APPENDIX 7: NOISE IMPACT ASSESSMENT

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Acoustic Assessment
Proposed Modification (Mod 4)
Cabbage Tree Road Sand Quarry
Williamtown, NSW

Prepared for:

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1.0 INTRODUCTION

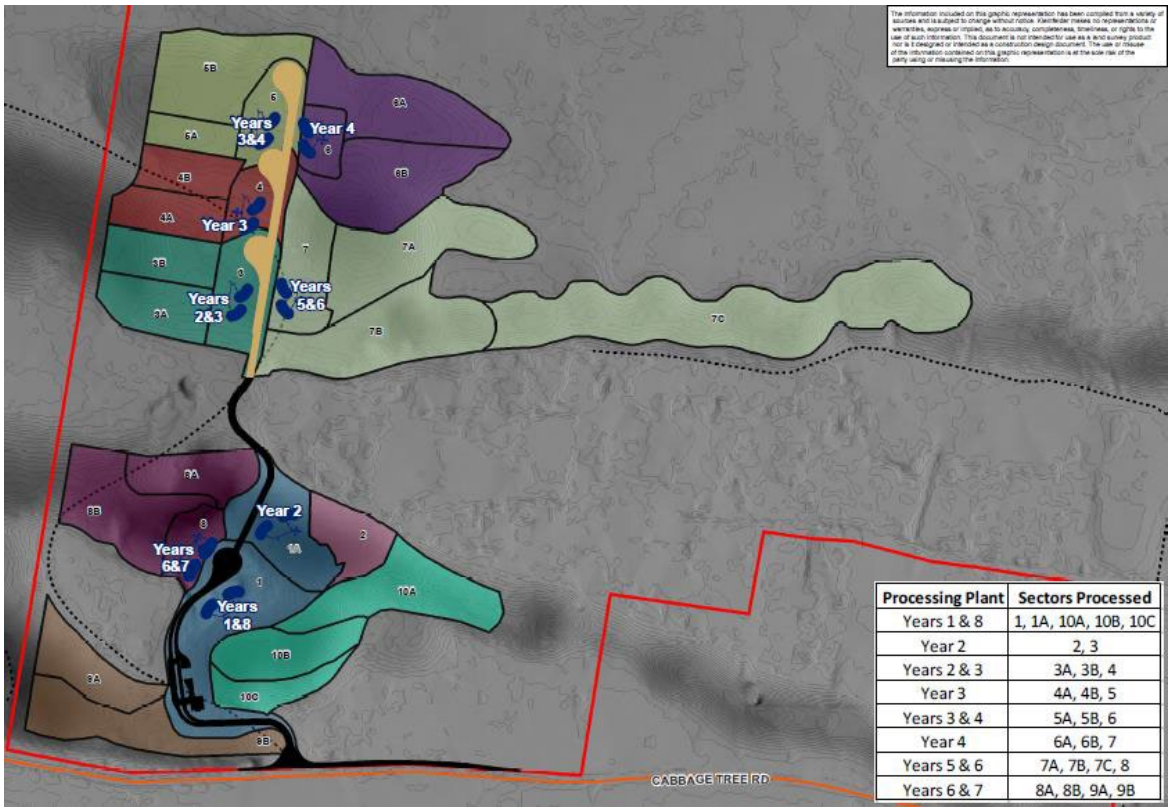
This report presents the results, findings and recommendations arising from an acoustic assessment of a proposed modification to the existing Cabbage Tree Road Sand Quarry at Williamtown, NSW.

This proposed modification (Modification 4 – Mod4) seeks the amendment of the Consent to permit the following:

1. An additional 7.3ha extraction area on adjacent land to the west in Lot 9 DP239608 (Western Extension).
2. A net reduction in the extent of the impact area within the land holding originally assessed under SSD-6125. This involves both the expansion of some areas and relinquishment of other areas, with a net increase in area proposed for the Biodiversity Stewardship Area. The areas of expansion are less than 20m beyond the edge of the existing approved impact areas.
3. Amendment to Condition 34 and Appendix 6 in SSD-6125 relating to the Biodiversity Offset Strategy that reflects the change in boundary of the proposed onsite Stewardship Site and requirement to retire additional credits to offset the impacts of the Western Extension.
4. Amendment to the Statement of Commitments to reduce duplication with Conditions of Consent (CoC) and enable management plans to adapt to changing conditions on the site.
5. Permit the import of up to 6,000 tonnes per annum of Virgin Excavated Natural Material (VENM) sand with provenance from construction sites within local sand beds for on-site processing.
6. Clarify methodologies used for sand extraction and rehabilitation, including the change in dominant extraction methods to an excavator and transfer of sand from the extraction face to processing plant by articulated off-road dump trucks.
7. Amend condition relating to the Radiation Survey in Schedule 3, Condition 46.

The components 2-6 above were first proposed within Modification 3, which was subsequently withdrawn. As such these components have included consultation with Community and government agencies and have been updated where feasible to reflect suggested amendments during that process.

The main components of the proposed modifications as relevant to noise considerations are Item 1, the Western Extension, and Item 6. The approved and proposed surface disturbance areas are shown in **Figures 1 and 2**.



Processing Plant	Sectors Processed
Years 1 & 8	1, 1A, 10A, 10B, 10C
Year 2	2, 3
Years 2 & 3	3A, 3B, 4
Year 3	4A, 4B, 5
Years 3 & 4	5A, 5B, 6
Year 4	6A, 6B, 7
Years 5 & 6	7A, 7B, 7C, 8
Years 6 & 7	8A, 8B, 9A, 9B

Figure 1 - Site Layout (Approved)

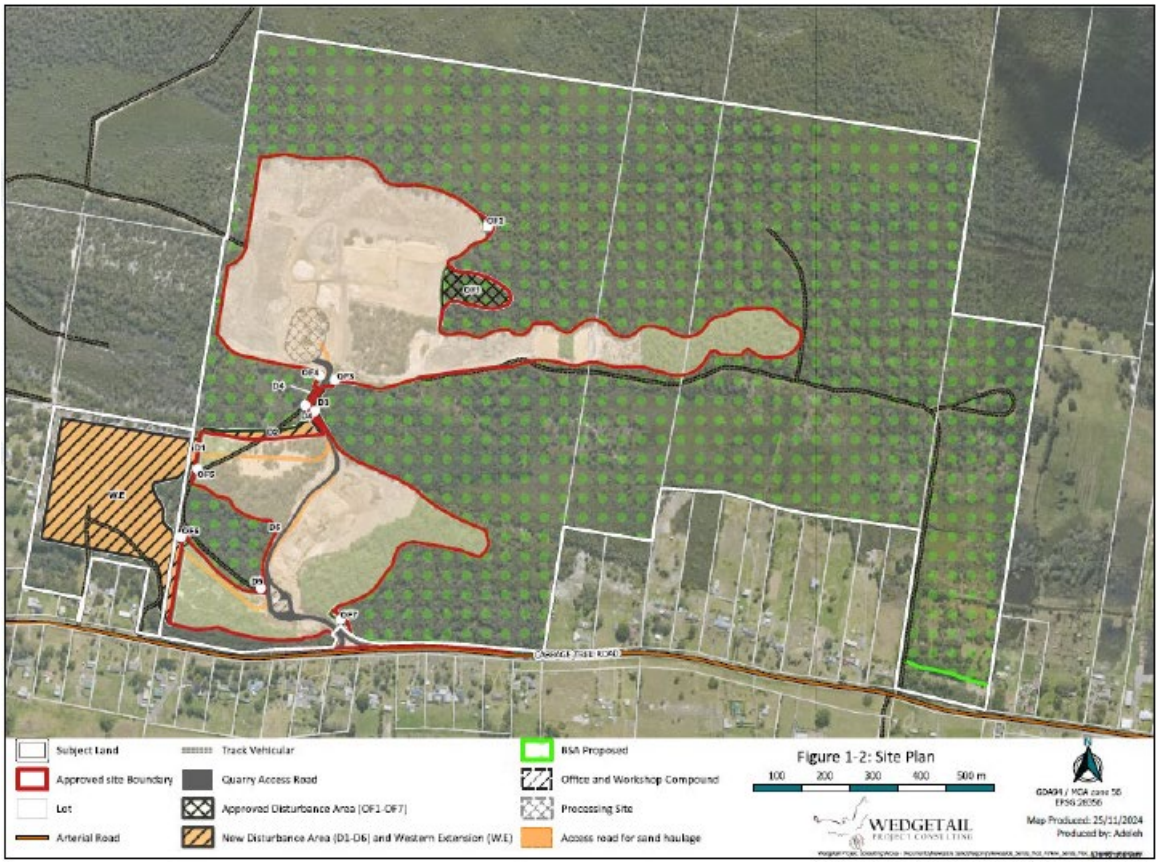


Figure 2 - Site Layout (Proposed)

2.0 NOISE CRITERIA

2.1 Existing noise criteria

The existing noise assessment criteria are detailed in Condition L3.1 of Development Consent (SSD-6125). Noise criteria for all residences listed in EPL21264 are as shown below. The noise criteria include the requirement that noise levels at day shoulder must not exceed **45 dB(A) L1 (1 min)** (sleep disturbance criterion) at any residence.

Receiver	Day LAeq(15 Min)	Shoulder LAeq(15 Min)	Shoulder LA Max(1 Min)
Any residential reciever	43	39	45

Operational noise generated at the premises must not exceed the noise limits shown in the table above.

2.2 Approved operating hours

Quarry operations will continue to occur during the following hours:

- All quarry activities:
  - 7 am to 6 pm Monday to Friday.
  - 7 am to 4 pm on Saturdays.
- Transportation and loading of sand only:
  - 5 am to 6 pm Monday to Friday.
  - 7 am to 4 pm on Saturdays.
- No work on Sundays or public holidays with an exception for repair and maintenance of plant and equipment that may occur during these times.

Employees (in light vehicles) will arrive at the quarry approximately 15 minutes before opening (i.e. 5:45 am) to open quarry gates, by 6 am, and will leave approximately 30 minutes after quarry close (i.e. to 6:30 pm).

2.3 Ambient noise logging

Background noise logging was conducted from 12-19 December 2023 at 442 Cabbage Tree Road, historically referred to as R28, using an ARL Ngara environmental noise logger. This property comprises the proposed wester extension, which would result in mining noise encroaching closer to residences at the eastern end of Barrie Close.

The logger location and potentially most impacted receiver R14 at 24 Barrie Close are shown in **Figure 3**. Ambient noise monitoring results for the daytime and morning shoulder (MS) period 5am-7am are summarised in **Table 1**.

Figure 3 – Noise logger location

Table 1. Noise logger results

Metric	LAeq (day)	LAeq (MS)	LA90 (day)	LA90 (MS)
LAeq	54	49	--	--
L90 (RBL)	--	--	42	37

2.4 Revised noise trigger levels

Since the logger was placed immediately adjacent to the receiver that would potentially be the most noise impacted by the proposed modification, it is appropriate to determine specific noise trigger levels for this receiver.

Under Section 2.3 of the NPfI, the daytime intrusiveness trigger level at R14 is “background + 5 dB”. The project amenity trigger levels under Section 2.4 (Table 2.2) of the NPfI are 50 dB(A),$L_{eq(day)}$ and 40 dB(A),$L_{eq(night)}$, which is applicable to the morning shoulder period.

After adjusting the period amenity noise level to a 15-minute value as described in S2.2 and S2.4 of the NPfI, the project noise trigger levels for receiver R14 are **47 dB(A),$L_{eq(day)}$ and 42 dB(A),$L_{eq(night)}$.**

3.0 NOISE ASSESSMENT

3.1 Noise monitoring results

Spectrum Acoustics conducted on-site noise measurements of a Volvo EC3500 in the operation of excavating material and loading a haul truck on 12 January 2024 at three different distances, as summarised in **Table 2**. This extraction method via excavator is proposed to replace the use of a dozer and results in lower noise emissions with no identifiable track noise. Noise from the machinery was generally in the range <800Hz and wind and birds dominated at the higher frequencies. Noise levels in the Table are for fill cycles of approximately two minutes duration. The truck then left to deposit the material at a nearby emplacement and the excavator either stayed at low idle or did some preparation works for the next fill before the truck returned after approximately 2 minutes.

The fill cycles therefore occurred for approximately half of a given 15 minute period with minimal noise between cycles. The results below are conservative in that they do not include the rest periods, to account for the possibility that the excavator could be filling multiple trucks or otherwise handling material in between filling the truck(s).

Table 2. Summary of measured operational noise levels, dB(A),Leq

Distance	Shielding?	Measured level
25m	No. Direct line of sight to excavator and truck	61.8 dB(A)
45m	Direct line of sight to excavator and truck partially obscured	49.1 dB(A)
55m	Yes. Measurement taken behind 2m high sand bund	43.5 dB(A)

The above results reveal the relatively quiet nature of the machinery and the absence of significant noise from handling sand rather than harder materials such as rock or coal.

The measured level at 55m behind a 2m sand bund was below the NPfI daytime trigger level of 47 dB(A). The level was 2 dB greater than the trigger level at 45m with no barrier to noise from the excavator. Compliance with the trigger level would be achieved by a barrier or bund that intercepts the line of sight from the excavator to a point 1.5m above the ground at the R14 property boundary. It is understood that for the vast majority of the time, material excavation would occur at distances >45m from the property boundary and would advance from east to west, approaching R14, with a significant natural elevation difference acting as a noise bund.

These results suggest that the NPfI trigger level could be achieved at all times during the proposed extraction without a purposely constructed noise bund, or with a 2-3m sand bund placed along the property boundary when activities are at natural ground level at the nearest point to R14. **Figure 4** is a reproduction of Figure 1 from the SoEE prepared by Wedgetail Project Consulting showing residential receivers nearest to the proposal.

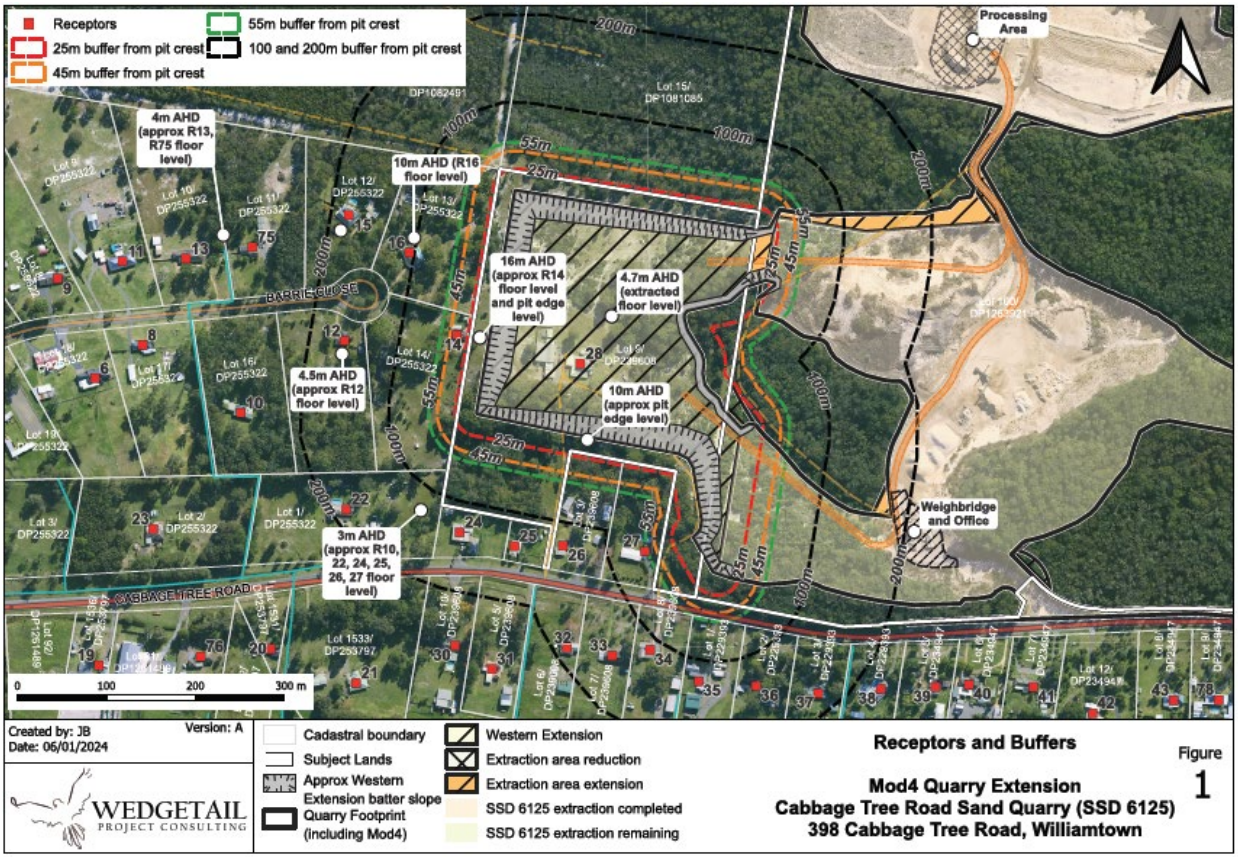


Figure 4 – Residential receivers

All receivers are at a greater distance from the proposed pit edge than R14 and outside the 55m setback at which compliance with the noise trigger level would be achieved without a barrier. Importantly for noise reduction, R16 is at 6m lower elevation than R14 and all other receivers are lower again by 6-7m. The pit edge therefore constitutes a substantial noise barrier to these receivers and levels well below the trigger level would result.

3.1 Historic Noise monitoring results

Quarterly attended noise monitoring has been conducted by Spectrum Acoustics from June 2020 to December 2024 at receiver 42 as indicated in Figure 1. The site has never been audible during these monitoring events.

Under the modification, trucks would replace the conveyor system for transporting material from the dig site to the processing area. A Moxy MY31 articulated truck is relatively quiet, having previously be measured by Spectrum Acoustic at less than 100 dB(A),Lw at other sites. This is comparable to the sound power level of a conveyor belt drive. With the trucks always operating at below ground level on the pit floor, always moving away from residences relative to the dig site and having never heard or measured noise from the site during compliance monitoring with the conveyor in operation, it is expected that haulage noise will continue to be inaudible off-site.

The noise monitoring location should be moved to R14 should the modification be approved.

4.0 CONCLUSION

An acoustic assessment of a proposed modification (MOD 4) to the existing Cabbage Tree Road Sand Quarry at Williamtown, NSW, has been conducted.

Additional background noise monitoring and on-site noise tests were conducted to determine the potential noise impact at receiver R14 at the east end of Barrie Close. The assessment has found that the noise trigger level would not be exceeded at R14 subject to construction of an acoustic barrier or mound between excavation works and the eastern boundary of R14.

All other receivers are at greater distance and at lower elevation that R14 so significantly lower noise levels would be experienced at these residences.

Overall noise emissions, though historically inaudible off-site, would be lower due to the use of an excavator rather than a dozer for extraction.

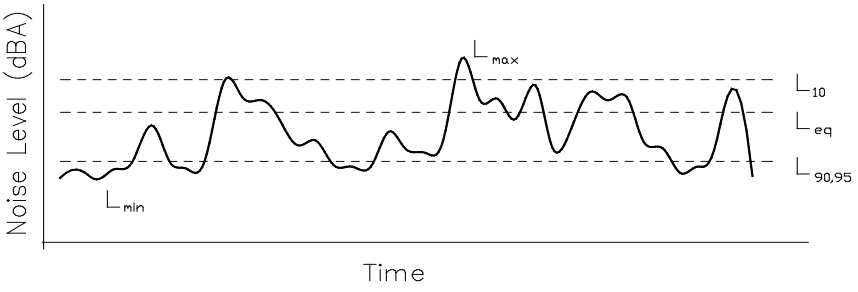
APPENDIX I

TERMS AND DEFINITIONS

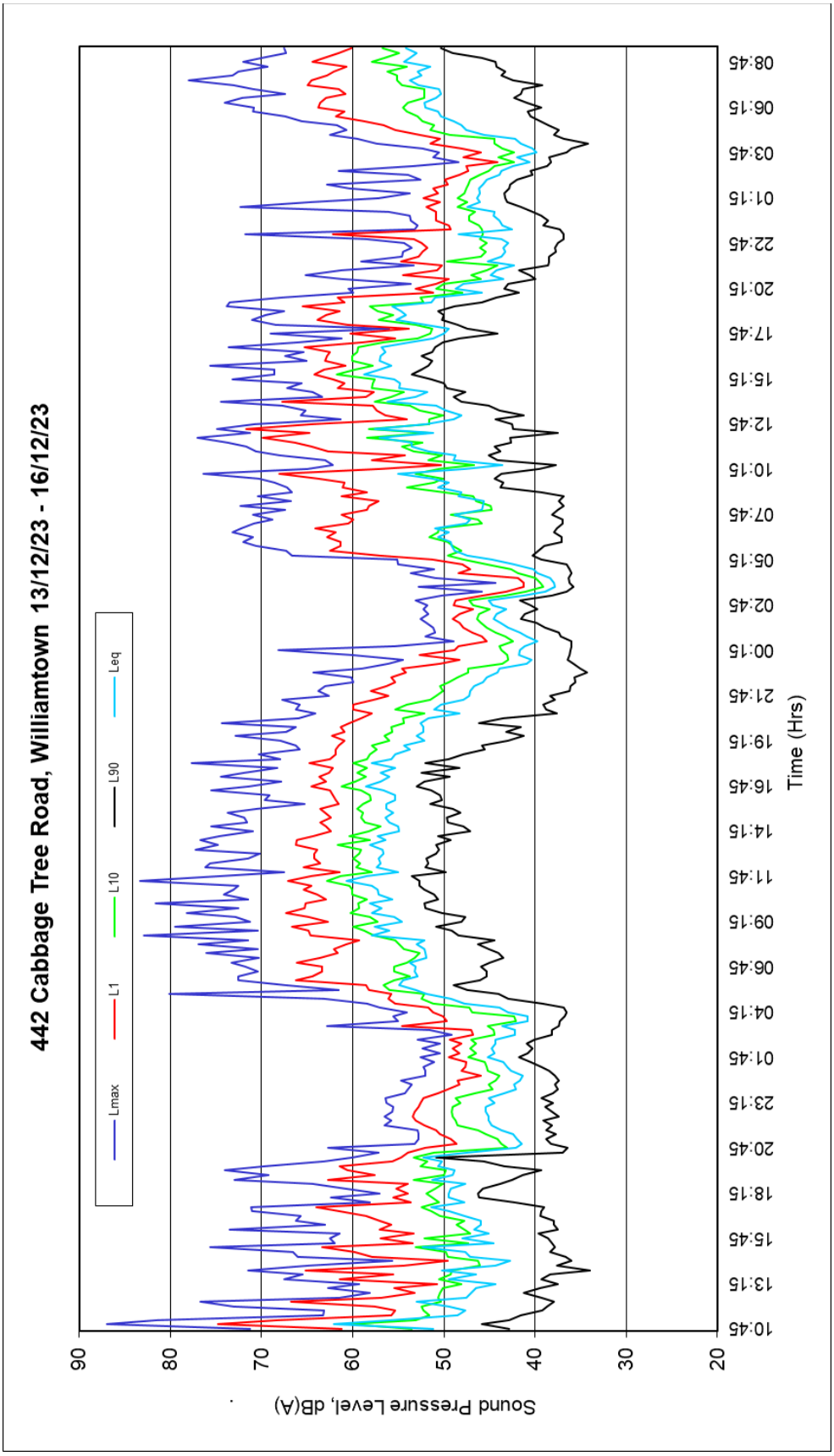
Table A1 contains the definitions of commonly used acoustical terms and is presented as an aid to understanding this report.

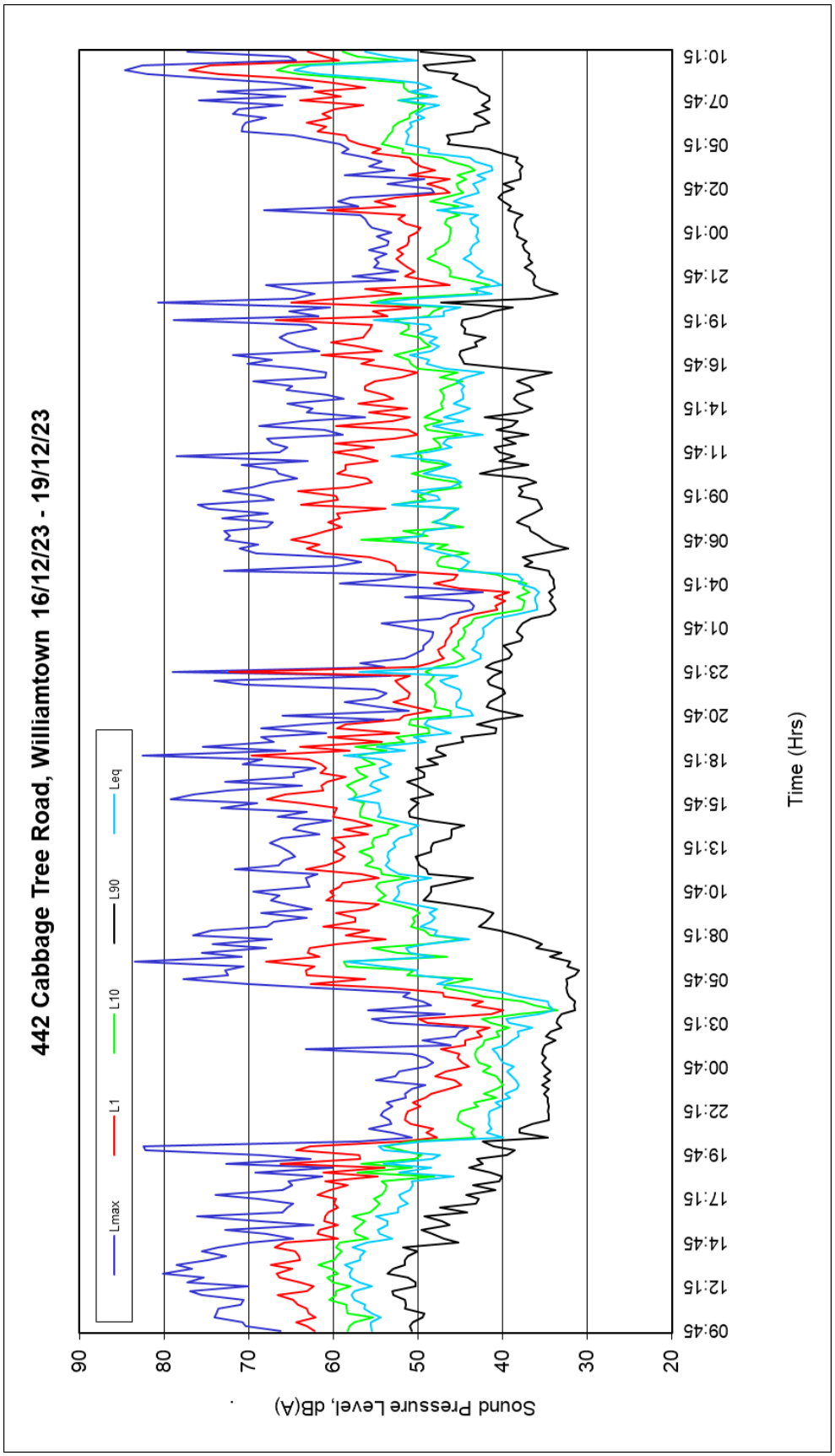
TABLE A1
DEFINITION OF ACOUSTICAL TERMS

Term	Definition
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A-Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB.
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
Lmax	The Maximum noise level recorded for a measurement period.
L90	Average Minimum Noise Level - the level exceeded for 90% of the monitoring period and recognised as the Background Noise Level. In this instance, the L90 percentile level is representative of the noise level generated by the surrounds of the residential area.



NOISE LOGGER DATA CHARTS




442 Cabbage Tree Road, Williamtown 16/12/23 - 19/12/23
Lmax
L1
L10
L90
Leq
Sound Pressure Level, dB(A)
90
80
70
60
50
40
30
20
Time (Hrs)
09:45
12:15
14:45
17:15
19:45
22:15
00:45
03:15
05:45
08:15
10:45
13:15
15:45
18:15
20:45
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01:45
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