: Project intrusiveness noise level criteria for each residential receiver catchment

RECEIVER CATCHMENT	TIME OF DAY	MEASURED RBL - dB(A)	PROJECT INTRUSIVENESS NOISE LEVELS - $L_{Aeq,15min}$ dB(A)
RC1 – RC3	Day	35	40
	Evening	32	37
	Night	31	36

Project Amenity Noise Level

The recommended amenity noise levels represent the objective for total industrial noise at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location.

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise as follows:

$$\text{Project Amenity Noise Level} = \text{Recommended Amenity Noise Level (see Table 8)} - 5 \text{ dB(A)}$$

The following exceptions to the above method to derive the project amenity noise level apply:

- In areas with high traffic noise levels. Where the level of transport noise, road traffic noise in particular is high enough to make noise from an industrial source inaudible, the project amenity noise level shall be set at 15 dB(A) below the measured $L_{Aeq,period(traffic)}$ for the particular assessment period
- In proposed developments in major industrial clusters
- Where the resultant project amenity noise level is 10 dB(A) or more lower than the existing industrial noise level. In this case the project amenity noise levels can be set at 10 dB(A) below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time
- Where cumulative industrial noise is not a necessary consideration because no other industries are present in the area, or likely to be introduced into the area in the future. In such cases the relevant amenity noise level is assigned as the project amenity noise level for the development

The recommended amenity noise level, project amenity noise level, and converted project amenity noise level for comparison with the intrusiveness criteria (from time of day period to 15-minute) is provided for each surrounding receiver catchment in Table 8.



Table 8: Project amenity noise level criteria for each receiver catchment

RECEIVER CATCHMENT	RECEIVER TYPE	TIME OF DAY	RECOMMENDED AMENITY NOISE LEVEL - $L_{Aeq,period}$ dB(A)	PROJECT AMENITY NOISE LEVEL - $L_{Aeq,period}$ dB(A)	PROJECT AMENITY NOISE LEVEL - $L_{Aeq,15min}$ dB(A)
RC1 – RC3	Residential (Rural) ¹	Day	50	45	48
		Evening	45	40	43
		Night	40	35	38

Note 1: Rural residential as classified in Table 2.3 of the Noise Policy for Industry (NPI) 2017

Sleep Disturbance and Maximum Noise Level Assessment

Where the proposed development night-time noise levels generated at a residential location exceed either:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB(A), whichever is greater, and/or
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB(A), whichever is greater,

a detailed maximum noise level event assessment should be undertaken.

Corrections for Annoying Noise Characteristics – Noise Policy for Industry Fact Sheet C

Fact Sheet C contained within the Noise Policy for Industry outlines the correction factors to be applied to the source noise level at the receiver before comparison with the project noise trigger levels established within this report, to account for the additional annoyance caused by these modifying factors.

The modifying factor corrections should be applied having regard to:

- The contribution noise level from the premises when assessed/measured at a receiver location, and
- The nature of the noise source and its characteristics (as set out in Fact Sheet C)

Table C1 within Fact Sheet C sets out the corrections to be applied for any assessment in-line with the NPI. The corrections specified for tonal, intermittent and low-frequency noise are to be added to be added to the measured or predicted levels at the receiver before comparison with the project noise trigger levels. The adjustments for duration are to be applied to the criterion.

Project Noise Trigger Levels

Table 9 presents the project intrusiveness and project amenity noise levels for each period, and each receiver catchment, as well as the resultant project noise trigger levels (PNTLs) that shall be applied for any assessment of impacts of mechanical plant and equipment noise on the surrounding receiver catchments.

Table 9: Project noise trigger levels (PNTL) to be applied to each surrounding receiver catchment

RECEIVER CATCHMENT	RECEIVER TYPE	TIME OF DAY	PROJECT INTRUSIVENESS NOISE LEVEL - $L_{Aeq,15min}$ dB(A)	PROJECT AMENITY NOISE LEVEL - $L_{Aeq,15min}$ dB(A)	SLEEP DISTURBANCE NOISE LEVEL - dB(A)	PNTL - $L_{Aeq,15min}$ dB(A)
RC1 – RC3	Residential	Day	40	48	N/A	40
		Evening	37	43	N/A	37
		Night	36	38	40 $L_{Aeq,15min}$ 52 L_{AFmax}	36



5.3.2 NSW Liquor Act 2007

The noise emissions criteria from the NSW Liquor Act 2007 shall be applied to noise from any music/entertainment and patrons of licensed premises and assessed to the surrounding residential receivers.

A summary of the noise emissions requirements for licensed premises within the NSW Liquor Act 2007 is provided in Table 10 for all surrounding residential receivers.

Table 10: Summary of NSW Liquor Act 2007 noise emission criteria

PERIOD	OCTAVE BAND CENTRE FREQUENCIES	NOISE CRITERIA dB(A)
7am – 12am	From 31.5 Hz to 8000 Hz	$L_{A10, \text{oct}} \leq L_{A90, \text{oct}} + 5$ at property boundary
12am – 7am	From 31.5 Hz to 8000 Hz	$L_{A10, \text{oct}} \leq L_{A90, \text{oct}} + 0$ at property boundary
		Inaudible in habitable rooms

Table 11 presents the subsequent noise criteria based on the noise surveys conducted (outlined in Section 4).

Table 11: NSW Liquor Act 2007 noise emission criteria based on noise survey conducted

RECEIVER	TIME PERIOD	FREQUENCY (Hz)									OVERALL dB(A)
		31.5	63	125	250	500	1000	2000	4000	8000	
RC1 – RC3	7am – 12am	69 ¹	45 ¹	28 ¹	25	31	32	31	30	25	37
	12am – 7am	69 ¹	45 ¹	28 ¹	18	24	25	24	23	18	30

Note 1: Based on the threshold of hearing from ISO 226:2003

6 CONSTRUCTION NOISE AND VIBRATION CRITERIA

6.1 CONSTRUCTION NOISE CRITERIA

6.1.1 Interim Construction Noise Guideline (ICNG)

The noise criteria outlined within the ICNG has been adopted for the assessment of noise emissions from the construction of the proposed development.

Airborne Noise – Residential Receiver Catchments

The airborne noise criteria for surrounding residential receiver catchments have been extracted from Table 2 in the ICNG and is presented in Table 12 below.

Table 12: NSW ICNG construction noise criteria for surrounding residential receiver catchments

TIME OF DAY	MANAGEMENT LEVEL $L_{Aeq,15min}^1$	HOW TO APPLY
<p>Recommended Standard Hours:</p> <p>Monday – Friday 7am – 6pm</p> <p>Saturday 8am – 1pm</p> <p>No work on Sundays or public holidays</p>	<p>Noise Affected RBL + 10dB</p>	<p>The noise-affected level represents the point above which there may be some community reaction to noise.</p> <ul style="list-style-type: none"> ▪ Where the predicted or measured $L_{Aeq,15min}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. ▪ The proponent should also inform all potentially impacted residences of the nature of works to be carried out, the expected noise levels and duration as well as contact details.
	<p>Highly Noise Affected 75 dB(A)</p>	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <ul style="list-style-type: none"> ▪ Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur in, taking into account: <ul style="list-style-type: none"> – Times identified by the community when they are less sensitive to noise (such as before and after school, for works near schools, or mid-morning or mid-afternoon for works near residences) – If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
<p>Outside Recommended Standard Hours</p>	<p>Noise Affected RBL + 5dB</p>	<ul style="list-style-type: none"> ▪ The proponent should apply all feasible and reasonable work practices to meet the noise affected level. ▪ Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. ▪ For guidance on negotiating agreements see section 7.2.2.

Note 1: Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Ground-borne Noise – Residential Receiver Catchments

Ground-borne noise is noise generated by vibration transmitted through the ground into a structure, such as an excavator with a hydraulic hammer attachment, or impact/bore piling. The following ground-borne noise levels for residences have been extracted from Section 4.2 of the ICNG and indicate when management actions should be implemented.

- Evening (6pm to 10pm) – Internal Noise Level: $L_{Aeq,15min}$ 40 dB(A); and
- Night-time (10pm to 7am) – Internal Noise Level: $L_{Aeq,15min}$ 35 dB(A).

An assessment of ground-borne noise to these levels is only required when the ground-borne noise levels are higher than airborne noise levels, and for surrounding residential receiver catchments. The ground-borne noise levels are for evening and night-time periods only. The levels shall be assessed at the centre of the most affected habitable room.

6.2 CONSTRUCTION VIBRATION CRITERIA

It is important for vibration emissions from vibration-intensive equipment utilised during the construction works be managed to maintain appropriate levels of human comfort, and to avoid both cosmetic and structural damage. The vibration limits proposed in the ensuing sub-sections aid in achieving this outcome.

6.2.1 Human Comfort

The office of Environment and Heritage (OEH) developed a document, “Assessing vibration: A technical guideline” in February 2006 to assist in preventing people from exposure to excessive vibration levels from construction and operation of a development within buildings. The guideline does not however address vibration induced damage to structures or structure-borne noise effects. Vibration and its associated effects are usually classified as continuous, impulsive or intermittent.

Continuous and Impulsive Vibration

Structural vibration in buildings can be detected by occupants and can affect them in many ways including reducing their quality of life and also their working efficiency. Complaint levels from occupants of buildings subject to vibration depend upon their use of the building and the time of the day.

Maximum allowable magnitudes of building vibration with respect to human response are shown in Table 13. It should be noted that the human comfort for vibration is more stringent than the building damage criteria.

Table 13: Preferred and maximum weighted RMS values for continuous and impulsive vibration acceleration (m/s^2) 1-80 Hz

LOCATION	ASSESSMENT PERIOD ¹	PREFERRED VALUES		MAXIMUM VALUES	
		z-axis	x- and y-axes	z-axis	x- and y-axes
Continuous vibration					
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night time	0.007	0.005	0.014	0.010
Impulsive vibration					
Residences	Daytime	0.30	0.21	0.60	0.42
	Night time	0.10	0.071	0.20	0.14

Note 1: Daytime is 7:00am to 10:00pm and night time is 10:00pm to 7:00am



Intermittent Vibration Criteria

Disturbance caused by vibration will depend on its duration and its magnitude. This methodology of assessing intermittent vibration levels involves the calculation of a parameter called the Vibration Dose Value (VDV) which is used to evaluate the cumulative effects of intermittent vibration. Various studies support the fact that VDV assessment methods are far more accurate in assessing the level of disturbance than methods which is only based on the vibration magnitude.

Table 14: Acceptable vibration dose values for intermittent vibration ($m/s^{1.75}$)

LOCATION	DAYTIME ¹		NIGHT-TIME ¹	
	PREFERRED VALUE	MAXIMUM VALUE	PREFERRED VALUE	MAXIMUM VALUE
Residences	0.20	0.40	0.13	0.26

Note 1: Daytime is 7:00am to 10:00pm and night time is 10:00pm to 7:00am

6.2.2 Cosmetic Damage

Structural vibration thresholds are set to minimize the risk of cosmetic surface cracks and lie below the levels that have the potential to cause damage to the main structure. Table 15 presents guide values for building vibration, based on the vibration thresholds above which cosmetic damage has been demonstrated outlined within BS7385-Part 2:1993. These values are evaluated to give a minimum risk of vibration-induced damage, where minimal risk for a named effect is usually taken as 95% probability of no effect.

Table 15: Transient vibration guide values for cosmetic damage – BS 7385-2:1993

TYPE OF BUILDING	PEAK PARTICLE VELOCITY IN FREQUENCY RANGE OF PREDOMINANT PULSE (PPV)	
	4 Hz TO 15 Hz	15 Hz AND ABOVE
Reinforced or framed structures Industrial or light commercial type buildings	50mm/s	N/A
Unreinforced or light framed structures Residential or light commercial type buildings	15mm/s	20mm/s (50mm/s at 40Hz and above)

6.2.3 Structural Damage

Ground vibration criteria is defined in terms of the levels of vibration emission from the construction activities which will avoid the risk of damaging surrounding buildings or structures. It should be noted that human comfort criteria are normally expressed in terms of acceleration whereas structural damage criteria are normally expressed in terms of velocity.

Most specified structural vibration levels are defined to minimize the risk of cosmetic surface cracks and are set below the levels that have the potential to cause damage to the main structure. Structural damage criteria are presented in German Standard DIN4150-Part 3 “Structural vibration in buildings – Effects on structures” and British Standard BS7385-Part 2: 1993 “Evaluation and Measurement for Vibration in Buildings”. Table 16 indicates the vibration limits presented in DIN4150-Part 3 to ensure structural damage doesn’t occur.

Table 16: Guideline value of vibration velocity, v_i , for evaluating the effects of short-term vibration – DIN4150-3

LINE	TYPE OF STRUCTURE	VIBRATION VELOCITY, V_i , IN mm/s				PLANE OF FLOOR OF UPPERMOST FULL STOREY
		FOUNDATION			ALL FREQUENCIES	
		AT A FREQUENCY OF				
		LESS THAN 10HZ	10 TO 50HZ	50 TO 100HZ*		
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15	
3	Structures that, because of their particular sensitivity to vibration, do not correspond to those listed in lines 1 and 2 and are of great intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8	

*For frequencies above 100Hz, at least the values specified in this column shall be applied

6.2.4 Project Construction Vibration Limits

Table 17 indicates the vibration criteria for the surrounding sensitive receivers to the development.

Table 17: Acceptable vibration dose values for intermittent vibration ($m/s^{1.75}$)

RECEIVER	PERIOD	HUMAN COMFORT VIBRATION OBJECTIVES			BUILDING DAMAGE OBJECTIVES mm/s
		CONTINUOUS mm/s (RMS)		INTERMITTENT $m/s^{1.75}$ (VDV)	
		Z-AXIS	X- AND Y- AXIS		
RC1 – RC3	Day	10 - 20	7 – 14	0.20 – 0.40	5
	Night	7 - 14	5 – 10	0.13 – 0.26	



7 OPERATIONAL NOISE AND VIBRATION ASSESSMENT

7.1 TRAFFIC NOISE GENERATION

Based on the Traffic and Parking Impacts Report prepared by TEF Consulting, dated 20th October 2025, the traffic generation impacts are summarised as follows:

- The proposed development will generate the following number of additional vehicle trips:
 - Access 1 – 4 trips/h in and 12 trips/h out during AM peak hour, and 17 trips/h in and 7 trips/h out during PM peak hour
 - Access 2 – 8 trips/hr in and 24 trips/h out during AM peak hour, and 29 trips/h in and 13 trips/h out during PM peak hour

The report also concludes that *“Additional traffic generation is very low and will have no detrimental impacts on the existing road network operation nor on road safety”*.

In consideration of the above peak hour generated movements and conclusion, noise generated by additional traffic as a result of the proposed development is expected to be minor and capable of complying against the requirements of the NSW RNP without acoustic mitigation measures.

7.2 RESTAURANT NOISE EMISSION

It is understood that there are two restaurants proposed as part of the development; one within the upper basement level of Building H and one within its own building (north of Building C).

An assessment of noise from patrons and music associated with the restaurants of the development to surrounding residential receivers (as per Figure 1) has been conducted to ensure compliance against the Liquor Act 2007 requirements.

At the time of writing, restaurant operators have not been determined and details such as operating hours or restaurant layouts have not yet been confirmed. As such, the below assumptions have been adopted as part of this assessment.

7.2.1 Indoor Patron Areas

The operational noise assessment of indoor patron areas has been conducted based on the following assumptions:

- Restaurants operate between 7am to 12am
- The building envelopes have the following min. acoustic performances
 - Solid elements have an R_w of 45 (achievable with typical facade constructions)
 - Glazed elements have an R_w of 36 (achievable with typical 10.38mm laminated glass systems)
- The average sound pressure level within restaurants are assumed to be 80dB(A) which is representative of a bustling and busy restaurant from the mix of patron chatter, clinking cutlery, background music, and movement of staff
- The following internal noise spectrum has been adopted for patrons and music based on data held by this office for spaces of similar use

Table 18: Patron and music sound pressure level for internal spaces of a licensed premise

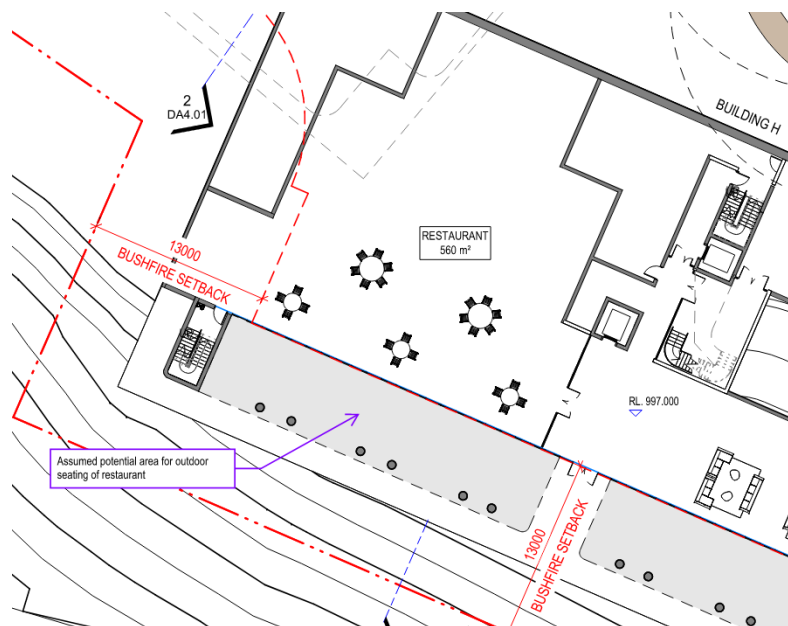
TYPE	OCTAVE BAND SOUND PRESSURE LEVELS – dB, L ₁₀								
	31.5HZ	63HZ	125HZ	250HZ	500HZ	1KHZ	2KHZ	4KHZ	8KHZ
Indoor patron and music	85	85	84	78	77	76	71	64	56



7.2.2 Outdoor Patron Areas

It is assumed that the Building H restaurant may potentially have outdoor seating located along the eastern façade, as shown in Figure 2.

Figure 2: Assumed outdoor patron area



The operational noise assessment of outdoor patron areas has been assessed based on the following:

- Restaurants operate between 7am to 12am
- There is no amplified loudspeakers/music within the outdoor areas
- The sound power level of an individual patron is 73dB(A) which is representative of a raised voice, with spectrum shown in Table 19
- One in two patrons are speaking continuously at any given time (this is a conservative estimate)
- It is assumed there are 40 people occupying the outdoor seating area

Outdoor patrons have been assessed based on the following noise spectrum based on data held by this office:

Table 19: Typical patron sound power level (1 patron)

TYPE	OCTAVE BAND NOISE LEVELS – dB, L ₁₀								
	31.5HZ	63HZ	125HZ	250HZ	500HZ	1KHZ	2KHZ	4KHZ	8KHZ
1 Patron	64	64	64	68	73	67	63	58	53

7.2.3 Predicted Noise Levels

The cumulative noise generated by the restaurants have been predicted to the facades of the surrounding residential receivers and are assessed against the NSW Liquor Act 2007 requirements. Predicted noise levels are summarised below in Table 20. Attenuation factors from distance, barriers, etc. have been applied where applicable.

Table 20: Cumulative predicted noise level to noise-sensitive residential receivers (7am to 12am)

RECEIVER	TYPE	OCTAVE BAND NOISE LEVELS – dB, L ₁₀								
		31.5Hz	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
RC1	Predicted Noise (dB, L ₁₀)	23	23	23	25	31	25	19	14	8
	Noise Criteria (dB, L ₁₀)	69	45	28	25	31	32	31	30	25
	Compliance (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RC2	Predicted Noise (dB, L ₁₀)	34	34	30	20	15	10	7	< 1	< 1
	Noise Criteria (dB, L ₁₀)	69	45	28	25	31	32	31	30	25
	Compliance (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RC3	Predicted Noise (dB, L ₁₀)	30	30	27	17	12	8	2	< 1	< 1
	Noise Criteria (dB, L ₁₀)	69	45	28	25	31	32	31	30	25
	Compliance (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The indicative assessment demonstrates that the restaurants will be capable of satisfying the NSW Liquor Act 2007 requirements. A more detailed assessment may be requested by Council as part of a separate tenancy development application once an operator has been selected and detailed restaurant layouts / operations are known.

7.3 MECHANICAL SERVICES NOISE EMISSION

Primary external mechanical plant and equipment serving the development are expected to be limited to ventilation fans and outdoor air-conditioning condensers. At this stage the mechanical design is preliminary, and equipment selections are yet to be made.

During the design development stage of the project, the mitigation measures outlined in Section 8.1 should be considered when preparing the mechanical services design. In consideration of the mitigation measures, it is expected that the development will be capable of complying with the project specific noise emission criteria.



8 OPERATIONAL MITIGATION MEASURES

8.1 MECHANICAL SERVICES

Mitigation measures for the mechanical plant should be considered during the design development stage to ensure compliance with the outlined criteria at the nearest sensitive receiver catchments. These mitigation measures could include but not limited to the following:

- Positioning mechanical plant away from nearby receivers
- Acoustic attenuators fitted to duct work
- Screening around mechanical plant
- Acoustic insulation within duct work
- Management of operating speeds (such as quiet mode for condenser units) to reduce overall noise levels

It should be noted that the noise reduction requirements will likely be refined and reduced once the mechanical plant and equipment selections and designs have been progressed further during the detailed design of the proposed development. The mitigation measures proposed at this stage of the development are conservative in nature.

9 CONSTRUCTION NOISE ASSESSMENT

9.1 PROPOSED CONSTRUCTION ACTIVITIES

At the time of writing, a contractor has not been engaged and a detailed description of work / construction methodology has not been determined. As such, the construction staging has been assumed as follows:

- Demolition of existing structures
- Excavation and civil works
- Structural works

Similarly, hours of work are also yet to be determined. For the purpose of this assessment, we have adopted the recommended standard hours in the ICNG which are as follows:

- Monday to Friday: 7:00am to 6:00pm
- Saturday: 8:00am to 1:00pm
- Sunday and public holidays: no work

9.2 EXPECTED CONSTRUCTION EQUIPMENT

The noise sources likely to be associated with the works listed in the previous section of this report are presented in Table 21. The equipment noise levels have been extracted from AS2436:2010 “Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites”.



Table 21: Cumulative impact – construction equipment noise levels

STAGES	ESTIMATED DURATION	EQUIPMENT	QUANTITY	SOUND POWER LEVEL – dB(A)	ACOUSTICAL USAGE FACTOR (%)	USAGE IN 15-MINUTE PERIOD (MINUTES)	TIME CORRECTED SOUND POWER LEVEL– dB(A) L _{Aeq,15min}
Excavation and Civil Works	6 months	Excavator 30 tonne	3	107	40	6	103
		Bobcat	2	107	40	6	103
		General Truck	2	107	30	4.5	102
Structural Works	18 months	Powered hand tool	6	102	50	7.5	99
		Concrete pump truck	2	108	50	7.5	105
		General truck	2	107	30	4.5	102
		Mobile crane	1	104	20	3	97

9.3 NOISE MODELLING AND ASSUMPTIONS

In order to assess the noise impact from the site during the various construction stages, a noise model was prepared using commercial software SoundPLAN v9.0, which is a comprehensive software package for conducting three-dimensional complex noise propagation modelling. Using the software, a 3D model of the site and its surroundings was constructed including the nearby buildings, and the construction plant and equipment were positioned as noise sources. Within the model, the effects of the environment (built and natural) on propagation of sound were considered to reliably estimate the resulting noise effects on the surrounding noise sensitive receivers

The noise model represents the ‘reasonable’ worst case periods of construction activities, meaning that all the equipment of each stage is operating simultaneously during a 15-minute observation period.

The assumptions that were made within the assessment include the following:

- The predicted noise levels represent a reasonably worst-case scenario for each receiver
- The predicted noise levels at the receivers have been assessed at a height of 1.5m above ground level in accordance with the assessment procedures of the ICNG
- The noise levels have been assessed using neutral weather conditions

9.4 PREDICTED NOISE LEVELS

The predicted noise levels at surrounding noise-sensitive receivers have been presented in Table 22 to Table 23 and have been assessed to the ICNG construction noise management levels established in Section 6, during the ICNG recommended hours of work.

The noise contour maps produced by the three-dimensional noise propagation modelling are provided in Appendix B.

Table 22: Predicted ‘worst-case’ noise levels at surrounding noise-sensitive receivers (excavation works)

RECEIVER CATCHMENT	PREDICTED NOISE LEVEL RANGE (dBA $L_{Aeq,15min}$)	NOISE MANAGEMENT LEVEL (dBA $L_{Aeq,15min}$)	NOISE MANAGEMENT LEVEL EXCEEDANCE (dBA)	EXCEEDS HIGHLY NOISE AFFECTED LEVEL (YES/NO)
RC1	50 - 66	45	Up to 21	No
RC2	50 - 62	45	Up to 17	No
RC3	50 - 62	45	Up to 17	No

Table 23: Predicted ‘worst-case’ noise levels at surrounding noise-sensitive receivers (structural works)

RECEIVER CATCHMENT	PREDICTED NOISE LEVEL RANGE (dBA $L_{Aeq,15min}$)	NOISE MANAGEMENT LEVEL (dBA $L_{Aeq,15min}$)	NOISE MANAGEMENT LEVEL EXCEEDANCE (dBA)	EXCEEDS HIGHLY NOISE AFFECTED LEVEL (YES/NO)
RC1	50 - 66	45	Up to 21	No
RC2	50 - 64	45	Up to 19	No
RC3	50 - 60	45	Up to 15	No



10 CONSTRUCTION VIBRATION ASSESSMENT

Vibration intensive activities are typically limited to demolition of structures and excavation works with hydraulic hammers, rock breaking, and percussive methods of piling installation.

The proposed construction activities include bulk excavation using tracked excavators and trucks, and piling works, which are expected to use non-impact methods such as bored piling. While these activities can generate ground vibration, the magnitude and extent of propagation are highly dependent on equipment type, ground conditions, and separation distance.

Safe working distances for vibration intensive plant and are quoted for both “cosmetic” damage (in accordance with BS 7385) and human comfort (in accordance with Assessing Vibration – a technical guideline), have been provided, based on Transport for NSW’s “Construction Noise and Vibration Guideline”. The recommended safe working distances for each of the plant listed above are provided in Table 24.

Table 24: Recommended safe working distances for vibration intensive plant

EQUIPMENT	APPROX. SIZE/ WEIGHT/ MODEL	MINIMUM DISTANCE – COSMETIC DAMAGE (BS 7385)	MINIMUM DISTANCE – HUMAN RESPONSE (OH&E VIBRATION GUIDELINE)
Vibratory roller	1-2 tonne	5m	15m to 20m
	2-4 tonne	6m	20m
	4-6 tonne	12m	40m
	7-13 tonne	15m	100m
	13-18 tonne	20m	100m
	> 18 tonne	25m	100m
Small hydraulic hammer	300 kg (5 to 12t excavator)	2m	7m
Medium hydraulic hammer	900 kg (12 – 18t excavator)	7m	23m
Large hydraulic hammer	1600 kg (18 to 34t excavator)	22m	73m
Pile driver – vibratory	Sheet piles	2m to 20m	20m
Piling rig – bored	≤ 800mm	2m (nominal)	N/A
Piling rig – hammer	12t down force	15m	50m
Jackhammer	Handheld	1m (nominal)	Avoid contact with structure

The closest vibration sensitive receivers are considered to be the adjacent existing residential properties (RC1 to RC3). Once a construction methodology is determined at time of head contractor appointment, it is recommended that the contractor engage a specialist to undertake attended vibration measurements at the commencement of work in order to verify the safe working distances.



If the levels are compliant with the vibration limits as listed in Section 6.2, then work may proceed based on the implementation of the measures detailed in this report. If there are exceedances, reasonable and feasible mitigation measures and additional vibration monitoring should be conducted. Measures to prevent cosmetic damage to surrounding structures are provided in Section 11 and a vibration monitoring strategy has been provided in Section 11.3.



11 CONSTRUCTION NOISE AND VIBRATION MANAGEMENT

11.1 PROJECT SPECIFIC RECOMMENDATIONS

11.1.1 Noise

It is predicted that noise levels are expected to be exceeding the “noise affected” management levels at surrounding receivers throughout the stages of construction, namely due to the proximity of receivers and low background noise levels in the area. Having said this, the “highly noise affected” level is not expected to be exceeded.

These predicted noise levels (and exceedances) are considered to be a worst-case scenario without any corrections for shielding or directivity and with all equipment operation simultaneously in a 15-minute period. Noise levels at surrounding sensitive receivers can be expected to be less than those presented in Section 9.4, when works are not occurring simultaneously, when works are further away from the project site boundary, if a solid hoarding is implemented around the boundary, and if works occur internally within the building shell.

Furthermore, it is noted that this is an indicative assessment for a worst-case scenario and shall be refined as part of a Construction Noise and Vibration Management Sub-Plan once detailed construction plan/methodologies are available.

Notwithstanding the above, the following noise mitigation strategies are recommended to protect the amenity of surrounding noise-sensitive receivers during highly concentrated and loud activities:

- At least a one-hour respite period should be offered per day during the most intensive periods of noisy activities, and/or restricting particularly noisy works to be outside highly sensitive periods of the day (such as the early morning)
- Frequent and proactive communication with surrounding residents and neighbours is also encouraged and a Community Consultation Strategy should be developed by the contractor. This will allow occupants of surrounding residents to arrange their schedules to accommodate possible noise sensitive activities (like online meetings and conferencing). More details regarding communication with the community can be found in Section 11.2.3

For exceedances of less than 3dB(A), careful selection and maintenance of plant equipment will ensure that disruptions to adjacent receivers are minimised.

11.1.2 Vibration

It is expected that the main vibration inducing activities will primarily be during the excavation stage from activities such as rock/slab breaking. Other activities are generally considered to not be highly vibration intensive activities. If piling works are required, it is recommended that the method of piling be bored piling, which is lower in vibration generation compared to alternative methods like vibratory or hammer piling.

Upon any complaints from surrounding residents, the following shall be undertaken:

- Vibration monitoring is recommended to be conducted at surrounding sensitive receivers (or at the location of complaint) in accordance with the monitoring program strategy proposed in Section 11.3
- Reasonable and feasible measures should be considered to lessen the impact, such as alternative methods or equipment for activities which are causing complaints to achieve the vibration levels required

To further diminish the vibration impact, the one-hour respite period shall also apply for vibration mitigation.

We recommend that dilapidation reports be prepared on surrounding sensitive receivers and buildings which will be in close proximity to heavy machinery. Guidance for this may be provided by the geotechnical engineer and controlled by ground composition.



11.2 GENERAL ACOUSTIC RECOMMENDATIONS

According to AS 2436 the following techniques could be applied to minimize the spread of noise and vibrations to the potential receivers.

11.2.1 Noise

If a process that generates significant noise levels cannot be avoided, the amount of noise reaching the receiver should be minimized. Two ways of achieving this are to either increase the distance between the noise source and the receiver or to introduce noise reduction measures such as screens. Practices that will reduce noise from the site include:

- Increasing the distance between noise sources and sensitive receivers.
- Reducing the line-of-sight noise transmission to residences or other sensitive land uses using temporary barriers (stockpiles, shipping containers and site office transportables can be effective barriers).
- Constructing barriers that are part of the project design early in the project to introduce the mitigation of site noise.
- Installing purpose-built noise barriers, acoustic sheds and enclosures.

Physical methods to reduce the transmission of noise between the site works and residences, or other sensitive land uses, are generally suited to works where there is longer-term exposure to the noise. A few of these methods have been introduced below.

Screening

Hoarding: Another way of implementing screening is to build hoarding that includes a site office on an elevated structure. This option offers superior noise reduction when compared with a standard, simple hoarding. The acoustic performance is further enhanced when the hoarding is a continuous barrier.

General remarks: In many cases, it is not practical to screen earthmoving operations effectively, but it may be possible to partially shield a construction plant at the early stages of the project with protective features required to screen traffic noise.

The usefulness of a noise barrier will depend upon its length, its height, its position relative to the source and the receiver, and the material of which it is made. A barrier designed to reduce noise from a moving source should extend beyond the last property to be protected by at least ten times the shortest distance from the said property to the barrier. A barrier designed to reduce noise from a stationary source should, where possible, extend beyond the direct line of sight between the noise source and the receiver by a distance equal to ten times the effective barrier height, which is the height above the direct line between source and receiver.

If the works are already predominantly located within nominally closed structures, careful consideration should be given to reducing noise breakout at any openings.

Cranes

For the early works construction phases, any cranes will be limited to mobile cranes where the engines are typically enclosed in an acoustically treated housing.

Reversing and warning alarms

Community complaints often involve the intrusive noise of alarms commonly used to provide a safe system of work for vehicles operating on a site. Beeper reversing alarm noise is generally tonal and may cause annoyance at significant distances from the work site.

There are alternative warning alarms capable of providing a safe system of work that are equal to or better than the traditional “beeper”, while also reducing environmental noise impacts. The following alternatives should be considered for use on construction sites as appropriate (and combined where appropriate):

- Broadband audible alarms incorporating a wide range of sound frequencies (as opposed to the tonal-frequency ‘beep’) are less intrusive when heard in the neighbourhood.



- Variable-level alarms reduce the emitted noise levels by detecting the background noise level and adjusting the alarm level accordingly.
- Proximity alarms that use sensors to determine the distance from objects, such as people or structures, and generate an audible alarm in cabin for the driver.
- Spotters or observers.

Selection of Alternate Equipment

As part of the Contractor's Construction Methodology and Construction Management Plan, the noise and vibration impact of each equipment / machinery should be considered. Where feasible and practical, quieter equipment (lower Sound Power Level) shall be selected for the task. The Contractor can review the manufacturer's equipment sound data or utilise AS2436 and the TfNSW CNS as guides in understanding what the typical Sound Power Levels are for alternative types of machinery.

Attended short-term noise measurements can also be conducted to either compare the noise levels of machinery, or to understand what the noise level at surrounding noise sensitive receivers are.

The same consideration shall be taken for vibration intensive machinery, which are expected to be only rock hammering and piling. Where feasible and practical, less vibration intensive equipment shall be selected for the task such as favouring pulverising and sawing methods rather than hydraulic hammering for rock breaking.

As with noise, attended short-term vibration measurements can be conducted at start of vibration intensive works to ensure vibration criteria (see Section 6.2) at surrounding receivers are not exceeded.

As a guide, the Contractor can also refer to AS2436 and the TfNSW CNS to use as a guide in understanding vibration intensive activities and their alternate methods, based on minimum working distances.

Machinery shall be selected based on the noise criteria and vibration criteria as presented in Section 6 and 6.2.

11.2.2 Vibration

Vibration can be more difficult to control than noise, and there are few generalizations that can be made about its control. It should be kept in mind that vibration may cause disturbance by causing structures to vibrate and radiate noise in addition to perceptible movement.

Impulsive vibration can, in some cases, provide a trigger mechanism that could result in the failure of building components that had previously been in a stable state. Vibrations can also trigger annoyance, which might get elevated into action by occupants of exposed buildings and should therefore be included in the planning of communication with impacted communities.

It should be remembered that failures, sometimes catastrophic, can occur as a result of conditions not directly connected with the transmission of vibrations, e.g. the removal of supports from retaining structures to facilitate site access. BS 7385-2 provides more information on managing ground-borne vibration and its potential effects on buildings. Where site activities may affect existing structures, a thorough engineering appraisal should be made at the planning stage.

General principles of seeking minimal vibration at receiving structures should be followed in the first instance. Predictions of vibration levels likely to occur at sensitive receivers are recommended when they are relatively close, depending on the magnitude of the source of the vibration or the distance associated. Relatively simple prediction methods are available in textbooks, codes of practice and standards, however, it is preferable to assess site transmission and propagation characteristics between source and receiver locations through measurements.

Guidance for measures available for the mitigation of vibration transmitted can be sought in more detailed standards, such as BS 5228-2 or policy documents, such as the NSW DEC *Assessing Vibration: A technical guideline*. Identifying the strategy best suited to the control of vibration follows a similar approach to that of noise: avoidance, control at the source, control along the propagation path, control at the receiver, or a combination of these.



It is noted that vibration sources can include stationary plants (pumps and compressors), portable plants (jackhammers and pavement vibrators), mobile plants, pile-drivers, tunnelling machines and activities, and blasting, amongst others. Unusual ground conditions, such as a high water-table, can also cause a difference to expected or predicted results, especially when considering the noise propagated from piling.

11.2.3 Community Consultation to be Undertaken

The builder shall directly contact adjacent noise sensitive receivers and provide them with the following information:

- The contact details for a nominated representative in order to make noise / vibration complaints
- Explain the timeframe for the construction works and the proposed activities, i.e. the proposed start / stop dates of work and a description of the noise producing equipment that will be used
- Notify the noise sensitive receivers and relevant local / state authority in a timely manner should there be any need for an extension to the proposed arrangements
- Provide them with a copy of this report as approved by the relevant local / state authority
- Where noise is demonstrated as being compliant with criteria, this should not limit the proponent in undertaking further additional reasonable and feasible steps to reduce noise emissions.

11.2.4 Complaint Handling Procedures and Community Liaison

To assist in the management of noise and vibration complaints various procedures are to be followed. These include:

- Clearly visible signage identifying any key personnel along with their contact details to be erected along the perimeter of the building site including:
 - A 24-hour contact name, phone number and email address provided for the resident to address any complaint. The signage will declare; "For any enquiry, complaint or emergency relating to this site at any time please contact..."
- Give complaints a fair hearing
- Relevant local / state authority should be notified of the nature and details of complaints received (time, complainant etc.) and what remedial action has taken place, if any
- Have a documented complaints process, including an escalation procedure so that if a complaint is not satisfied there is a clear path to follow
- Call back as soon as possible to keep people informed of action to be taken to address noise problems. Call back at night time only if requested by the complainant to avoid further disturbance
- Implement all feasible and reasonable measures to address the source of the complaint
- A register is to be kept by the contractor to keep a record of complaints and detail any information associated with them. The contents of the register will include:
 - The name and the address of the complainant
 - Time and date of the complaint
 - The nature of the complaint (Noise/Vibration)
 - Subsequent details
 - Remedial action undertaken

The contents of the register will be maintained and updated on a monthly basis with any new complaint without delay. The complaints will be reported to both the relevant local / state authority and the Contractor. The investigation of the complaint and any remedial actions will be performed by the builder and/or client representative on a monthly basis. In the event of noisy works scheduled, the builder will notify residents 5 business days in advance.



11.3 NOISE & VIBRATION MONITORING STRATEGY

11.3.1 General Methodology

Monitoring may be in the form of regular checks by the builder or indirectly by an acoustic consultant engaged by the builder and in response to any noise or vibration complaints. Where noise and vibration criteria are being exceeded or in response to valid complaints, noise and / or vibration monitoring should be undertaken. This would be performed inside the premises of the affected property and on site adjacent to the affected receivers.

Monitoring is to be undertaken by an experienced noise and vibration monitoring professional or an acoustic consultant. The results of any noise or vibration monitoring are to be provided to the relevant party or person in a timely manner allowing the builder to address the issue and respond to the complaints.

Noise and vibration monitoring can take two forms:

- Short-term monitoring
- Long-term monitoring

Both of these approaches are elaborated below.

11.3.2 Short-term Monitoring

Short-term monitoring consists of attended monitoring when critical stages of the construction are occurring. This normally provides real-time assistance and guidance to the subcontractor on site, telling them when the noise and vibration criteria are exceeded. Thus, the selection of alternative method on construction or equipment selection is allowed in order to minimise noise and vibration impacts.

Short-term monitoring may also be undertaken prior to start of works to ensure noise levels emitted from machinery and equipment are within the manufacturer's tested data / tolerance. This check can be implemented periodically throughout the construction program as a maintenance routine to ensure machinery and equipment stay within the manufacturer's data / tolerance and are not faulty.

11.3.3 Long-term Monitoring

Similarly, to short-term monitoring, long-term monitoring provides real-time alerts to the builder / site manager when the noise and vibration criteria are exceeded. Instead of someone being on site measuring, noise and vibration loggers are used.

Typically, the noise and vibration loggers stay on site for a period of several months for the critical construction stages of the project, such as the demolition and excavation phases.

Both methodologies are complementary and normally used simultaneously providing a significant amount of data via the long-term monitoring but also providing information on the sources of noise and vibration generating exceedances via the short-term or attended monitoring.

Long-term noise monitoring reports shall be prepared and presented in accordance with the recommendations of the NSW ICNG (Section 8.2 of the ICNG).

11.3.4 Proposed Monitoring Programme

A monitoring programme is to be developed as part of a Construction Noise and Vibration Management Sub-Plan, once a Contractor has been engaged and detailed construction methodologies are available.



12 CONCLUSION

This Noise and Vibration Impact Assessment has been prepared by E-LAB Consulting on behalf Management 7BBH Pty Ltd for a State Significant Development Application (SSD-86456706) located at 142-150 Narrow Neck Rd, Katoomba.

The following operational noise and vibration assessments were conducted as part of this noise and vibration impact assessment:

- Noise impact from traffic generation as a result of the development
- Noise emissions associated with the development's restaurants
- Noise emission from mechanical plant and equipment serving the development

The following construction noise and vibration assessments were conducted as part of this noise and vibration impact assessment:

- Noise generated during the construction of the development and associated impacts on the surrounding noise sensitive receivers
- Vibration generated during the construction of the development and associated impacts on the surrounding vibration sensitive receivers

To assess each of the acoustic considerations for the proposed development, noise and vibration criteria has been established in Section 5 in accordance with the following documents:

- NSW EPA's Noise Policy for Industry 2017, dated October 2017 (NPI)
- NSW EPA's Road Noise Policy, dated March 2011 (RNP)
- NSW's State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP 2021)
- NSW EPA's Interim Construction Noise Guideline, dated July 2009 (ICNG)
- Assessing vibration: A Technical Guideline 2006 (AVTG)
- British Standard BS5228 – Part 1:1997 "Noise and Vibration Control on Construction and Open Sites."
- British Standard BS7358:1993 "Evaluation and Measurement for Vibration in Buildings"
- German Standard DIN4150 – Part 3: "Structural vibration in buildings – Effects on structures"

Having given regard to the analysis conducted within this report, it is the finding of this Noise and Vibration Impact Assessment that the proposed development is compliant with the relevant noise and vibration criteria controls for this type of development, and it is expected to comply with the applicable regulations with regards to noise and vibration, particularly those listed above.

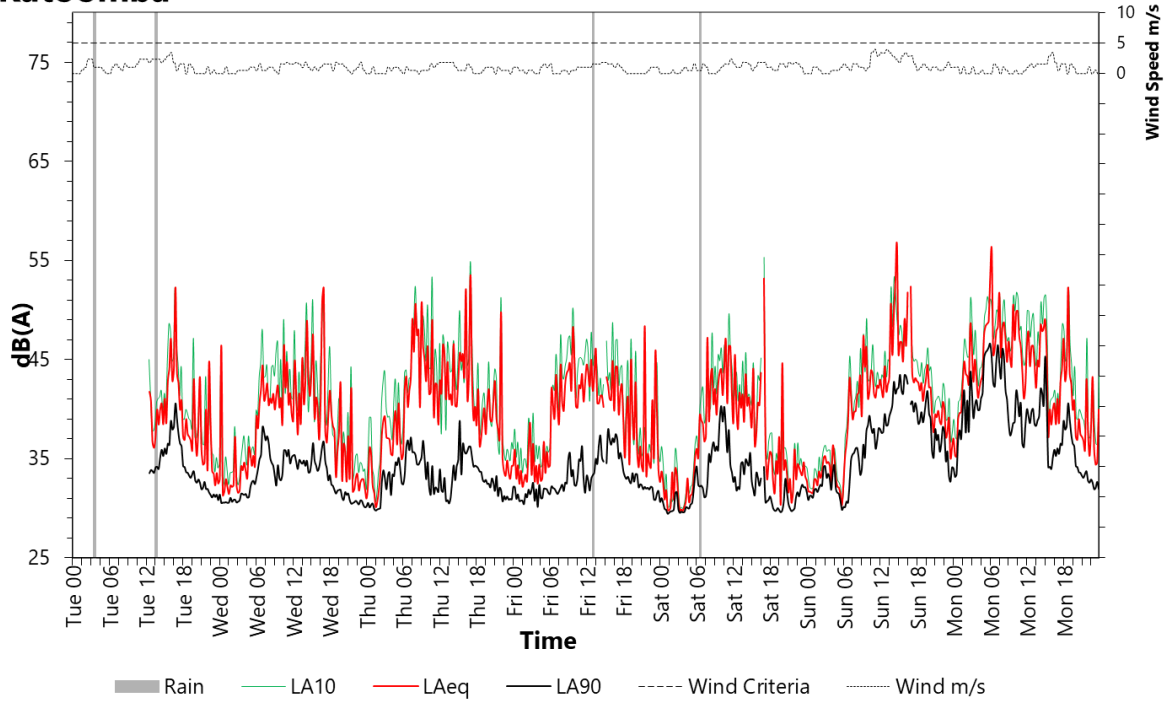
It is recommended the application for the proposed development is approved, under the implementation of the mitigation measures outlined within the report.



Appendix A Noise Monitoring Data

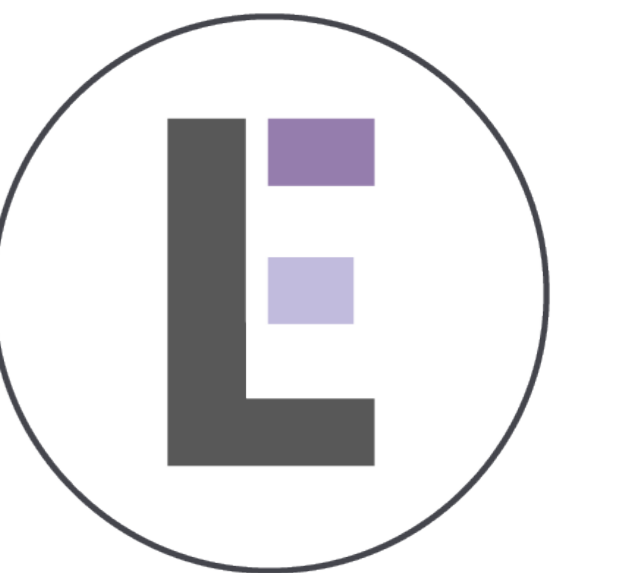
**142-150 Narrow Neck Rd,
Katoomba**

Tuesday 24 May 2022
to
Monday 30 May 2022



Appendix B **Construction Noise Contour Map**





E-LAB CONSULTING

ISSUE	DATE	STATUS
1	14/10/2025	FOR INFORMATION

LEGEND

Noise Level, $L_{Aeq, 15min}$ dB(A)

< 50
50 - 52
52 - 54
54 - 56
56 - 58
58 - 60
60 - 62
62 - 64
64 - 66
> 66

NOTES

[EXTERNAL CONSULTANT]

[COMPANY]
[EXTERNAL CONSULTANT]

[COMPANY]
[EXTERNAL CONSULTANT]

[COMPANY]
[EXTERNAL CONSULTANT]

[COMPANY]

PROJECT
142 - 150 NARROW NECK RD, KATOOMBA

PROJECT NO.
P00248

ARCHITECT
ANTONIADES ARCHITECTS

CLIENT
MANAGEMENT 788H

SCALE
N.T.S.

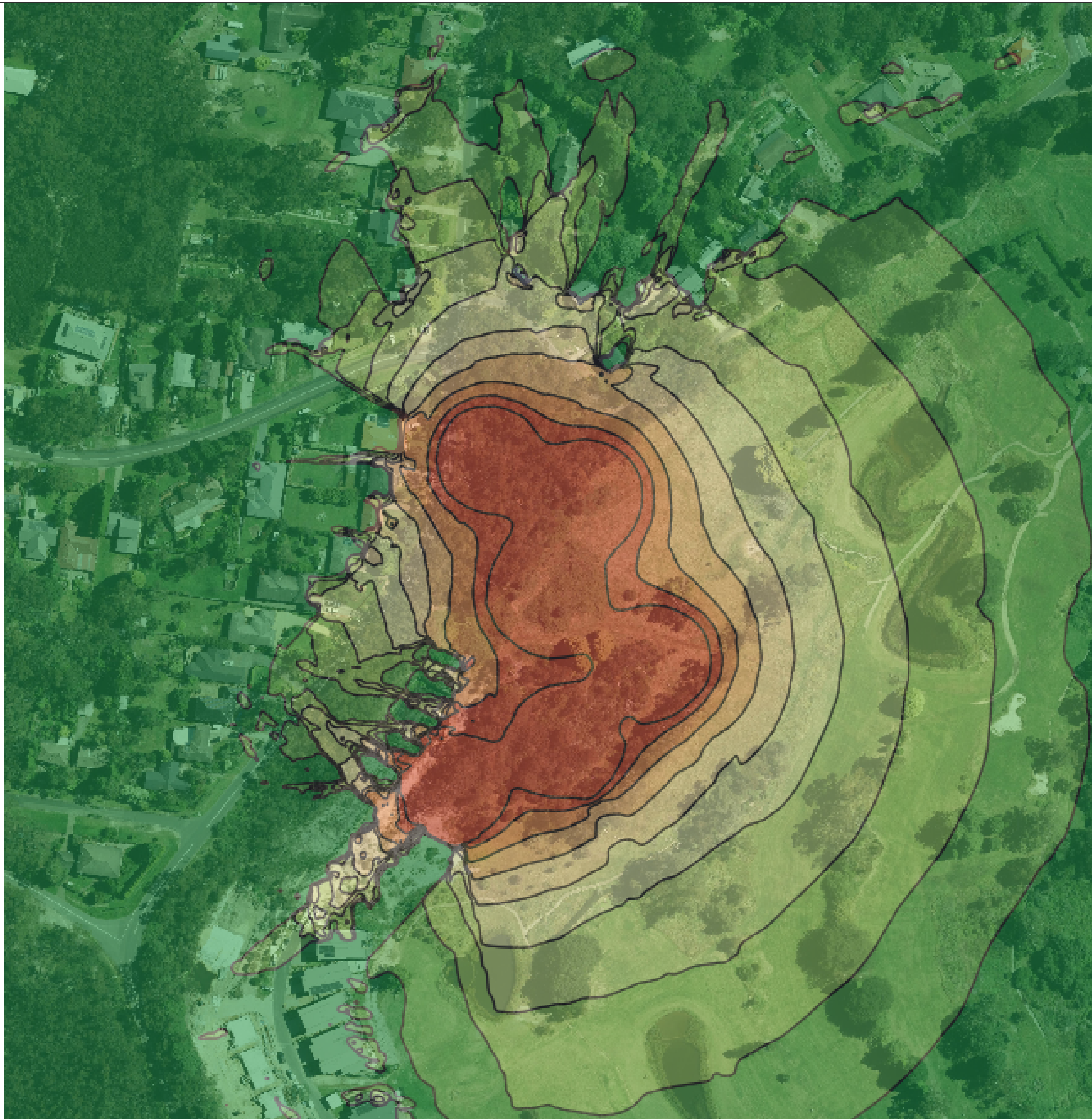
STATUS
FOR INFORMATION

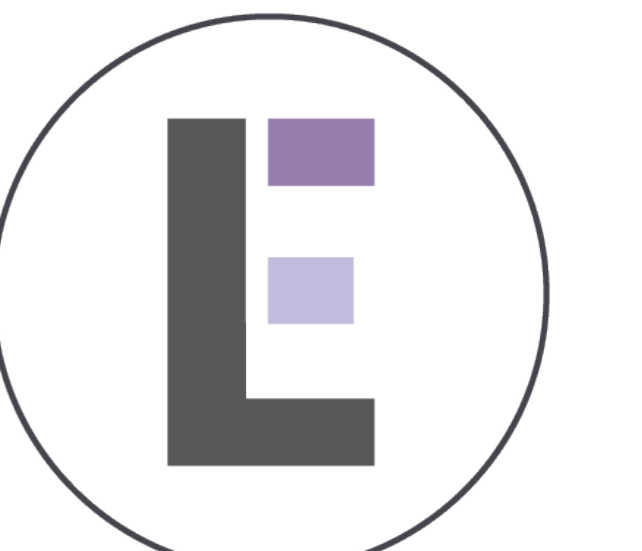
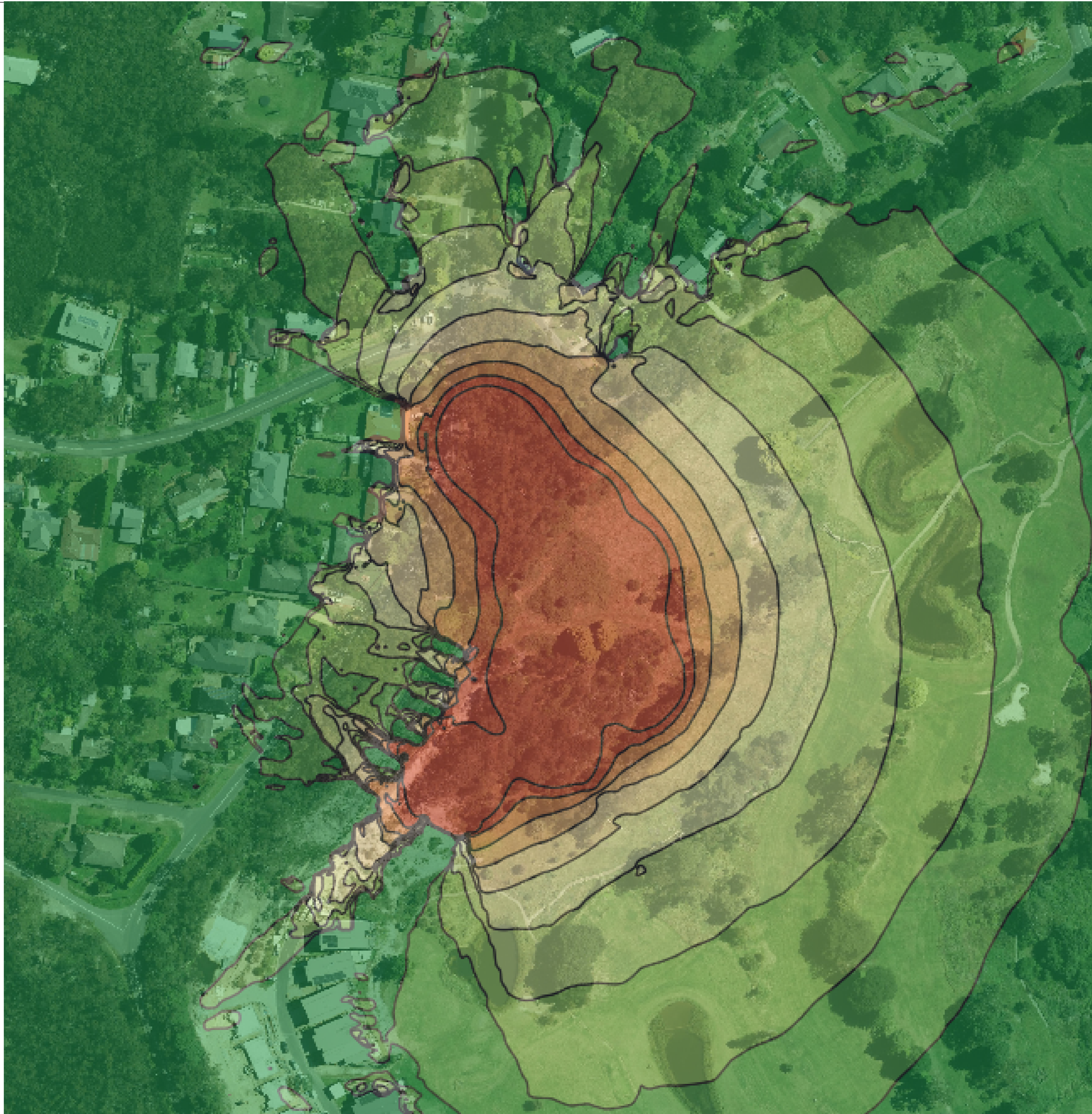
DRAWING
NOISE CONTOUR MAP
CIVIL WORKS - EXCAVATION

DISCIPLINE
ACOUSTICS AND VIBRATION

DRAWING NUMBER
AC-DWG-100-01-01

REVISION
001





E-LAB CONSULTING

ISSUE	DATE	STATUS
1	14/10/2025	FOR INFORMATION

LEGEND

Noise Level, $L_{Aeq, 15min}$ dB(A)

< 50
50 - 52
52 - 54
54 - 56
56 - 58
58 - 60
60 - 62
62 - 64
64 - 66
> 66

NOTES

 [EXTERNAL CONSULTANT]

 [COMPANY]
 [EXTERNAL CONSULTANT]

 [COMPANY]
 [EXTERNAL CONSULTANT]

 [COMPANY]
 [EXTERNAL CONSULTANT]

 [COMPANY]

PROJECT
 142 - 150 NARROW NECK RD, KATOOMBA

PROJECT NO.
 P00248

ARCHITECT
 ANTONIADES ARCHITECTS

CLIENT
 MANAGEMENT 788H

SCALE
 NTS

STATUS
 FOR INFORMATION

DRAWING
 NOISE CONTOUR MAP
 STRUCTURAL WORKS - CONSTRUCTION

DISCIPLINE
 ACOUSTICS AND VIBRATION

DRAWING NUMBER
 AC-DWG-100-01-02

REVISION
 001

