RODNEY STEVENS ACOUSTICS
Acoustic Consultants

REPORT 230424R13

Revision 1

Noise Impact Assessment
Proposed Subdivision
Orchard Hills North - Stage 7

PREPARED FOR:
Legacy Property

20 January 2026

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Noise Impact Assessment

Proposed Subdivision

Orchard Hills North - Stage 7

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
230424R1	Revision 0	17 December 2025	Dani Awad	Desmond Raymond	Desmond Raymond
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1 INTRODUCTION

Rodney Stevens Acoustics Pty Ltd (here forth referred to as RSA), has been engaged by Legacy Property to conduct a Road Noise Impact Assessment for Development Application (DA) lodgement of the proposed subdivision at Orchard Hills North - Stage 1.

The report addresses potential traffic noise impacts from the M4 Motorway, Caddens Road and surrounding roads on the amenity of the proposed residential dwellings of the Stage 1 subdivision. This report considers the Orchard Hills Road Hierarchy Plan (presented in Appendix E) and provides recommendations to mitigate the potential future impacts of traffic noise from existing roads in addition to the proposed East-West and North-South Collector Roads in line with **Orchard Hills North Development Control Plan Part E17 dated December 2022**. This includes 2036-year future noise impacts from the aforementioned collector roads, utilising traffic modelling data presented in **ORCHARD HILLS NORTH REZONING Transport Management and Accessibility Plan 31 JANUARY 2023**.

This assessment is to form part of the supporting documentation for submission to Penrith City Council.

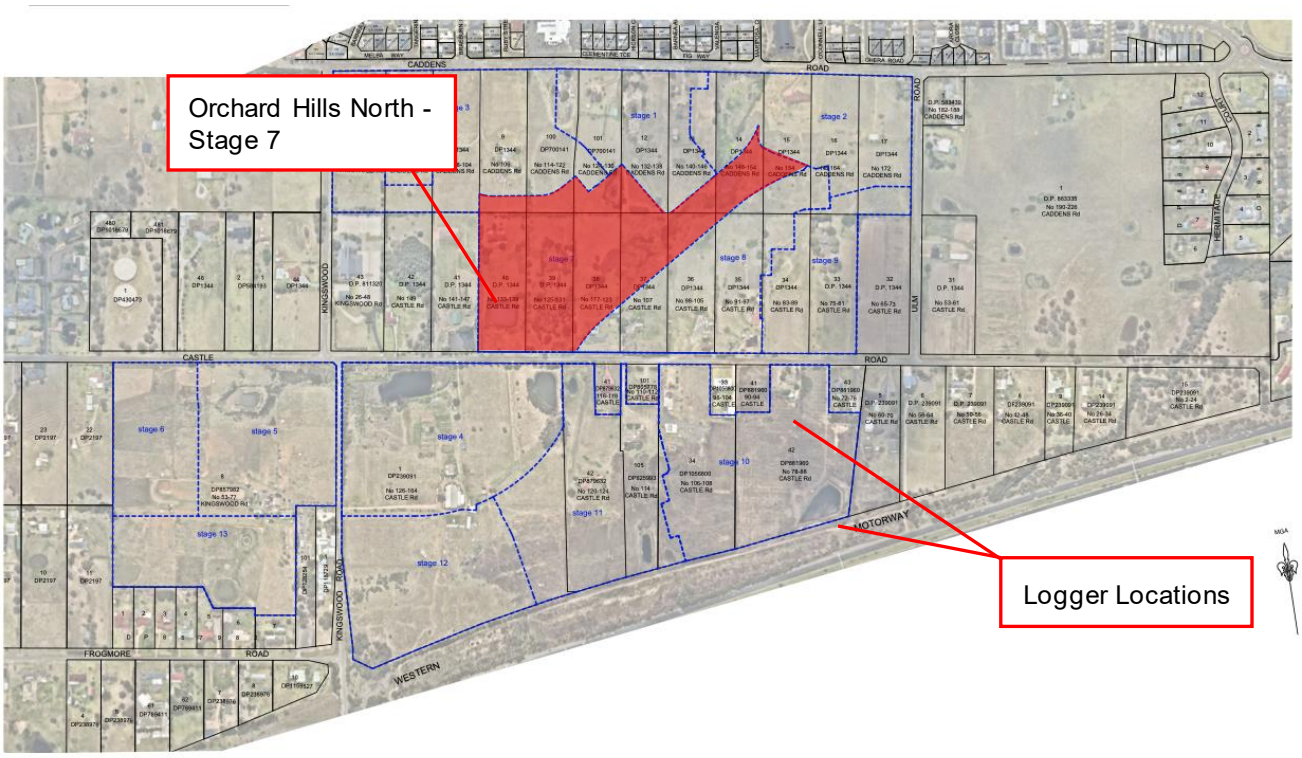
Specific acoustic terminology is present throughout this report. An explanation of these acoustic terms is provided in Appendix A

2 PROPOSED DEVELOPMENT

2.1 Site Location

The proposed subdivision site is located at Orchard Hills North - Stage 1 and is bounded by Castle Road to the north, Kingswood Road to the east and the M4 motorway further to the south. The location of the proposed site and surrounding area is presented in Figure 2-1.

Figure 2-1 Site Location



* Figure used only for site location/context and may not represent the current greater subdivision stage and lot numbering.

Aerial image courtesy of Google Map © 2025

2.2 Proposed Development

The proposal consists of the rezoning and subdivision of a rural/greenfield site at Orchard Hills North – This assessment will consider the Stage 1 site. The site layout of the proposed sub division is presented in Appendix D.

3 EXISTING ACOUSTIC ENVIRONMENT

3.1 Unattended Noise Monitoring

In order to characterise the existing acoustical environment of the area, unattended noise monitoring was conducted between Wednesday 7th June and Wednesday 14th June 2023 at the logging locations shown in Figure 2-1. Two noise loggers were set up on site. The first logger was located on the southern boundary of the greater subdivision site overlooking the M4 Motorway this location is representative of the traffic noise levels that the site will be exposed to.

The second logger was located approximately 120m north of the southern boundary of the greater site, noise monitoring at this location is representative of the traffic and ambient noise levels that the interior of the site will be exposed to.

Logger locations were selected with consideration to other noise sources which may influence readings, security issues for noise monitoring equipment and gaining permission for access from residents and landowners.

Instrumentation for the survey comprised of 2 RION NL-42 environmental noise loggers (serial numbers 422910 and 422904) fitted with microphone windshields. Calibration of the logger was checked prior to and following measurements. Drift in calibration did not exceed ±0.5 dB(A). All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

The logger determines LA1, LA10, LA90 and LAeq levels of the ambient noise. LA1, LA10, LA90 are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Glossary for Definitions in Appendix A). Detailed results at the monitoring location are presented in graphical format in Appendix B. The graphs show measured values of LA1, LA10, LA90 and LAeq for each 15-minute monitoring period.

3.2 Noise Intrusion (State Environmental Planning Policy (Infrastructure) 2007)

In order to ascertain the existing noise levels from the M4, the measured noise logger data was processed in accordance with the State Environmental Planning Policy (Infrastructure) 2007 and the Development near Rail Corridors and Busy Roads Interim Guideline. Table 3-1 details the traffic noise levels.

Table 3-1 Measured Traffic Noise Levels

Logger Location	Noise Level – dB(A) re 20 µPa	
	$L_{Aeq\ (15hour)}$ 07:00 – 22:00	$L_{Aeq\ (9hour)}$ 22:00 to 07:00
Traffic (Southern Boundary)	62	58
Traffic (Ambient)	51	51

Traffic noise levels recorded by the noise logger have been corrected to account for distance from the road to the proposed façade. They are representative of the current existing noise levels the proposed façade will encounter.

3.3 2036 Future Road Traffic Noise Prediction

Calculation of the levels of road traffic noise likely to be experienced at the future residential development site due to the development of the East - West and North - South collector roads have been carried out using the Calculation of Road Traffic Noise (CoRTN 1988) prediction method and data collected from Orchard Hills North Rezoning Transport Management and Accessibility Plan dated 31st January 2023. Traffic volumes have been utilised from the aforementioned Transport Management Plan (see Appendix F).

It must be noted that Caddens Road has previously been assessed and due to its low traffic noise will not be included in the following prediction.

Table 3-2 presents the CoRTN noise prediction for 2036 (precinct 1 and 2).

Table 3-2 Predicted Traffic Noise

Road	Year	Road Traffic Volume Average Peak	CoRTN Noise Prediction
East - West	2036	AM: 1,761	LAeq (1 hours) 72 dB(A)
East - West	2036	PM: 1,921	LAeq (1 hours) 69 dB(A)
North - South	2036	AM: 1,907	LAeq (1 hours) 72 dB(A)
North - South	2036	PM: 2,204	LAeq (1 hours) 69 dB(A)

The predicted noise exposure levels to the proposed development from the road traffic from the collector roads and are as follows:

- Distance of 10 metres - $L_{Aeq\ (18\ hours)}$ 72 dB(A) for the day and $L_{Aeq\ (9\ hours)}$ 69 dB(A) for the night time.
- Distance of 50 metres - $L_{Aeq\ (18\ hours)}$ 65 dB(A) for the day and $L_{Aeq\ (9\ hours)}$ 62 dB(A) for the night time
- Distance of 100 metres - $L_{Aeq\ (18\ hours)}$ 62 dB(A) for the day and $L_{Aeq\ (9\ hours)}$ 59 dB(A) for the night time

4 NOISE CRITERIA

4.1 Road Noise and Vibration Criteria

The determination of an acceptable level of road noise that will impact internal residential spaces requires consideration of the activities carried out within the space and the degree to which noise will interfere with those activities.

As sleep is the activity most affected by traffic noise, bedrooms are considered to be the most sensitive internal living areas. Higher levels of noise are acceptable in living areas without interfering with activities such as reading, listening to the television etc. Noise levels in utility spaces such as kitchens, bathrooms, laundries etc. can be higher.

4.2 Penrith City Council Requirements

Penrith City Council has specific requirements for traffic noise intrusion into residential spaces. These requirements are detailed in the Penrith City Council's DCP and pertain to the SEPP (Infrastructure) 2007 they are as follows:

State Environmental Planning Policy (Infrastructure) 2007

Appropriate measures must be taken to ensure that the following LAeq levels are not exceeded:

In any bedroom in the building – 35 dB(A) at any time between 10 pm and 7 am

Anywhere else in the building (other than a garage, kitchen, bathroom or hallway) – 40 dB(A) at any time

4.3 State Environmental Planning Policy (Infrastructure) 2021

Road and Rail Noise Criteria

The NSW Government's State Environmental Planning Policy (Infrastructure) 2021 (SEPP (Infrastructure) 2007) was introduced to facilitate the delivery of infrastructure across the State by improving regulatory certainty and efficiency. In accordance with the SEPP, Table 3.1 of the NSW Department of Planning and Infrastructure's "*Development near Rail Corridors and Busy Roads - Interim Guideline*" (the DP&I Guideline) of December 2008 provides noise criteria for residential and non-residential buildings. These criteria are summarized in Table 4-1.

Table 4-1 DP&I Interim Guideline Noise Criteria

Type of occupancy	Noise Level dB(A)	Applicable time period
Sleeping areas (bedroom)	35	Night 10 pm to 7 am
Other habitable rooms (excl. garages, kitchens, bathrooms & hallways)	40	At any time

Note 1: Airborne noise is calculated as $L_{Aeq\ (15hour)}$ daytime and $L_{Aeq\ (9hour)}$ night-time

The following guidance is provided in the DP&I Guideline:

> *"These criteria apply to all forms of residential buildings as well as aged care and nursing home facilities. For some residential buildings, the applicants may wish to apply more stringent design goals in response to market demand for a higher quality living environment.*
>
> *The night-time "sleeping areas" criterion is 5 dB (A) more stringent than the "living areas" criteria to promote passive acoustic design principles. For example, designing the building such that sleeping areas are less exposed to road or rail noise than living areas may result in less onerous requirements for glazing, wall construction and acoustic seals. If internal noise levels with windows or doors open exceed the criteria by more than 10 dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."*

The noise criteria presented in Section 4.3 and in Table 4-1 apply to a 'windows closed condition'. Standard window glazing of a building will typically attenuate noise ingress by 20 dB(A) with windows closed and 10 dB(A) with windows open (allowing for natural ventilation). Accordingly, the external noise threshold above which a dwelling will require mechanical ventilation is an $L_{Aeq(9hour)}$ of 55 dB(A) for bedrooms and $L_{Aeq(15hour)}$ of 60 dB(A) for other areas.

Where windows must be kept closed, the adopted ventilation systems must meet the requirements of the Building Code of Australia and Australian Standard 1668 – The use of ventilation and air conditioning in buildings.

5 NOISE IMPACT ASSESSMENT

5.1 Traffic Noise Assessment

In order to ascertain the existing traffic noise levels from M4 Motorway, the measured noise logger data was processed in accordance with the NSW Department of Planning and Infrastructure's "*Development near Rail Corridors and Busy Roads - Interim Guideline*" assessment time periods as shown in Table 4-1.

The final façade noise levels were predicted for each time period considering the distance attenuation from each respective source, virtual source, façade's orientation and any barrier effects.

The required noise reduction via the building façade for each respective room for each time period will be compared to determine the appropriate design criteria levels.

It is typically accepted that an open window (fractionally open to meet ventilation requirements) results in an attenuation of external noise by 10 dB. This reduction has been used to predict the room noise level in the window open condition.

5.2 Recommended Noise Control Treatment

The calculation procedure establishes the required noise insulation performance of each surface component such that the internal noise level is achieved whilst an equal contribution of road noise energy is distributed across each component. Building envelope components with a greater surface area must therefore offer increased noise insulation performance.

The recommended acoustic treatment is based on the following floor finishes:

- Bedrooms: Hard Flooring
- Living Room Hard Flooring
- Kitchen/Wet Areas: Tiles

All recommendations must be checked by others to ensure compliance with other non-acoustic requirements that Council or other authority may impose (e.g. Thermal requirements for BASIX compliance).

5.3 Glazing

The R_w rating required for each window may vary from room to room. Recommendations for windows also apply to any other item of glazing located on the external facade of the building in a habitable room unless otherwise stated.

Note that the R_w rating is required for the complete glazing and frame assembly. The minimum glazing thicknesses will not necessarily meet the required R_w rating without an appropriate frame system. It will be therefore necessary to provide a window glass and frame system having a laboratory tested acoustic performance meeting the requirements in this section.

The window systems must be tested in accordance with both of the following:

- Australian Window Association Industry Code of Practice Window and Door – Method of Acoustic Testing; and
- AS 1191 Acoustics – Method for laboratory measurement of airborne sound insulation of building elements.

The entire frame associated with the glazing must be sealed into the structural opening using acoustic mastics and backer rods. Normal weather proofing details do not necessarily provide the full acoustic insulation potential of the window system. The manufacturers' installation instructions for the correct acoustic sealing of the frame must be followed.

We note that wooden frame systems have low acoustic performance due to the nature of the frame and must **NOT** be used.

It is possible that structural demands for wind and fire loading may require more substantial glass and framing assemblies than nominated above. Where this is the case, the acoustic requirements must clearly be superseded by the structural or fire rating demands.

5.3.1 Rw Requirements for Glazing

Stage 1 lot recommendations consider future potential road noise impacts from the surrounding area with reference to the **Orchard Hills Road Hierarchy Plan (**Appendix F**)** and consideration of projected traffic volumes associated with the projected full development of both Precincts 1 and 2 in year 2036 (Appendix G).

Lots within 50 - 100-metres from the proposed EW-NS Collector Roads.

The glazing for these lots will be required to achieve a rating of R_w 36 for Bedrooms and R_w 32 for Living areas. This Rw rating is generally achieved with an acoustically sealed aluminium frame, seals 10.38mm laminated glass and 6.38mm glass respectively. (Appendix E - GREEN).

Lots +100-metres from the proposed EW-NS Collector Roads.

The glazing for these lots will be required to achieve a rating of R_w 30 for Bedrooms and R_w 26 for Living areas. This Rw rating is generally achieved with an acoustically sealed aluminium frame, seals 6mm glass and 5mm glass respectively. (Appendix E - YELLOW).

Please note: Detailed designs for the proposed dwellings have not yet been finalised, hence assumptions have been made for typical glazing sizes and locations for the residences.

Once specific architectural plans have been produced a final specification for window thicknesses will need to be provided as this is dependent upon room sizes, room orientations, room uses and window areas.

Table 5-1 Glass Thickness Guideline

Glass Thickness	Rw Rating (Glass Pane Only)
5mm	26
6mm	28
6.38mm Laminated	32
8.38 Laminated	34
10.38 Laminated	36
12.38 Laminated	37

4mm – 50mm Airgap – 6mm Double Glazed	41

5.4 Roof/Ceiling

Lots within 50 - 100-metres from the proposed EW-NS Collector Roads.

The overall roof/ceiling acoustic rating required for the Appendix E GREEN highlighted areas is Rw + Ctr 38 (minimum).

All remaining lots +100-metres from the proposed EW-NS Collector Roads

These lots may utilise standard construction.

Please note: Detailed designs for the proposed lot dwellings have not yet been finalised, hence. Specific roof construction materials will be selected at the site-specific DA Noise Impact Assessment stage**.**

If ventilators, heat extraction units or other openings into the ceiling cavity for lighting, ventilation, decoration or other purposes are to be provided, then care should be taken to ensure that such units are properly attenuated, and all penetrations are properly sealed off so as not to degrade the rating of the roof/ceiling construction system. Care should also be taken to avoid any noise paths into the ceiling cavity via the eaves.

5.5 External Walls

The following wall construction recommendations are given as guidance only. The client is responsible for selecting adequate systems in order to achieve the recommended acoustic ratings.

5.5.1 Masonry Walls

Masonry external walls will be required to achieve a rating of R_w 50. This Rw rating is generally achieved with a standard construction with insulation. No further acoustic requirements are needed

5.5.2 Light Weight Walls

Lots within 50 - 100-metres from the proposed EW-NS Collector Roads

All proposed lightweight cladding external walls for the GREEN highlighted areas in Appendix E must have a minimum Rw + Ctr 38 rating.

All remaining lots +100-metres from the proposed EW-NS Collector Roads

These lots may utilise standard construction.

Please note: Detailed designs for the proposed lot dwellings have not yet been finalised, hence. Specific wall construction materials will be selected at the site-specific DA Noise Impact Assessment stage**.**

6 CONCLUSION

Rodney Stevens Acoustics has conducted a review of the proposed subdivision development at Orchard Hills North - Stage 1. The review has assessed the amenity of the site and compared it with the noise criteria required by Penrith City Council and other relevant standards.

A noise survey has been carried out, and the processed data has been used to determine traffic noise from the M4 motorway and surrounding roads to the project site. This report also considers impacts as a result of the proposed Orchard Hills Road Hierarchy Plan (presented in Appendix E) and provides recommendations to mitigate the potential future impacts of traffic noise from existing roads in addition to the proposed East-West and North-South Collector Roads in line with **Orchard Hills North Development Control Plan Part E17 dated December 2022.**

Based on the noise impact study conducted, the proposed development is deemed to comply with the SEPP (Infrastructure) 2007-noise criteria and the Penrith City Council and Orchard Hills North DCP's with recommendations from this report. It is therefore recommended that planning approval be granted for the proposed development based on acoustics.

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Approved by:

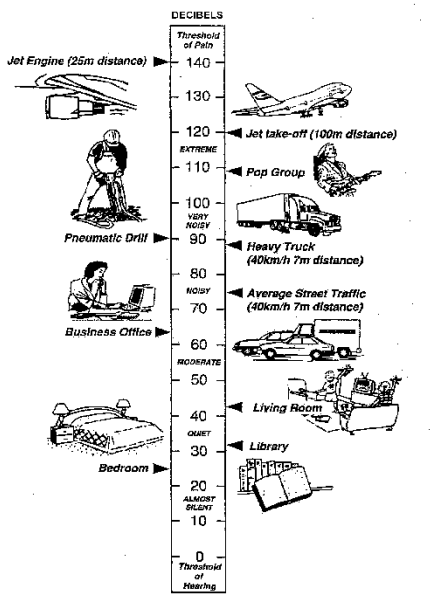
Desmond Raymond

Director

Appendix A. Acoustic Terminology

A-weighted sound pressure	The human ear is not equally sensitive to sound at different frequencies. People are more sensitive to sound in the range of 1 to 4 kHz (1000 – 4000 vibrations per second) and less sensitive to lower and higher frequency sound. During noise measurements, an electronic '*A-weighting*' frequency filter is applied to the measured sound level *dB(A)* to account for these sensitivities. Other frequency weightings (B, C and D) are less commonly used. Sound measured without a filter is denoted as linear weighted dB(linear).
Ambient noise	The total noise in a given situation, inclusive of all noise source contributions in the near and far field.
Community annoyance	Includes noise annoyance due to: ▪ character of the noise (e.g. sound pressure level, tonality, impulsiveness, low-frequency content) ▪ character of the environment (e.g. very quiet suburban, suburban, urban, near industry) ▪ Miscellaneous circumstances (e.g. noise avoidance possibilities, cognitive noise, unpleasant associations) ▪ human activity being interrupted (e.g. sleep, communicating, reading, working, listening to radio/TV, recreation).
Compliance	The process of checking that source noise levels meet with the noise limits in a statutory context.
Cumulative noise level	The total level of noise from all sources.
Extraneous noise	Noise resulting from activities that are not typical to the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
Feasible and reasonable measures	Feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, considering the following factors: ▪ Noise mitigation benefits (amount of noise reduction provided, number of people protected). ▪ Cost of mitigation (cost of mitigation versus benefit provided). ▪ Community views (aesthetic impacts and community wishes). ▪ Noise levels for affected land uses (existing and future levels, and changes in noise levels).
Impulsiveness	Impulsive noise is noise with a high peak of short duration or a sequence of these peaks. Impulsive noise is also considered annoying.

Low frequency	Noise containing major components in the low-frequency range (20 to 250 Hz) of the frequency spectrum.
Noise criteria	The general set of non-mandatory noise levels for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (e.g. noise levels for various land use).
Noise level (goal)	A noise level that should be adopted for planning purposes as the highest acceptable noise level for the specific area, land use and time of day.
Noise limits	Enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels, which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.
Performance-based goals	Goals specified in terms of the outcomes/performance to be achieved, but not in terms of the means of achieving them.
Rating Background Level (RBL)	The rating background level is the overall single figure background level representing each day, evening and night time period. The rating background level is the 10^{th} percentile min L_{A90} noise level measured over all day, evening and night time monitoring periods.
Receptor	The noise-sensitive land use at which noise from a development can be heard.
Sleep disturbance	Awakenings and disturbance of sleep stages.
Sound and decibels (dB)	Sound (or noise) is caused by minute changes in atmospheric pressure that are detected by the human ear. The ratio between the quietest noise audible and that which should cause permanent hearing damage is a million times the change in sound pressure. To simplify this range the sound pressures are logarithmically converted to decibels from a reference level of 2 x 10-5 Pa. The picture below indicates typical noise levels from common noise sources.



dB is the abbreviation for decibel – a unit of sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.

Sound power Level (SWL)

The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in *dB(A)*.

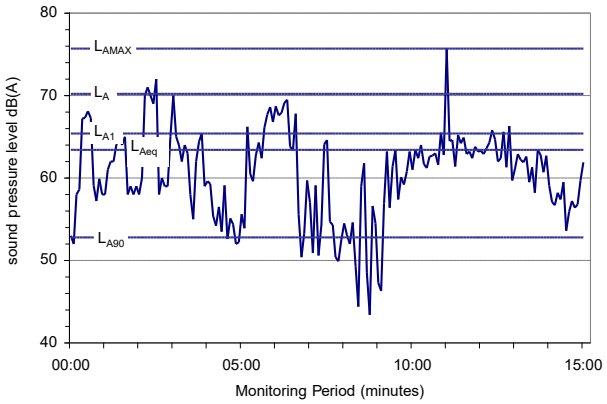
Sound Pressure Level (SPL)

The level of noise, usually expressed as SPL in *dB(A)*, as measured by a standard sound level meter with a pressure microphone. The sound pressure level in *dB(A)* gives a close indication of the subjective loudness of the noise.

Statistic noise levels

Noise levels varying over time (e.g. community noise, traffic noise, construction noise) are described in terms of the statistical exceedance level.

A hypothetical example of A weighted noise levels over a 15-minute measurement period is indicated in the following figure:



Key descriptors:

L_{Amax} Maximum recorded noise level.

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} Noise level present for 10% of the 15-minute interval. Commonly referred to the average maximum noise level.

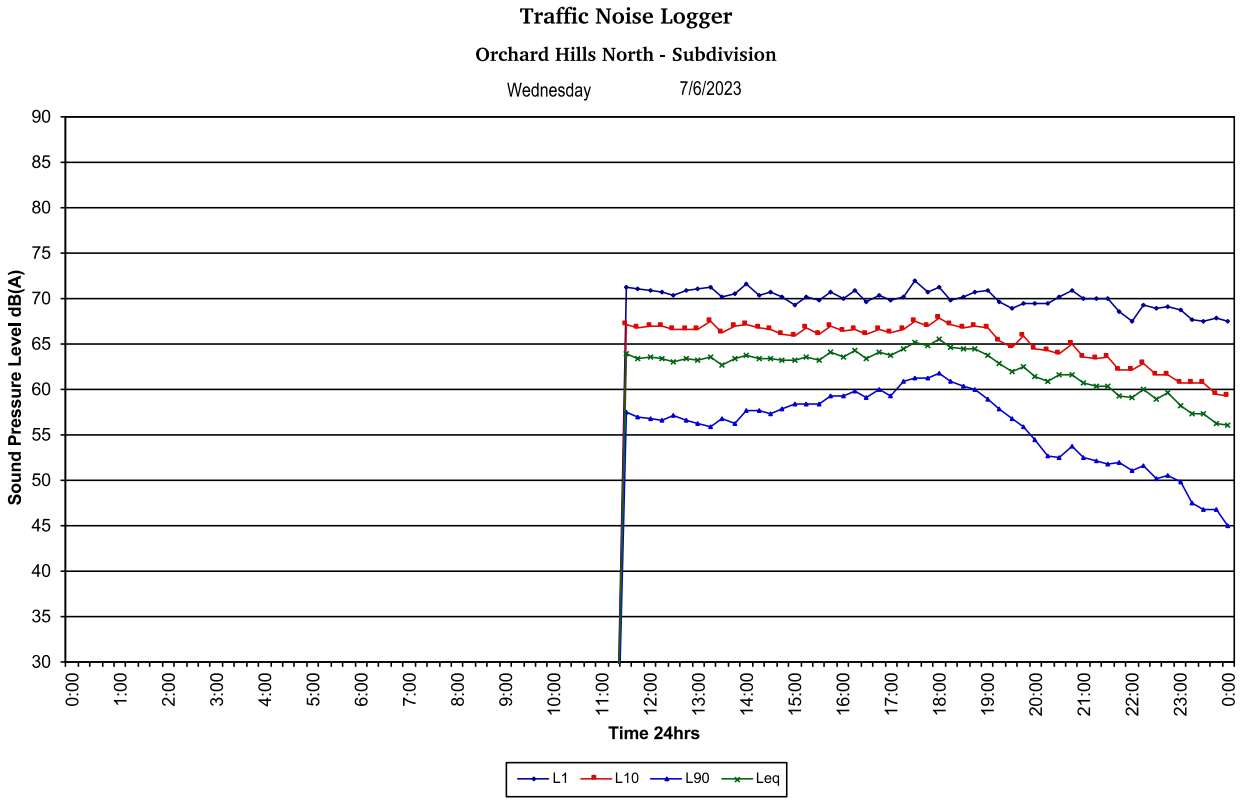
L_{Aeq} Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.

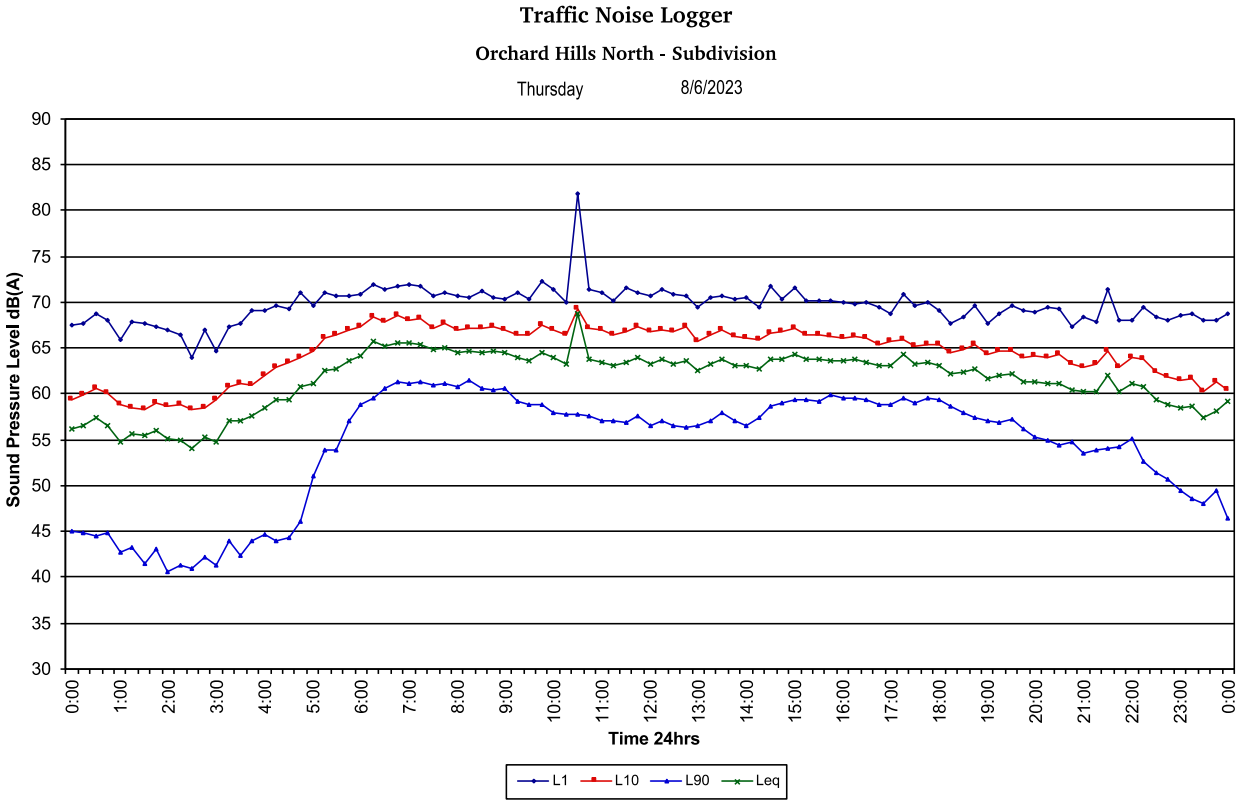
L_{A90} Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

Threshold The lowest sound pressure level that produces a detectable response (in an instrument/person).

Tonality Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dB(A) penalty is typically applied to noise sources with tonal characteristics

Appendix B Logger Graphs

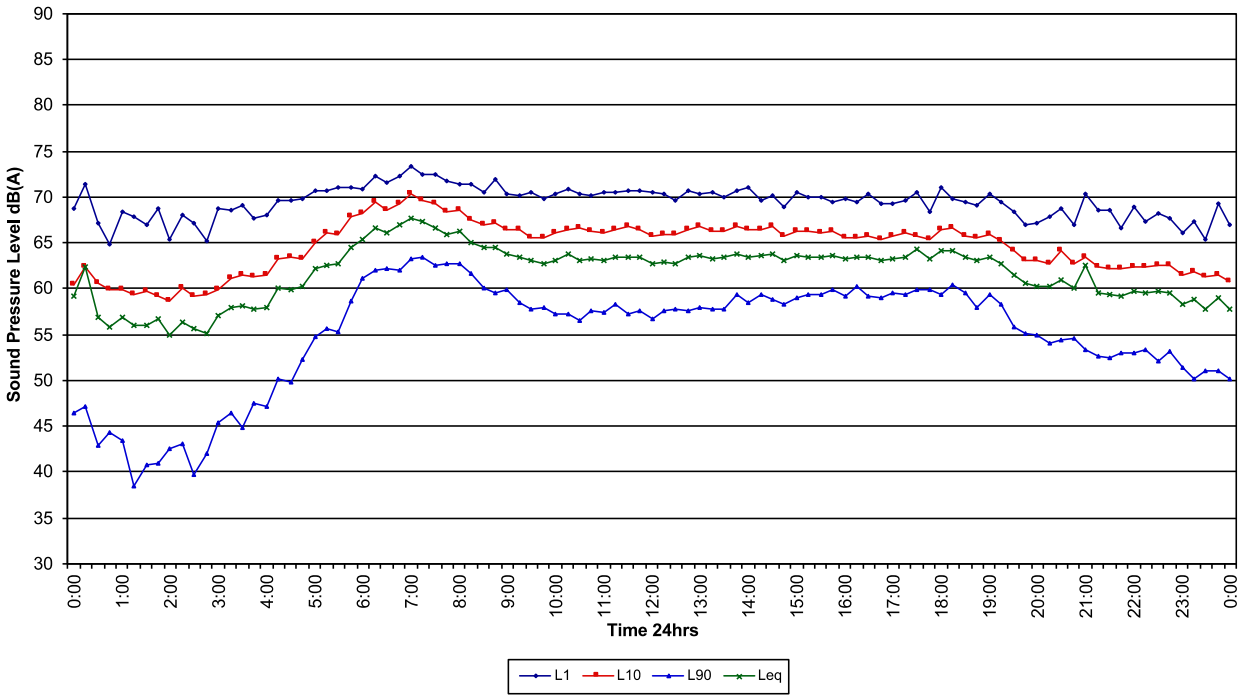




Traffic Noise Logger

Orchard Hills North - Subdivision

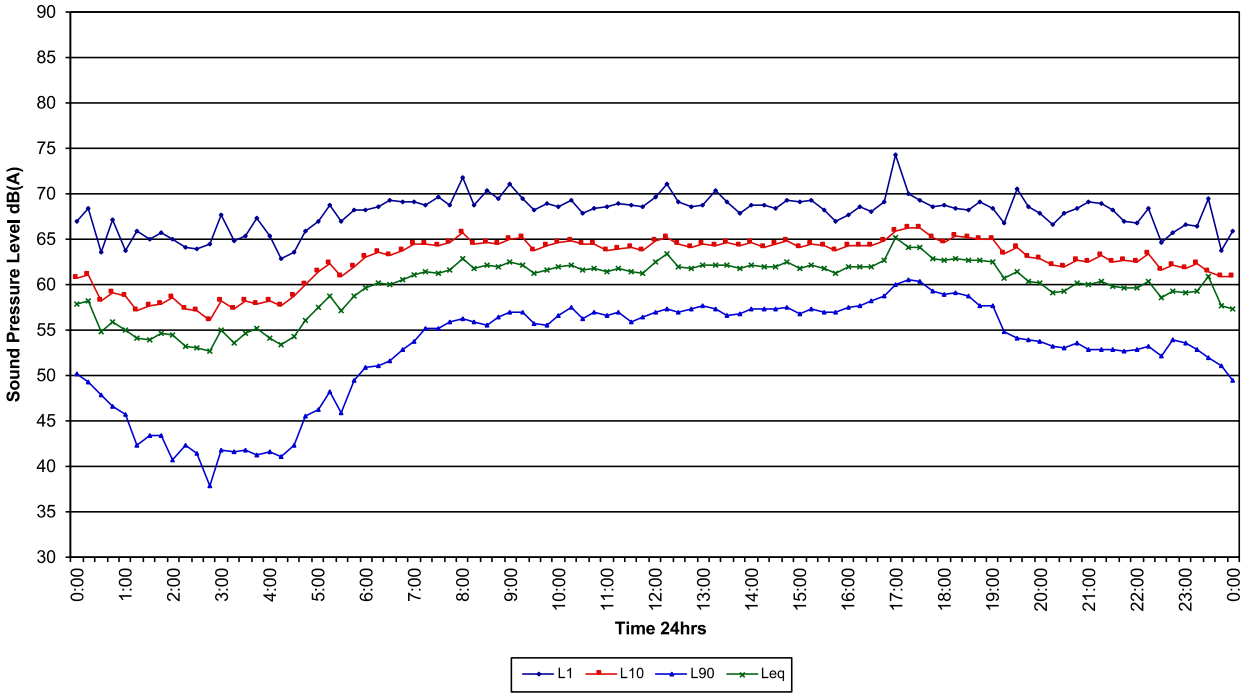
Friday 9/6/2023



Traffic Noise Logger

Orchard Hills North - Subdivision

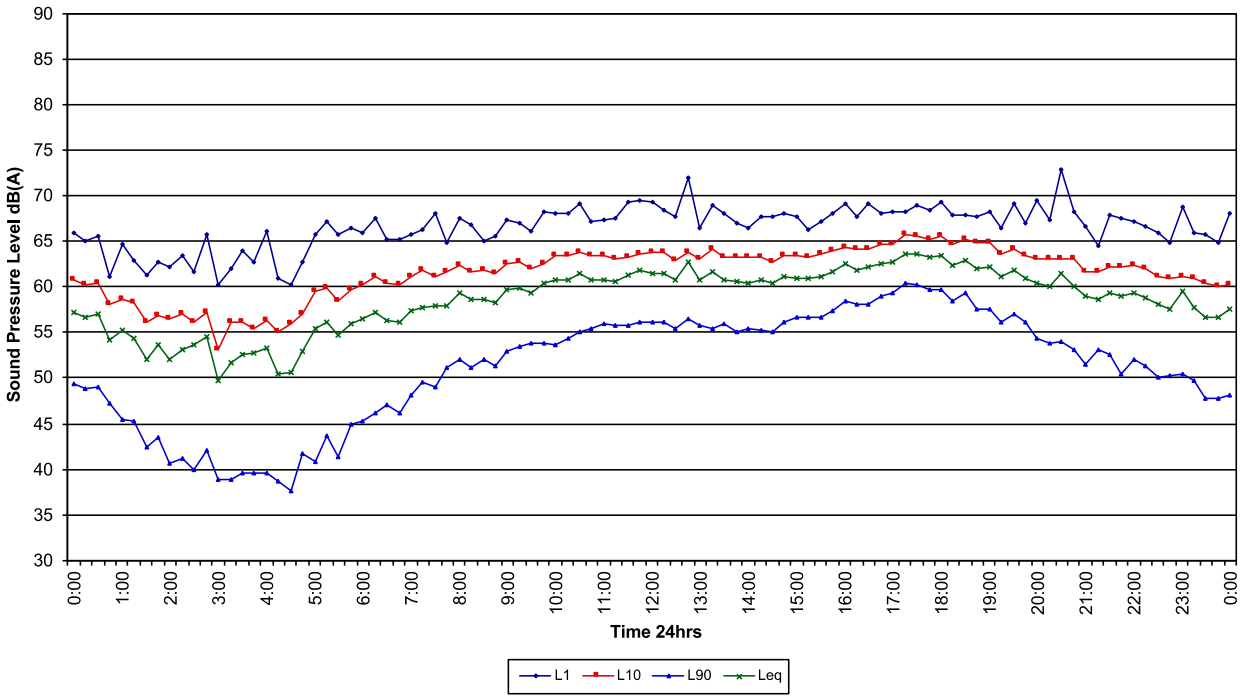
Saturday 10/6/2023



Traffic Noise Logger

Orchard Hills North - Subdivision

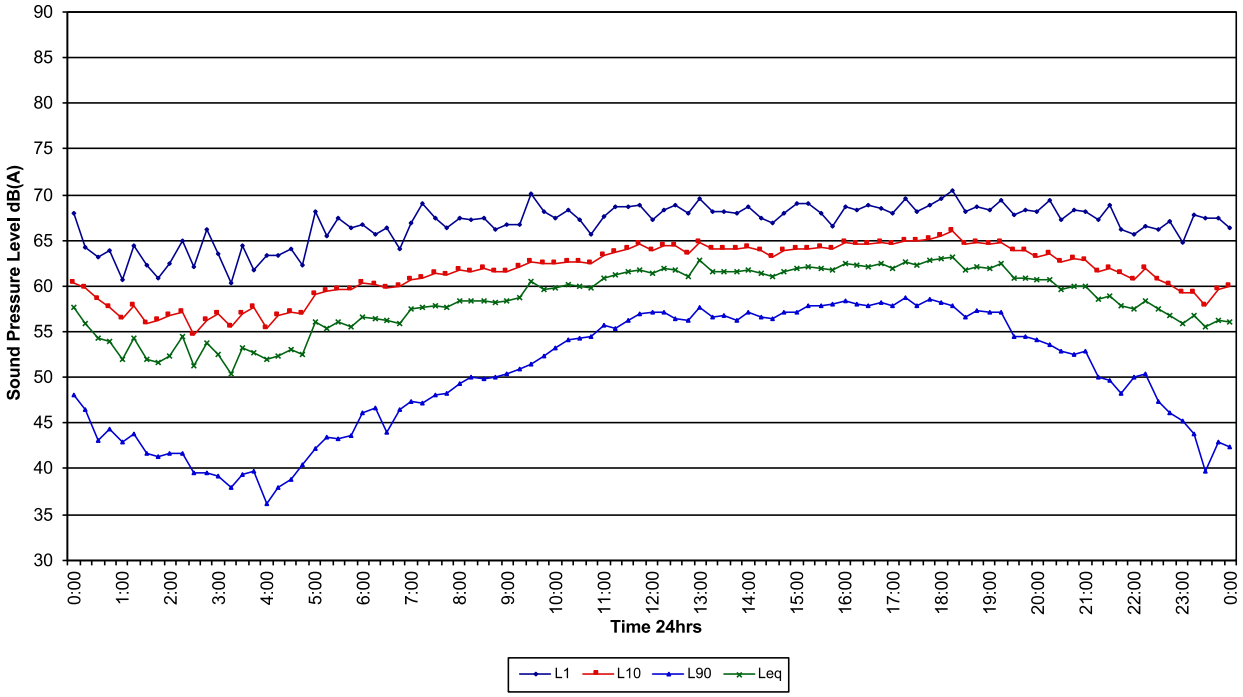
Sunday 11/6/2023

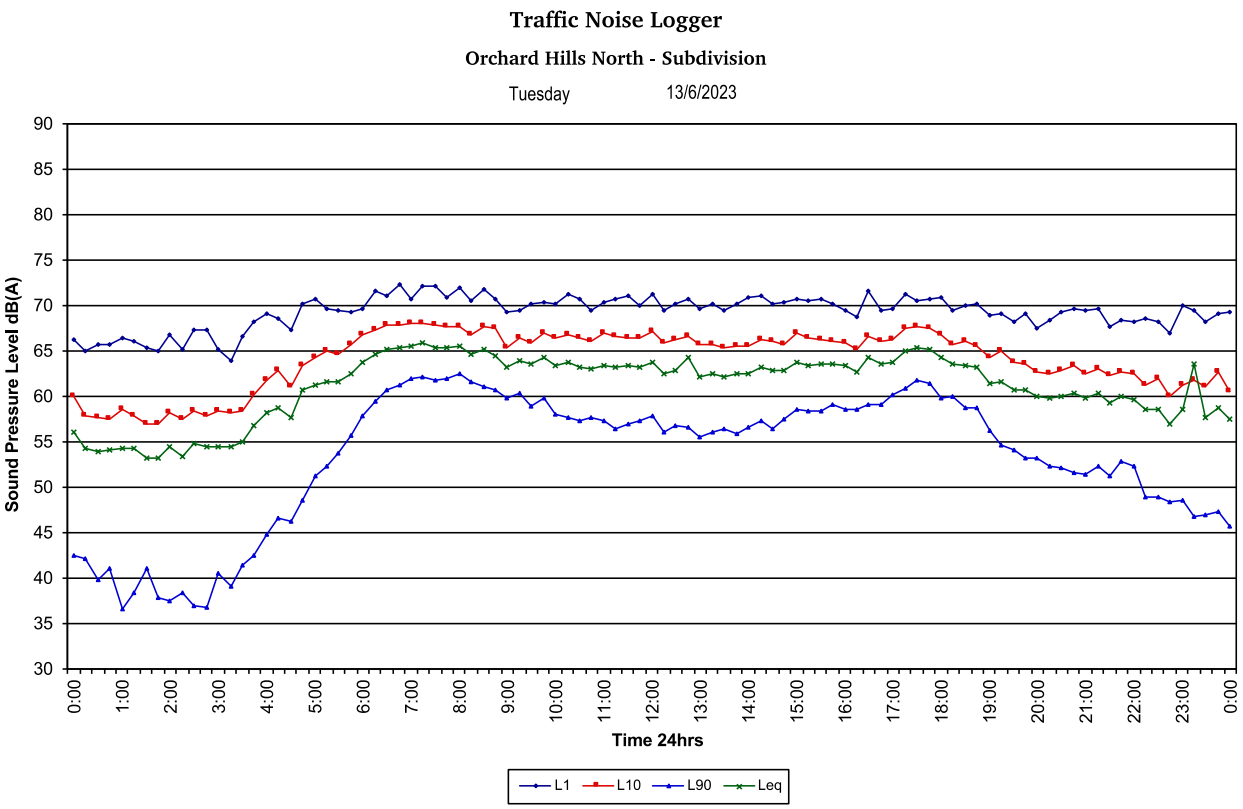


Traffic Noise Logger

Orchard Hills North - Subdivision

Monday 12/6/2023




Traffic Noise Logger
Orchard Hills North - Subdivision
Tuesday 13/6/2023
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
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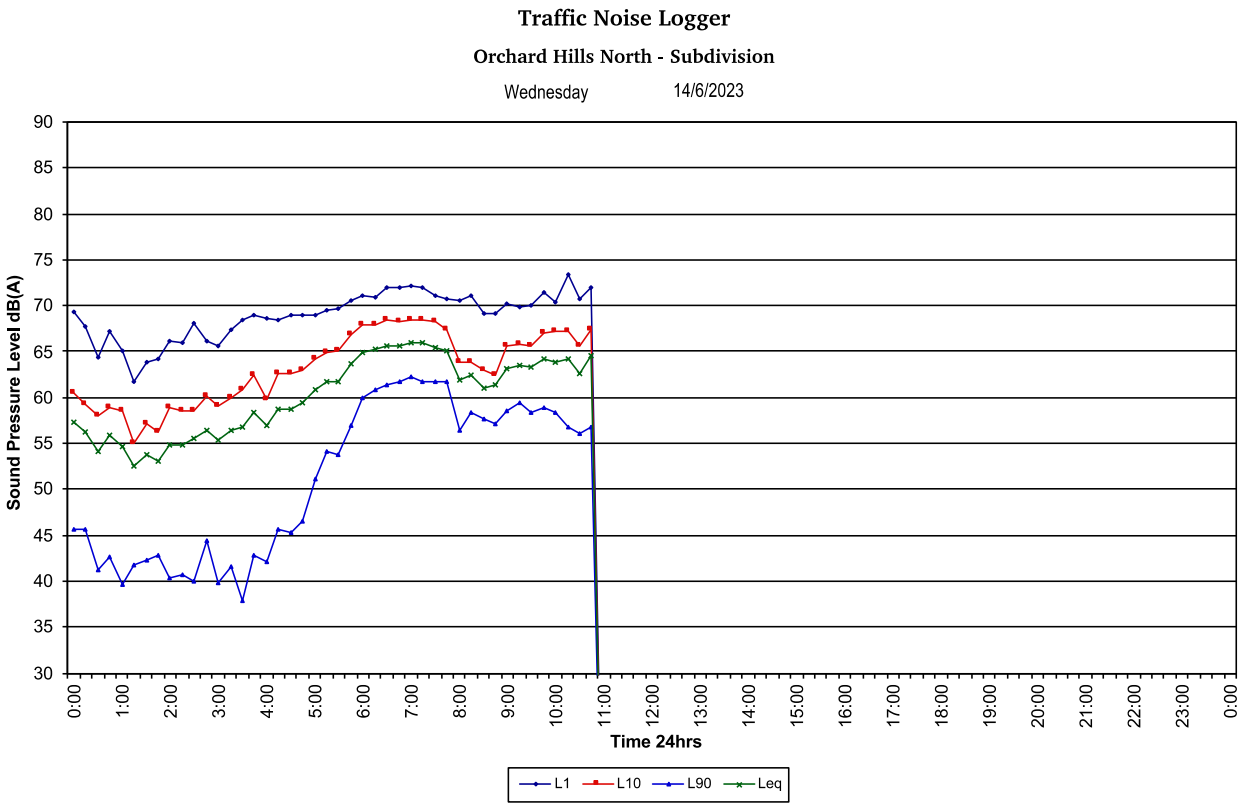
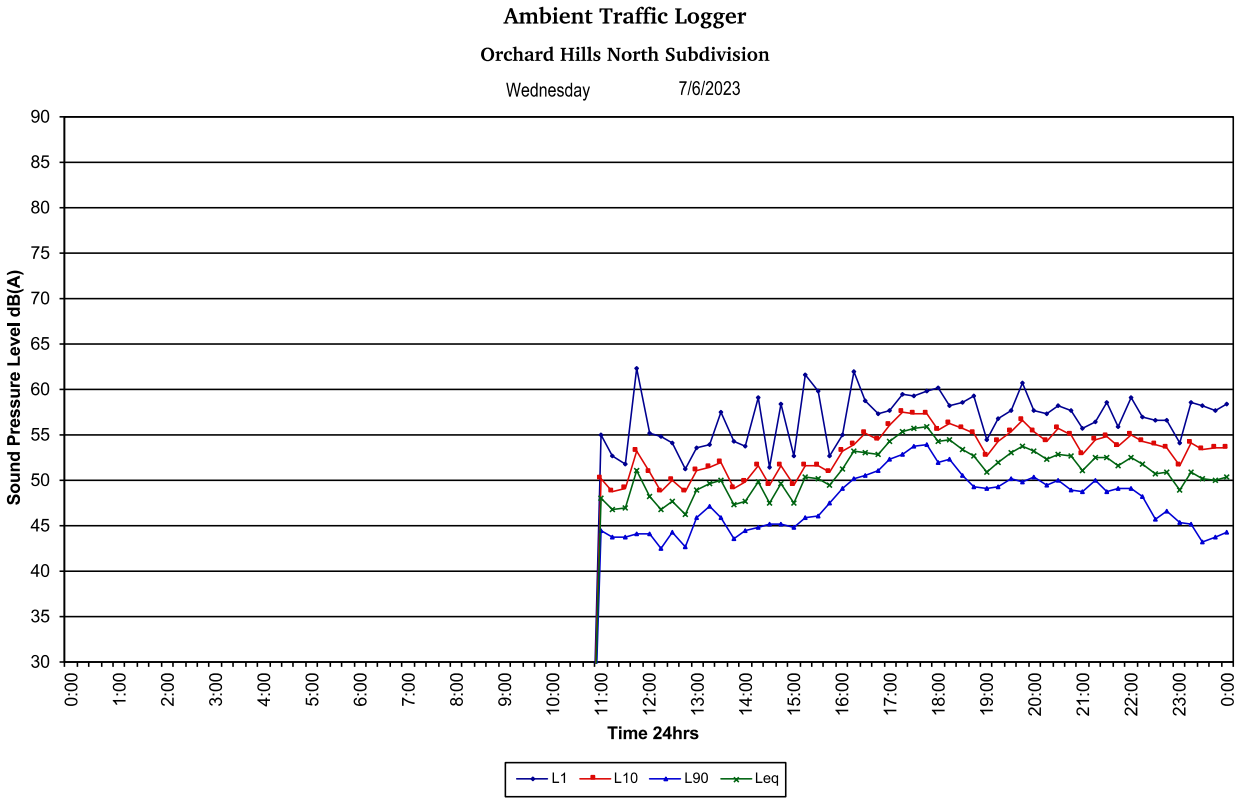
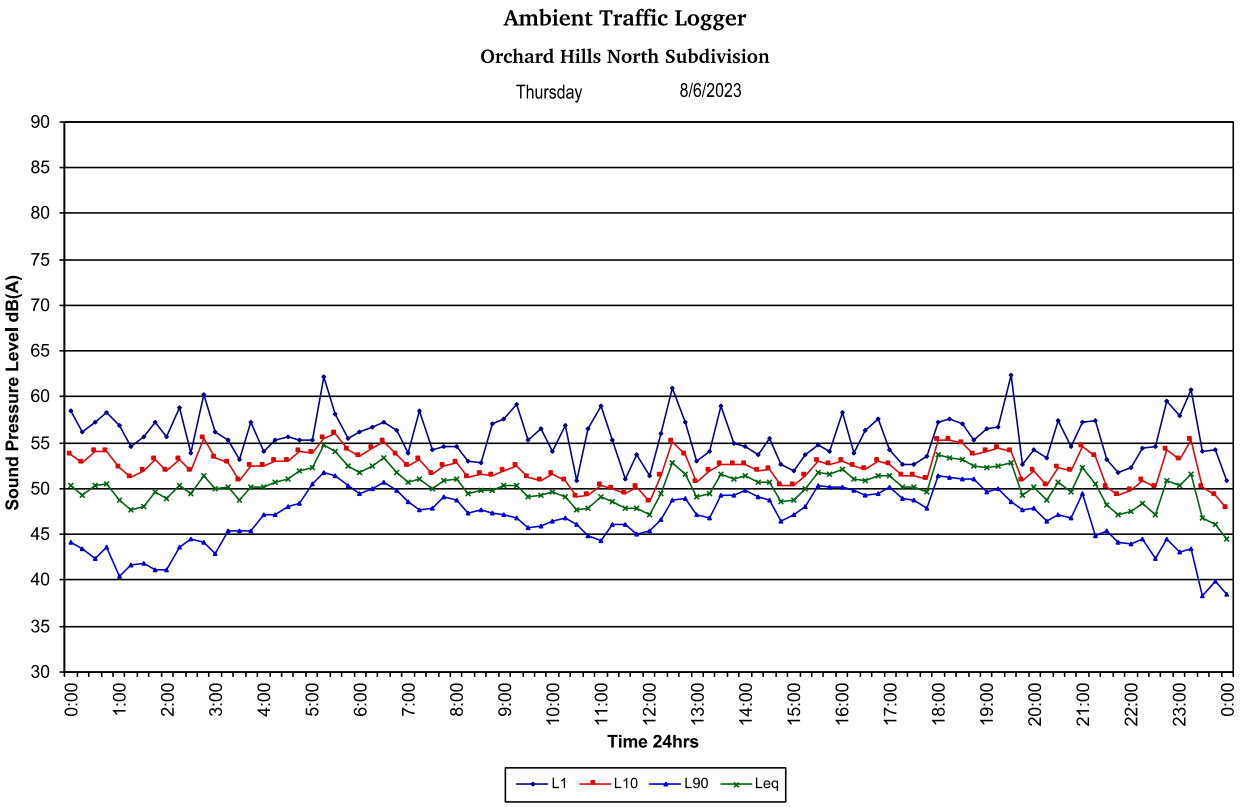
22:00
23:00
0:00
Time 24hrs
L1
L10
L90
Leq


Traffic Noise Logger
Orchard Hills North - Subdivision
Wednesday 14/6/2023
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
L90
Leq

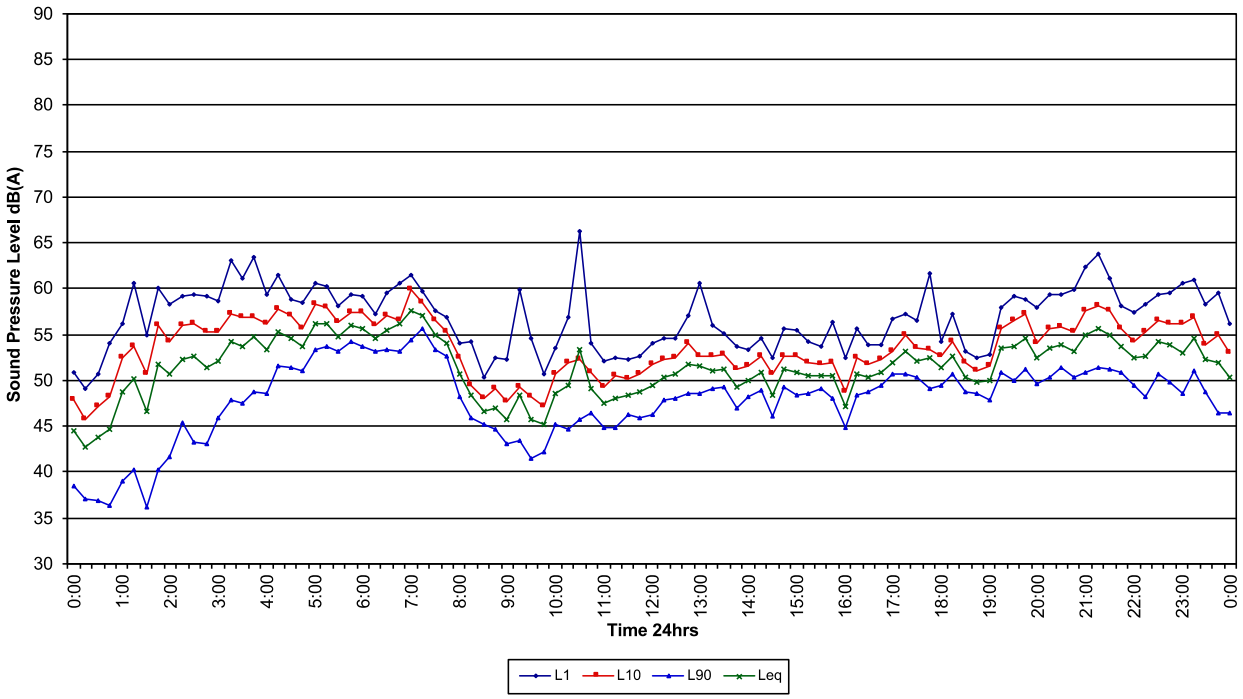

Ambient Traffic Logger
Orchard Hills North Subdivision
Wednesday 7/6/2023
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
L90
Leq


Ambient Traffic Logger
Orchard Hills North Subdivision
Thursday 8/6/2023
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
L90
Leq

Ambient Traffic Logger

Orchard Hills North Subdivision

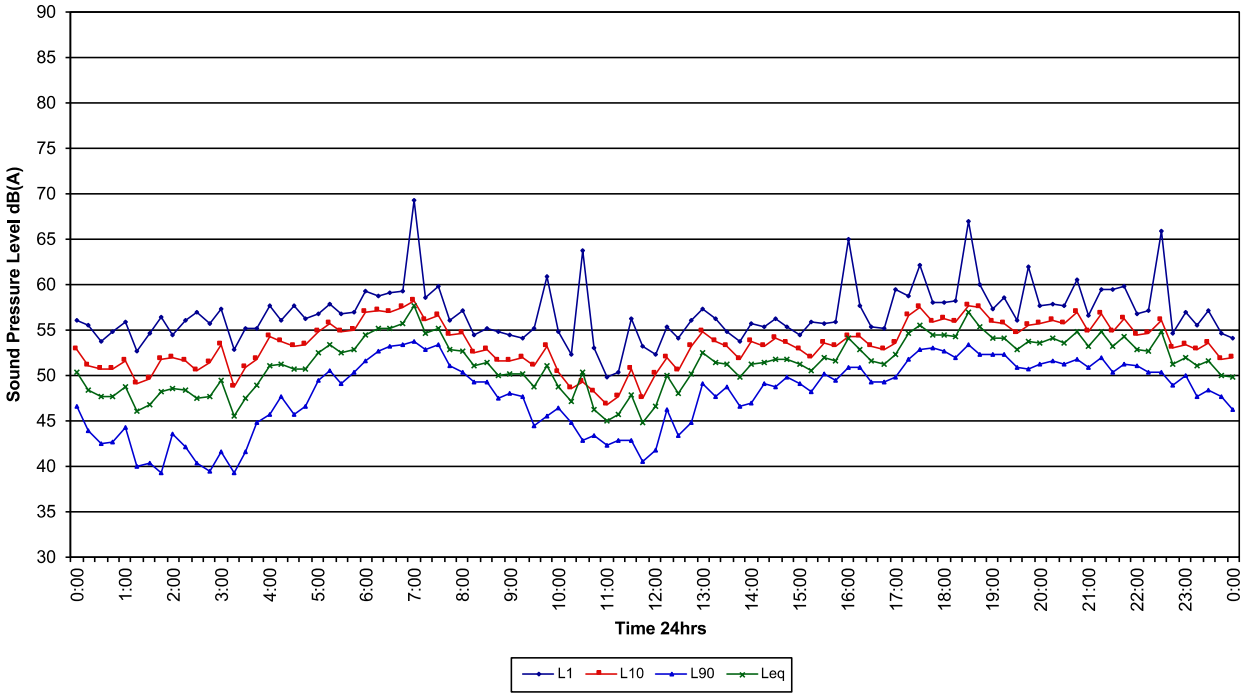
Friday 9/6/2023

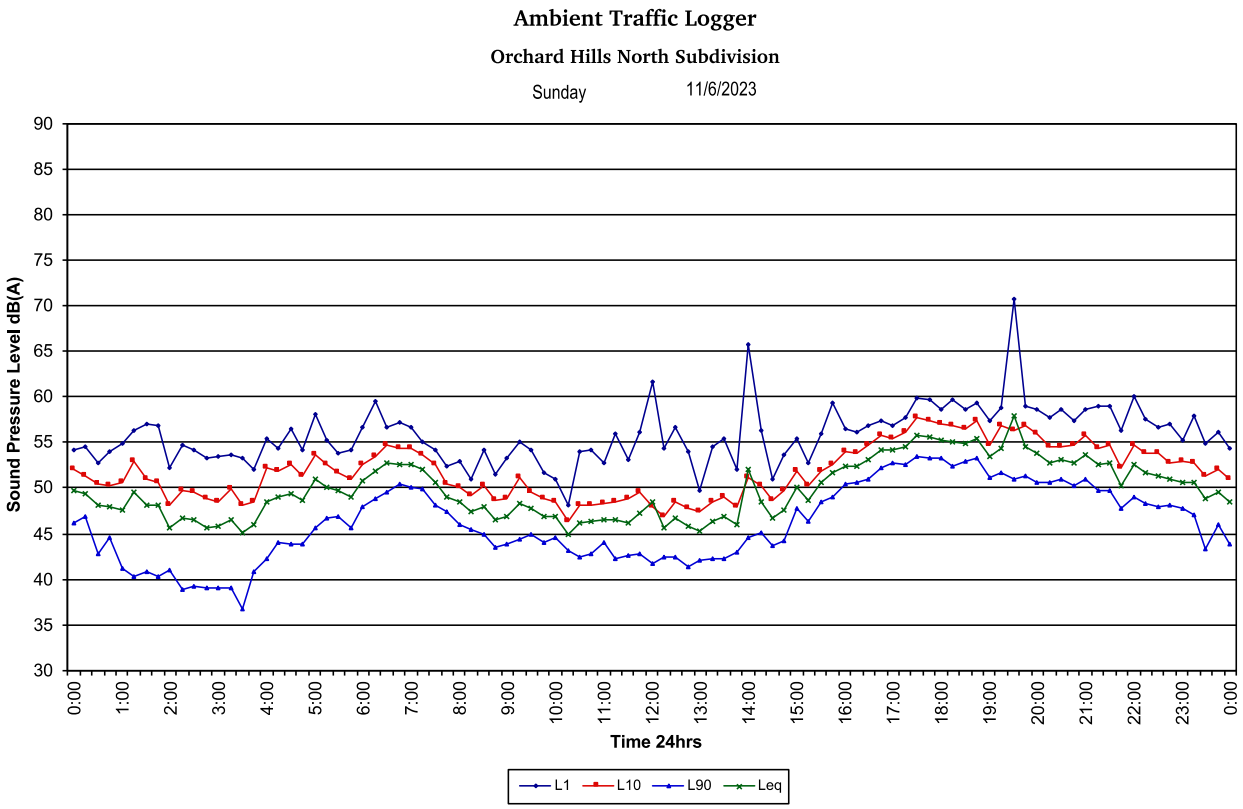


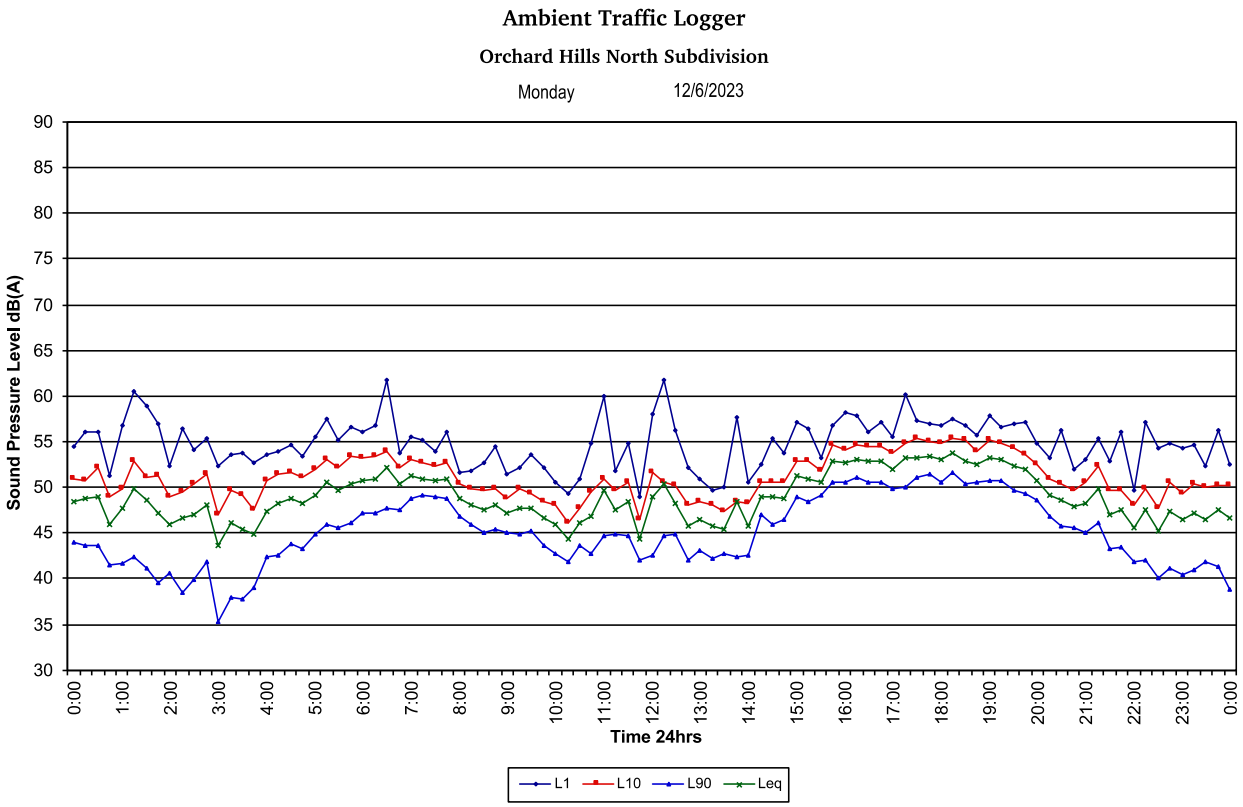
Ambient Traffic Logger

Orchard Hills North Subdivision

Saturday 10/6/2023



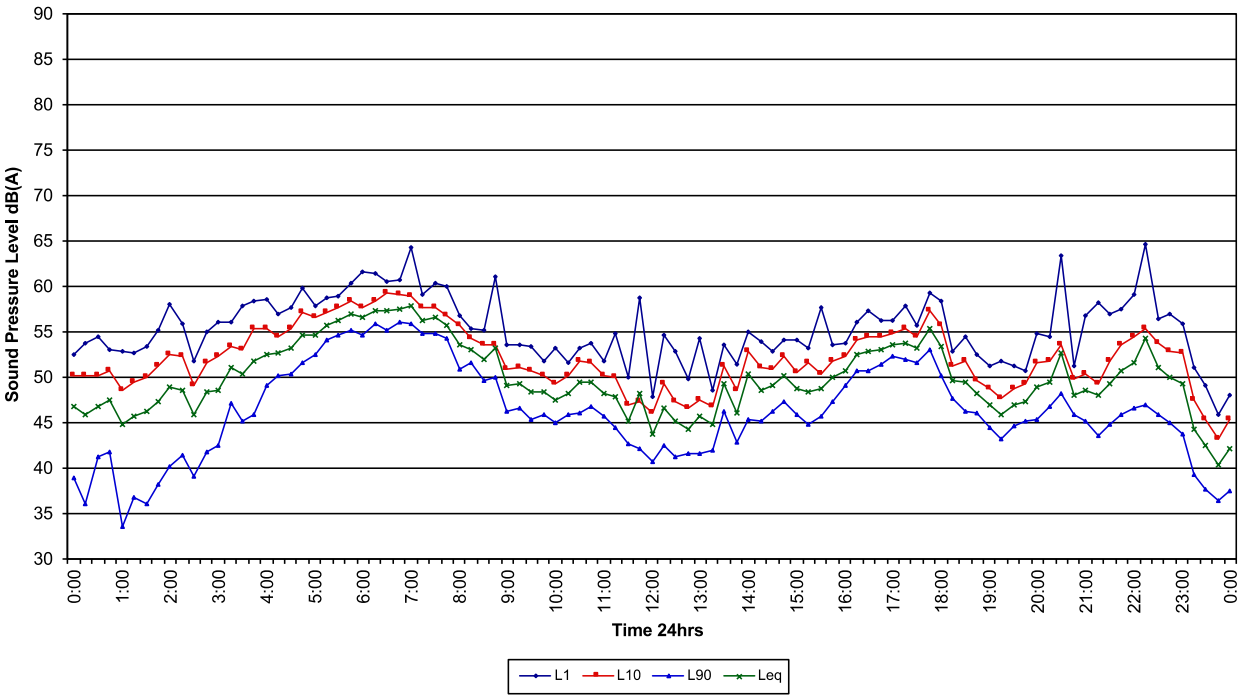

Ambient Traffic Logger
Orchard Hills North Subdivision
Sunday 11/6/2023
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00
Time 24hrs
L1 L10 L90 Leq


Ambient Traffic Logger
Orchard Hills North Subdivision
Monday 12/6/2023
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00
Time 24hrs
L1 L10 L90 Leq

Ambient Traffic Logger

Orchard Hills North Subdivision

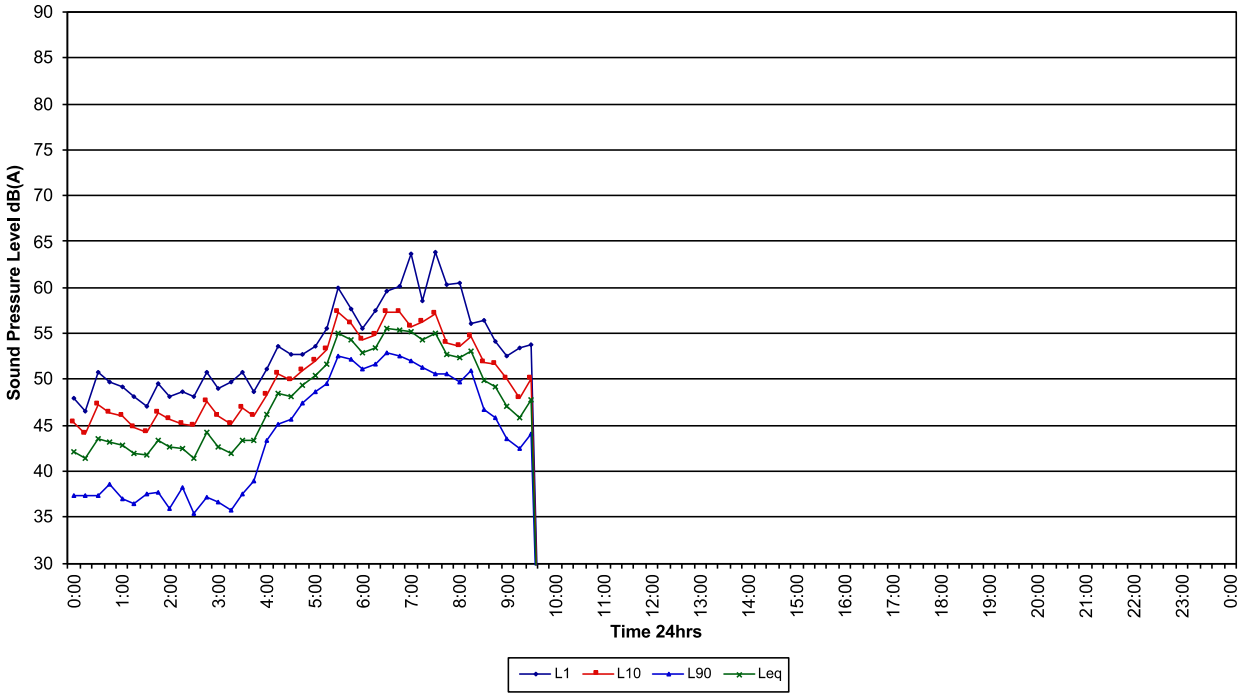
Tuesday 13/6/2023



Ambient Traffic Logger

Orchard Hills North Subdivision

Wednesday 14/6/2023



Appendix C Calibration Certificates

Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2013

Calibration Certificate
Calibration Number C22452

Client Details	Rodney Stevens Acoustics Pty Ltd 1 Majura Close St Ives Chase NSW 2075
Equipment Tested/ Model Number :	Rion NL-42AEX
Instrument Serial Number :	00422910
Microphone Serial Number :	197441
Pre-amplifier Serial Number :	25847

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	23.2°C	**Ambient Temperature :**	23.8°C
Relative Humidity :	55.7%	**Relative Humidity :**	53.8%
Barometric Pressure :	100.05kPa	**Barometric Pressure :**	100.04kPa

Calibration Technician :	Lucky Jaiswal	**Secondary Check:**	Shaheen Boaz
Calibration Date :	7 Jul 2022	**Report Issue Date :**	11 Jul 2022

Approved Signatory : Juan Aguero

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*N/A*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13dB*	*Temperature*	*±0.1°C*
1kHz	*±0.13dB*	*Relative Humidity*	*±1.9%*
8kHz	*±0.14dB*	*Barometric Pressure*	*±0.014kPa*
Electrical Tests	*±0.13dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

PAGE 1 OF 1

Acoustic Research Labs Pty Ltd
Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C22450

Client Details	Rodney Stevens Acoustics Pty Ltd 1 Majura Close St Ives Chase NSW 2075
Equipment Tested/ Model Number :	Rion NL-42AEX
Instrument Serial Number :	00422904
Microphone Serial Number :	197434
Pre-amplifier Serial Number :	25841

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	25.1°C	**Ambient Temperature :**	25.1°C
Relative Humidity :	51.9%	**Relative Humidity :**	51%
Barometric Pressure :	100.8kPa	**Barometric Pressure :**	100.94kPa

Calibration Technician : Lucky Jaiswal
Secondary Check: Shaheen Boaz
Calibration Date : 5 Jul 2022
Report Issue Date : 11 Jul 2022

Approved Signatory : Juan Aguero

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*N/A*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
125Hz	*±0.13dB*	*Temperature*	*±0.1°C*
1kHz	*±0.13dB*	*Relative Humidity*	*±1.9%*
8kHz	*±0.14dB*	*Barometric Pressure*	*±0.014kPa*
Electrical Tests	*±0.13dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

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Accredited for compliance with ISO/IEC 17025 - Calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.

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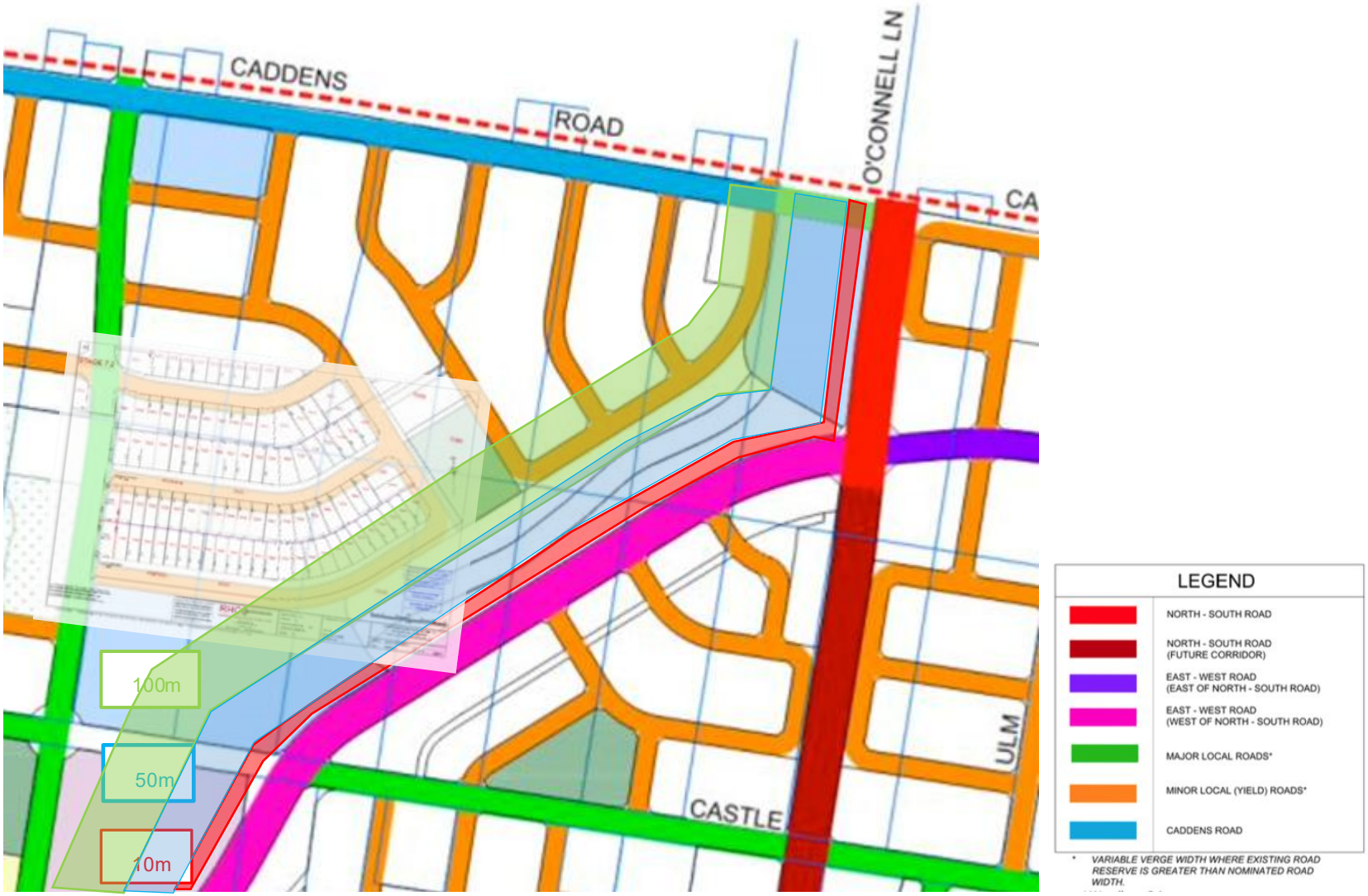
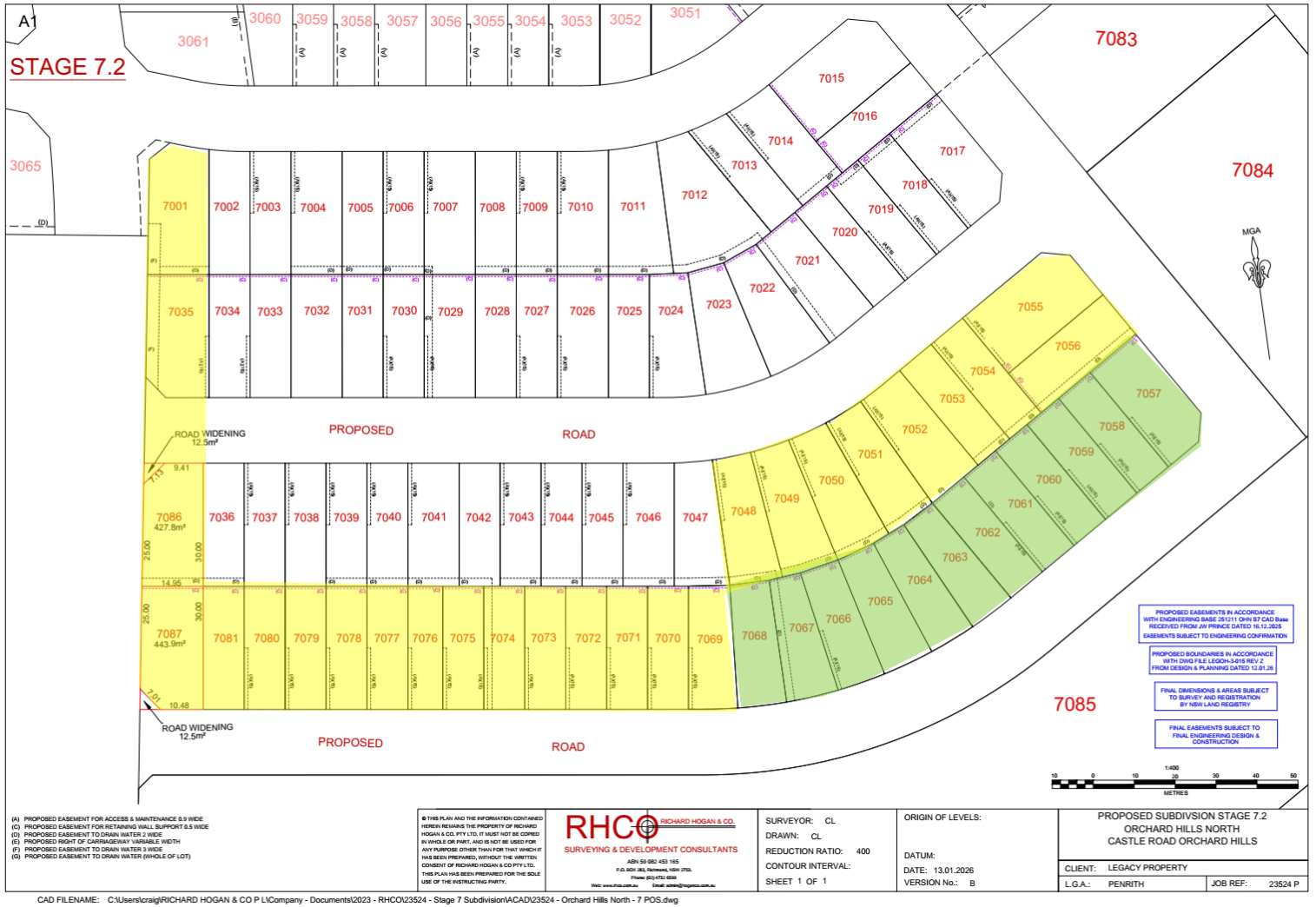
Appendix D Orchard Hills Road Hierarchy Plan - Site Context



Appendix E Acoustic Treatment Layout

Stage 7 Glazing Layout (GREEN & YELLOW) See Section 5.3.1



Appendix F Orchard Hills Road Hierarchy Plan

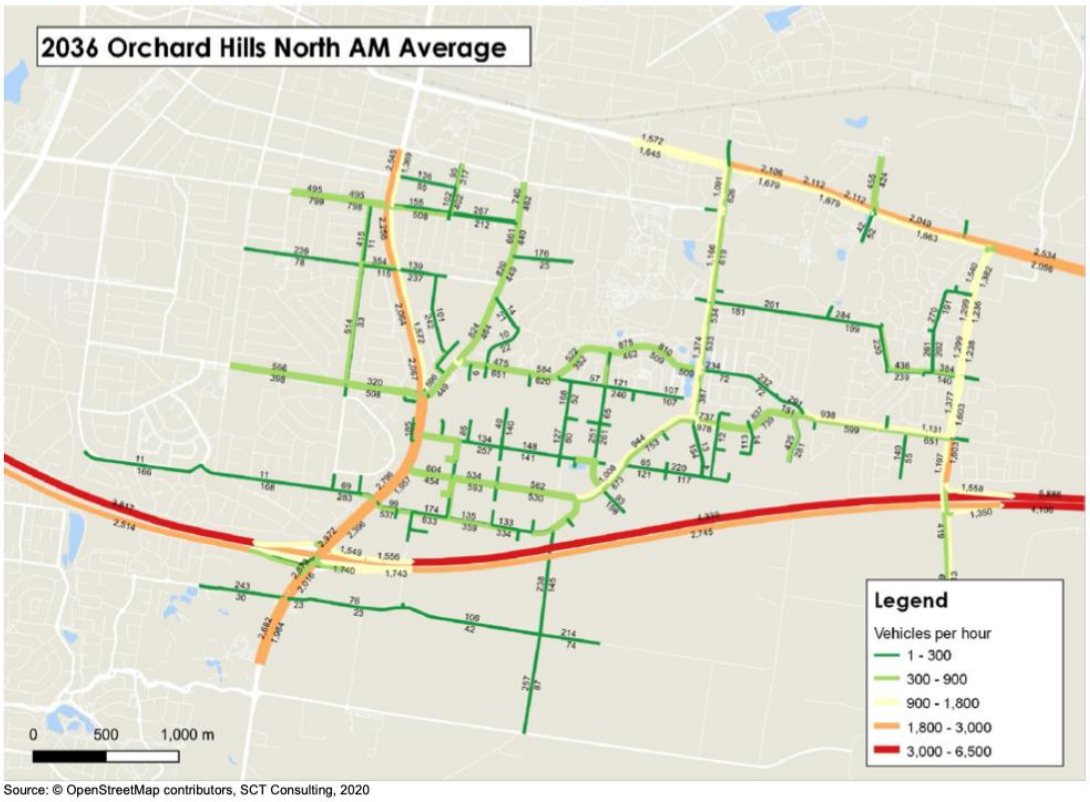
LEGEND	
	NORTH - SOUTH ROAD
	NORTH - SOUTH ROAD (FUTURE CORRIDOR)
	EAST - WEST ROAD (EAST OF NORTH - SOUTH ROAD)
	EAST - WEST ROAD (WEST OF NORTH - SOUTH ROAD)
	MAJOR LOCAL ROADS*
	MINOR LOCAL (YIELD) ROADS*
	CADDENS ROAD

* *VARIABLE VERGE WIDTH WHERE EXISTING ROAD RESERVE IS GREATER THAN NOMINATED ROAD WIDTH.*

Source: J Wyndham Prince

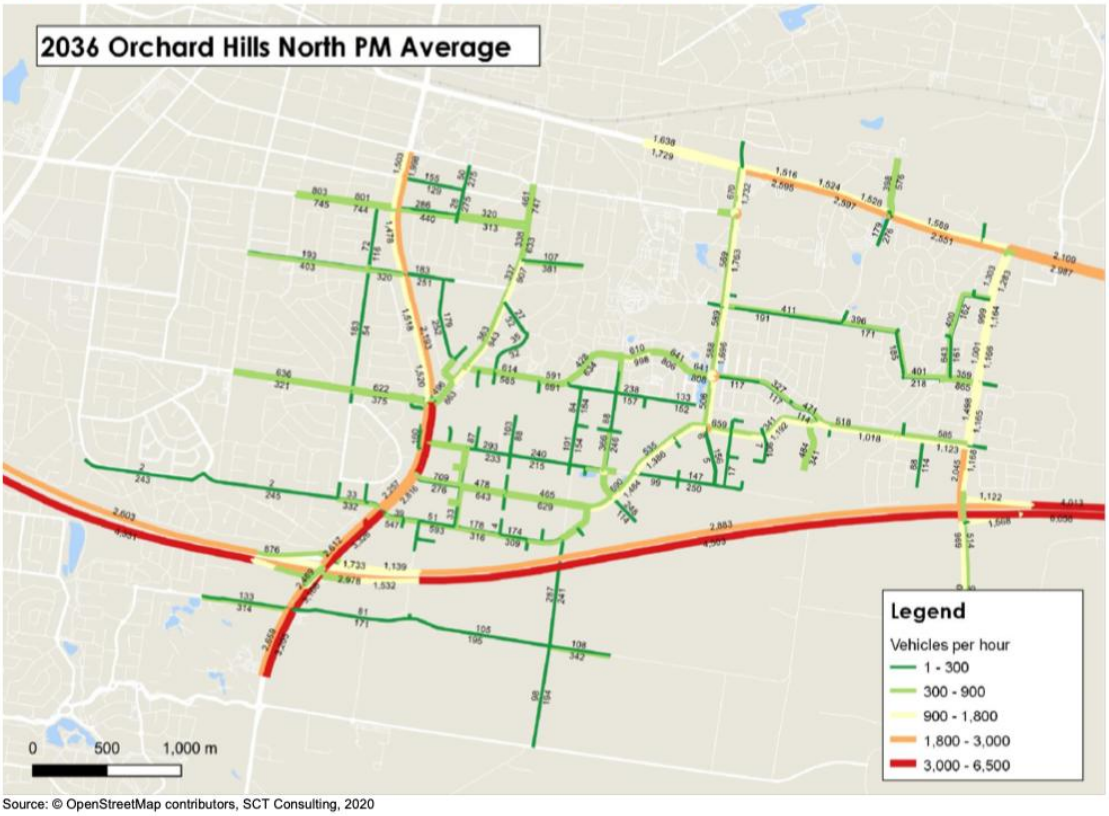
Appendix G Orchard Hills North precinct 1 & 2 AM/PM Average

Figure 5-5 2036 Orchard Hills North Precinct (Precincts 1 & 2), AM Peak period hourly average



Source: © OpenStreetMap contributors, SCT Consulting, 2020

Figure 5-6 2036 Orchard Hills North Precinct (Precincts 1 & 2), PM Peak period hourly average



Source: © OpenStreetMap contributors, SCT Consulting, 2020