



Warrell Creek to Nambucca Heads Pacific Highway upgrade

Post-construction operational noise report

Transport for NSW | July 2020

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Executive Summary

The Warrell Creek to Nambucca Heads (WC2NH) project is Stage 2 of the Warrell Creek to Urunga upgrade project. The upgrade comprises 19.6 kilometres of new dual carriageway on the Pacific Highway between the northern end of the existing Allgomera deviation south of Warrell Creek and the southern end of the Nambucca Heads to Urunga Pacific Highway upgrade project west of Nambucca Heads.

Key features of the WC2NH project include new grade-separated interchanges at Browns Crossing Road, Warrell Creek and Bald Hill Road, South Macksville as well as major bridges across the Nambucca River and Warrell Creek. Construction of the project started in February 2015, and it was fully opened to traffic in June 2018, with highway traffic speed increased to 110km/h in May 2019.

During the detailed design phase of the project, predictive noise modelling was carried out to determine the likely road traffic noise levels expected from the project. The results of the noise modelling for the WC2NH project were detailed in the Operational Noise Management Report (ONMR) (ref. WC2NH-DD00-EN02-RPT-0001, dated October 2017).

Transport for NSW (TfNSW) has engaged Renzo Tonin & Associates (Renzo Tonin) to carry out a post construction operational noise assessment of the WC2NH project, which is covered in this report.

Noise Criteria

The operational noise requirements for the WC2NH project were developed in accordance with the Minister's Conditions of Approval, the Environment Protection Authority's (EPA's) 'Environmental Criteria for Road Traffic Noise' (ECRTN) and Transport for NSW's 'Environmental Noise Management Manual' (ENMM).

Noise Monitoring

Long-term unattended noise monitoring was carried out at 21 locations and short term attended noise measurements were carried out at an additional 11 locations through consultation with TfNSW and the community, to represent noise sensitive areas further removed from the project. The results of the noise monitoring have been processed in accordance with the procedures contained in the ECRTN and ENMM and are presented within the body of this report.

Noise Modelling and Mitigation Review

Road traffic noise levels for the WC2NH project were calculated based on the Calculation of Road Traffic Noise (CoRTN) prediction algorithms using the 'As Built' noise model and design traffic volumes provided by TfNSW. Scenarios modelled for the post construction noise assessment include the 'Year of Opening' (2018) and 'Design Year' (2028) for both day and night-time periods. Post construction road traffic noise levels modelled were compared against the previously determined noise levels contained in the ONMR.

Conclusion

TfNSW has offered noise mitigation to 153 properties. A comparison of the post construction modelled traffic noise levels against the previously determined traffic noise levels presented in the ONMR found differences of less than +2dB(A). This result confirmed all properties treated have the appropriate level of mitigation and no additional noise mitigation treatment is required to these properties in accordance with the ENMM. The assessment identified four (4) dwellings that will be considered for mitigation treatment, in addition to those identified in the Environmental Assessment (EA) and ONMR.

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1 Introduction

1.1 Project Description

The Warrell Creek to Urunga section of the Pacific Highway upgrade received project approval in July 2011. The 42 kilometre upgrade was built in two stages – Nambucca Heads to Urunga and Warrell Creek to Nambucca Heads. The Warrell Creek to Nambucca Heads (WC2NH) project is Stage 2 of the Warrell Creek to Urunga upgrade project and comprises 19.6 kilometres of new dual carriageway road on the Pacific Highway between the northern end of the existing Allgomera Deviation south of Warrell Creek and the southern end of the Nambucca Heads to Urunga Pacific Highway upgrade project west of Nambucca Heads.

Key features of the WC2NH project include new grade-separated interchanges at Warrell Creek at Browns Crossing Road and South Macksville at Bald Hill Road as well as major bridges across the Nambucca River and Warrell Creek. Construction of the project started in February 2015, and it was fully opened to traffic June 2018, with highway traffic speed increased to 110km/h in May 2019.

Figure 1 and Figure 2 illustrates the site, surrounds and project area for the southern and northern sections of the project, respectively.

Figure 1 – Site, Surrounds and Project Area (South)

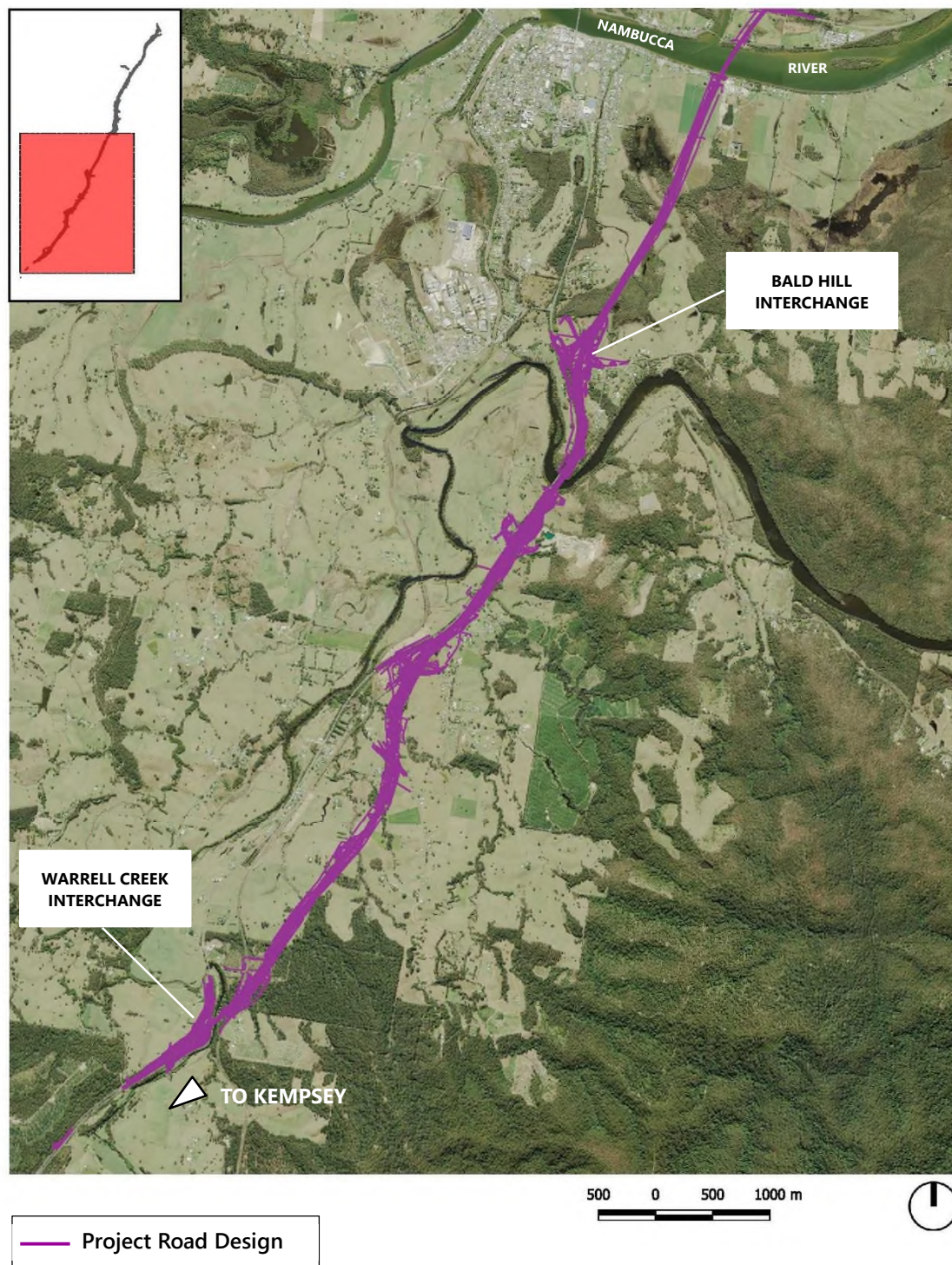
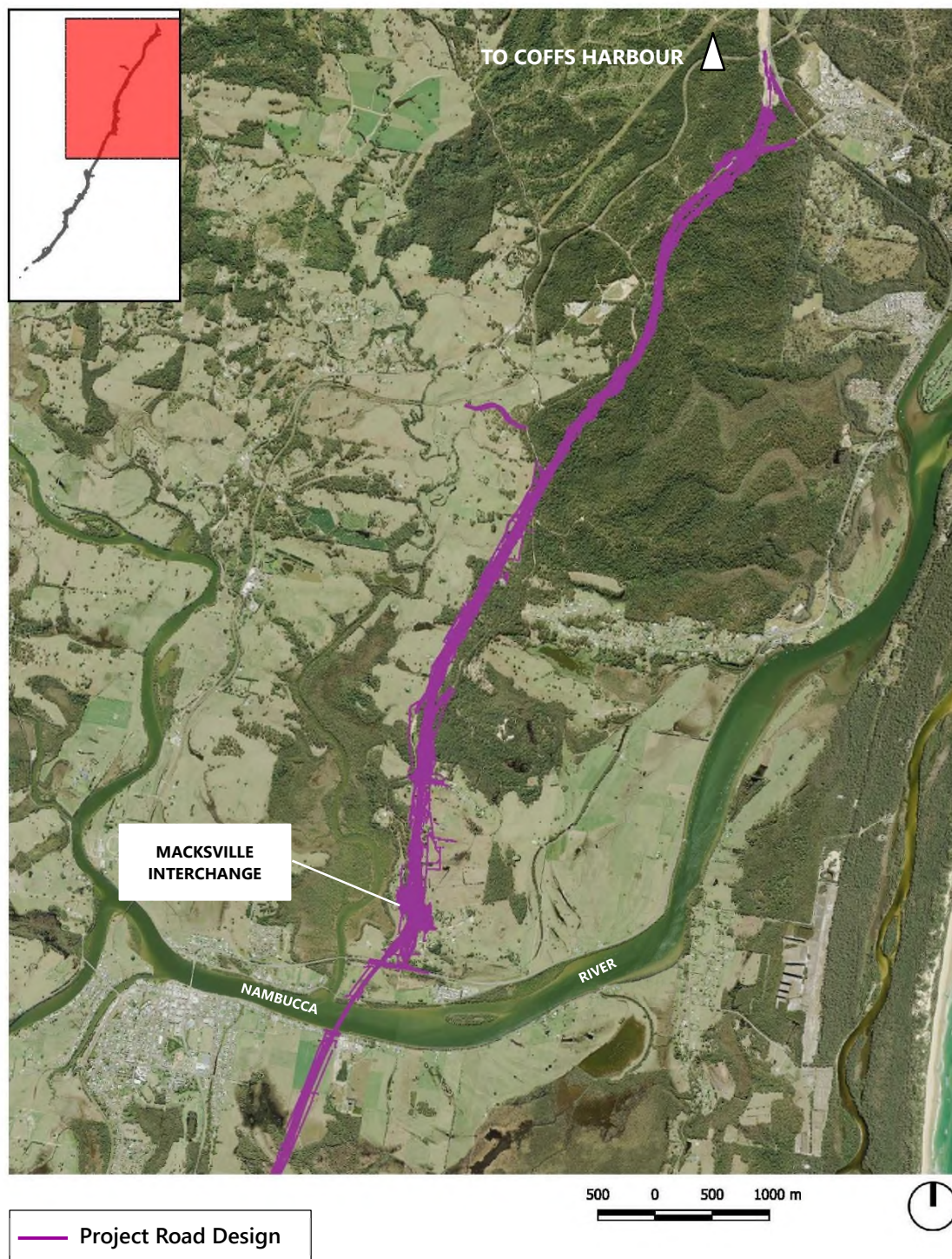


Figure 2 – Site, Surrounds and Project Area (North)



1.2 Purpose and Objectives

The purpose of this report is to review traffic noise levels from the WC2NH Pacific Highway upgrade and compare them against the predicted noise levels at the detailed design stage to assess the adequacy of the recommended and installed road traffic noise mitigation measures. This report also fulfils the requirements of Condition E1 of the Ministers Conditions of Approval (MCoA) for the project (refer to Section 2).

1.3 Process for Assessment

The post construction noise assessment process used in this report is summarised as follows:

1. Measurement of traffic noise at representative noise sensitive receivers along the project. This included long-term unattended noise monitoring at 21 noise-sensitive locations as well as short-term attended noise measurements at the same locations, simultaneously with traffic counting surveys along the project
2. The noise model developed during the detailed design used to predict traffic noise impacts due to the project was updated with the 'As Built' road design and validated
3. Evaluation of compliance against the ECRTN
4. Evaluation of the mitigation measures determined during detailed design stage in accordance with the ENMM.

Where operational traffic noise levels are found to be greater than the traffic noise levels modelled from the design noise model by more than 2dB(A), then the following steps are carried out:

1. An examination of the prediction methodology
2. A review of the suitability and adequacy of the installed noise mitigation measures
3. An assessment of additional feasible and reasonable mitigation measures at those locations.

In addition to the above, a study of engine brake noise from heavy vehicles was also carried out. The purpose of the study is to get an understanding of the frequency of occurrences and characteristics of engine brake noise at strategic locations along the project.

The ENMM requires the assessment and measurement of road traffic noise before and after opening the project and the prediction of traffic noise levels 10 years after opening. The ONMR was prepared using an opening year of 2016 and a design year of 2026 (ie. 10 years after opening). Given that the project opened in 2018, the prediction model has been revised to reflect the traffic volumes and traffic speeds in 2018 and 2028 for the upgraded highway.

The primary objectives of this Operational Noise Report (ONR) are to:

- Present the results and outcomes of operational noise monitoring in accordance with MCoA E1, and the post construction noise monitoring requirements set out in Practice Note viii of the ENMM
- Compare 'as-built' noise results against noise level outputs from the detailed design noise model used to review and design the noise mitigation measures required by MCoA C12 and documents specified under MCoA A1
- Identify areas of exceedance and non-conformance where additional feasible and reasonable noise mitigation measures may be warranted.

The assessment has been carried out with reference to the following documents:

- Condition E1 of the Ministers Conditions of Approval (MCoA) (DP&I, 2011)
- Environmental Criteria for Road Traffic Noise (ECRTN) (NSW EPA, May 1999)
- Environmental Noise Management Manual (ENMM) (RTA 2001)
- NSW Industrial Noise Policy (INP) NSW EPA (ex DECCW, 2000)
- Transport for NSW Procedure – Preparing a Post Construction Noise Assessment Report (Roads and Maritime, June 2014)
- Australian Standard AS 2702 - Acoustic Methods of Measurement of Road Traffic Noise
- Noise Model Validation Guideline, Roads and Maritime, 2016
- Pacific Highway upgrade – Warrell Creek to Nambucca Heads - Operational Noise Modelling and Assessment, Renzo Tonin & Associates, March 2015
- Pacific Highway upgrade – Warrell Creek to Nambucca Heads Detail Design – Acoustics Operational Noise Management Report, Arup Aurecon Design Joint Venture, March 2018
- Warrell Creek to Urunga, Upgrading the Pacific Highway – Working Paper 3 - Noise and Vibration Impact Assessment, Sinclair Knight Merz, January 2010
- Appendix 4 of the Transport for NSW Scope of Work and Technical Criteria (SWTC).

Reference documents relevant to the study and monitoring of engine brake noise from heavy vehicles include:

- Engine Brake Noise – Final Proposal and Regulatory Impact Statement, National Transport Commission, August 2007
- National In-Service Test Procedures for Engine Brake Noise From Heavy Vehicles, National Transport Commission, August 2007

- Review of the National In-Service Standard for Engine Brake Noise, National Transport Commission, May 2013.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001. Appendix A contains a glossary of acoustic terms used in this report.

2 Environmental and Legal Obligations

2.1 Minister's Conditions of Approval

Table 2.1 summarises the Minister's Conditions of Approval (MCoA) that require consideration during preparation of this ONR. The conditions of approval listed below are those issued by the Minister for Planning in July 2011 with a reference to where each condition is addressed in this report.

Table 2.1 – Minister's Conditions of Approval

MCoA No.	MCoA Details	Reference in this document
E1.	Within 12 months of the commencement of operation of the project, or as otherwise agreed by the Director General, the Proponent shall undertake operational noise monitoring to compare actual noise performance of the project against noise performance predicted in the review of noise mitigation measures required by condition C12 and prepare an Operational Noise Report to document this monitoring. The Report shall include, but not necessarily be limited to:	This document
a)	noise monitoring to assess compliance with the operational noise levels predicted in the review of operational noise mitigation measures required under condition C12 and documents specified under condition A1 of this approval;	Section 4
b)	a review of the operational noise levels in terms of criteria and noise goals established in the <i>Environmental Criteria for Road Traffic Noise</i> (EPA, 1999);	Section 2.2
c)	methodology, location and frequency of noise monitoring undertaken, including monitoring sites at which project noise levels are ascertained, with specific reference to locations indicative of impacts on sensitive receivers;	Section 4
d)	details of any complaints and enquiries received in relation to operational noise generated by the project between the date of commencement of operation and the date the report was prepared;	Appendix E
e)	any required recalibrations of the noise model taking into consideration factors such as actual traffic numbers and proportions;	Section 7
f)	an assessment of the performance and effectiveness of applied noise mitigation measures together with a review and if necessary, reassessment of all feasible and reasonable mitigation measures; and	Section 7
g)	identification of any additional feasible and reasonable measures to those identified in the review of noise mitigation measures required by condition C12, that would be implemented with the objective of meeting the criteria outlined in the <i>Environmental Criteria for Road Traffic Noise</i> (EPA, 1999), when these measures would be implemented and how their effectiveness would be measured and reported to the Director General and the EPA.	Section 7
	The Proponent shall provide the Director General and the EPA with a copy of the Operational Noise Report within 60 days of completing the operational noise monitoring referred to a) above and no later than 12 months after the date of the commencement of operation, or as otherwise agreed by the Director General.	This document

2.2 Project Noise Level Objectives

During the design stage, noise level objectives for this project were established as per the ECRTN and the ENMM, in accordance with the requirements of MCoA C12. Other relevant environmental documents for the project (outlined in Section 1.3) were also considered during the development of the operational noise mitigation measures.

The ECRTN defines a highway development as either a “new freeway or arterial road” or a “redevelopment of an existing freeway / arterial road”. Table 2.2 presents the road traffic noise criteria for existing residential land use developments affected by traffic noise from new and redeveloped freeways / arterial roads.

Table 2.2 – Noise Criteria for Residential Receivers

Type of Development	Noise Criteria, dB(A)		Where Criteria are Already Exceeded
	Day	Night	
New freeway or arterial road corridor	$L_{Aeq(15hr)}$ 55	$L_{Aeq(9hr)}$ 50	The new road should be designed so as not to increase existing noise levels by more than 0.5dB.
Redevelopment of existing freeway/ arterial road	$L_{Aeq(15hr)}$ 60	$L_{Aeq(9hr)}$ 55	In all cases, the redevelopment should be designed so as not to increase existing noise levels by more than 2dB.

(Source: NSW ECRTN)

2.3 Environmental Noise Management Manual (ENMM)

The ENMM was published to provide guidance in managing and controlling road traffic generated noise and assist in implementing the ECRTN.

The ENMM discusses what is deemed to be “feasible and reasonable” in terms of additional noise mitigation where the ECRTN base criteria are exceeded and all “feasible and reasonable” traffic management and other road design opportunities have been exhausted. This includes quieter pavement surfaces, noise barriers and at-property noise mitigation treatment of impacted noise sensitive receivers.

The ENMM states that it is generally not reasonable to mitigate traffic noise levels to the target noise levels of the ECRTN if the traffic noise levels with the project, ten years after project opening, are predicted to be:

- Within 2dB(A) of the ‘future existing’ traffic noise levels
- Not acute; ie. the traffic noise levels are predicted to be less than $L_{Aeq(15hr)}$ 65dB(A) and/or $L_{Aeq(9hr)}$ 60dB(A).

Future existing noise levels refer to the traffic noise levels at the ‘Year of Opening’ without the project implemented. In this instance it refers to traffic noise levels in the year 2018 assuming the WC2NH project was not constructed.

As discussed previously, the ONMR was based on the opening year of 2016 and therefore, the future existing noise levels presented in the ONMR were based on 2016 traffic data. In order to determine the future existing noise levels for the actual opening year of 2018, the modelled 2016 future existing noise levels have been updated to account for the minor increase in traffic volumes from 2016 to 2018, assuming the WC2NH project was not constructed.

2.4 Classification of the WC2NH project

The project was assessed using the ENMM and ECRTN to determine the appropriate criteria to apply for each receiver based on the classification of the upgraded highway near each receiver. This would be either a 'new freeway/arterial road corridor', or a 'redevelopment of existing freeway/arterial road'. The classifications developed in the SWTC have been adopted for this assessment to ensure consistency with the previous assessments.

The ENMM defines a 'new road traffic noise source' as being:

- A new road where a road of the same category (ie. arterial, collector or local road) did not previously exist
- A new road within an existing but previously undeveloped road corridor or an alignment or realignment producing noise at a receptor from a different direction which makes a significant contribution to the total traffic noise exposure (ie. >2dB(A) contribution).

To determine whether the traffic noise contribution from the direction of the project is 'significant', the road traffic noise contribution of the existing alignment (after any road redevelopment or upgrade on this alignment) is subtracted from the combined total traffic noise exposure to determine the contribution from the direction of the project. If the traffic noise from the direction of the project is determined to produce a 'significant' contribution [ie. >2dB(A)], then the new alignment or realignment is considered to be a new road traffic noise source.

In accordance with the EPA guidelines, the project is considered to be:

- "Redevelopment of an existing arterial road" where the route follows the alignment of the existing (old) Pacific Highway
- "New arterial road corridor" where the Macksville and Nambucca bypass alignment differs substantially from the existing (old) Pacific Highway alignment.

Accordingly, the receiver classifications adopted for the project are as follows:

- Redevelopment of existing freeway / arterial road receivers:
 - First 600 metres section of the southern extent of the project, which is a road redevelopment
 - Section of the project between Albert Drive overpass and the Bald Hill Road Interchange, which is a road redevelopment
 - Other sections of the project which are new road sections, but receivers were already exposed to traffic noise from the (old) Pacific Highway from the same direction as the project.

- New freeway / arterial road corridor receivers:
 - Other sections of the project which are new road sections, and receivers were not exposed to traffic noise from the (old) Pacific Highway and/or the project contributes significantly to the future noise exposure from a different direction to the (old) Pacific Highway.

In addition to the above, where the predicted design year noise levels at receivers are equal to or greater than 65dB(A) Day and 60dB(A) Night as a result of the project, then the noise exposure is considered to be 'acute' and noise control measures were considered.

To establish the most reasonable and feasible noise mitigation treatment in areas affected by significant traffic noise levels, reference is made to Practice Note iv of the ENMM.

2.5 Engine Brake Noise Study

For the study of engine brake noise from heavy vehicles, reference is made to a report prepared by the National Transport Commission (NTC), titled 'Engine Brake Noise – Final Proposal and Regulatory Impact Statement', dated August 2007. The report recommends the use of Modulated Root Mean Square (MRMS) as the relevant noise descriptor to describe the pulsing effect of the noise from engine braking, which was determined to be the primary cause of community annoyance.

Furthermore, the NTC report states the following:

"The NTC recommends an in-service standard with a modulated Root Mean Square of three that takes into account community annoyance and best practice muffler performance."

Therefore, as recommended by the NTC a MRMS value of 3.0 is used to assess engine brake noise from heavy vehicles. Engine brake noise which results in values above 3.0 are considered to be either 'very much' annoying or 'extremely' annoying, as concluded from a community panel study presented in the report.

Although the NTC has recommended a MRMS value of 3.0, for the study conducted as part of this ONR a MRMS value of 2.5 has been set for a conservative assessment of engine brake noise.

2.6 Nambucca Rest Stop

The ECRTN primarily provides requirements for the assessment of noise from continually flowing traffic and is not relevant to the assessment of noise impacts from the operation of the Nambucca Rest Stop.

The 'Industrial Noise Policy' (INP) is relevant when assessing noise emissions from the Nambucca Rest Stop. The noise is assessed as if it were an 'industrial' noise source. The INP establishes the 'intrusiveness criterion' to limit the permissible level of noise from the operation of an industrial premises to no more than 5dB(A) above the background noise level when measured over a 15-minute period ($L_{Aeq,15 \text{ min}}$) at a residential receiver.

From 'Working Paper 3 – Noise and Vibration Impact Assessment', dated 8 January 2010 prepared for the Warrell Creek to Urunga Pacific Highway upgrade Environmental Assessment (EA), the established noise criteria for the Nambucca Rest Stop was based on the definition of a non-intrusive noise impact as defined by the INP. The noise goal for the operation of the rest area at the nearest residential receiver is a $L_{Aeq,(15min)}$ noise level that does not exceed the Rating Background Level (RBL) by more than 5dB(A). Section 3.1.3 of the Working Paper 3 report states that the RBL during the quietest period (night) was measured to be 44dB(A), which corresponds to a noise criterion of $L_{Aeq,(15min)}$ **49dB(A)** for the nearest receivers.

3 Project Noise Mitigation Measures

There have been a number of methods used on the project to mitigate traffic noise. The following summarises the suite of noise mitigation measures implemented on the project to reduce noise impacts to receivers:

- Road alignment design
- Low-noise pavement surfaces
- Noise barriers (mounds and walls)
- At-property noise control treatments.

3.1 Road Design Features

Road design features of the project which assist in reducing traffic noise impacts include:

- Various cuttings which shield the road from residences
- Locations where the alignment and gradient of the road is lowered compared with the environmental impact statement and the reference design, which resulted in reduced noise levels at these locations.

3.2 Low-Noise Pavements

The road surfaces used on the WC2NH project include Plain Concrete Pavement (PCP) and 30mm Stone Mastic Asphalt (SMA). SMA was used for the following chainages, and structures.

- Chainage 41800 to 54850
- All bridge decks.

The main carriageway on the northern end of the project, from approximately 300 metres north of the Mattick Road overpass, has a concrete pavement.

Local and service roads were finished with Dense Graded Asphalt (DGA).

3.3 Noise Barriers

Noise barriers are most feasible where residences are closely grouped, where the barriers do not cause access difficulties to properties, and where they are visually acceptable. To derive the most appropriate height for noise barriers, a detailed feasibility analysis of the noise barriers was completed during the design phase in accordance with Practice Note iv of the ENMM. Noise barriers were designed to meet the requirements of the ECRTN during the design phase of the project.

In summary, noise barriers have been constructed in accordance with the requirements of the ECRTN and the ENMM. The ONMR presents the schedule of the noise barriers that were designed for the project and these range from 4.0 metres to 4.5 metres in height.

3.4 At-Property Noise Control Treatment

The ONMR recommends the most "feasible" and "reasonable" mitigation, as defined within the ENMM, in the form of at-property treatments be considered for affected residences.

The level of treatment offered depends on the level of the exceedance. The treatment options detailed in Table 3.1 are to be used by TfNSW as a general guideline when scoping the acoustic treatments for each property.

Table 3.1 – At-Property Treatment Guide

Treatment type	Predicted noise exceedance above the acceptable noise criteria, dB(A)	Acoustic treatments to be considered
1	< 10dB(A) reduction	Air conditioning with fresh air mechanical ventilation or upgrade doors and windows, acoustic seals and acoustic treatment of wall vents to the most-impacted facade(s) and mechanical ventilation.
2	> 10dB(A) reduction	Air conditioning with fresh air mechanical ventilation plus upgraded doors and windows, acoustic seals, and acoustic treatment of wall vents to all impacted facades where significant benefits can be demonstrated.

Each residence which requires acoustic treatment needs to be considered on a case by case basis to determine the type of treatment applicable. The available options need to be tailored with consideration to the following:

- The magnitude of the traffic noise at the residence
- The type and condition of the property to be treated
- The orientation of the dwelling to the noise source
- The internal room layout
- Specific requirements of the resident.

Following the noise modelling process undertaken during the detailed design phase of the Project and presented in the ONMR, a total of 153 properties were identified for at-property treatment in addition to at-road noise mitigation measures described above. All 153 properties were identified during the environmental assessment stage of the project.

4 Noise Monitoring

4.1 Noise Monitoring Methodology

Noise monitoring was conducted in accordance with:

- Australian Standard 2702-1984 "Acoustic Methods of Measurement of Road Traffic Noise"
- ECRTN Appendix C4 'Noise monitoring procedures'
- ENMM Appendix E 'Model consultant brief for post construction road traffic noise monitoring'
- NTC 'National In-Service Test Procedures for Engine Brake Noise from Heavy Vehicles' (January 2007).

4.1.1 Long-Term Noise Monitoring

All long-term (unattended) noise monitoring was conducted using Renzo Tonin & Associates' noise monitors. The noise monitoring equipment complies with IEC 61672 (parts 1-3) "*Electroacoustics - Sound Level Meters*" and are designated as Type 1 instruments suitable for laboratory and field use.

A noise monitor consists of a sound level meter in a weather resistant enclosure. Ambient noise levels are recorded at a rate as low as a few milliseconds per sample. Every 15 minutes, the data is processed statistically and stored in memory.

A noise monitor was installed at each nominated monitoring location and generally the noise monitor was located in the 'free-field' (ie. a minimum 3.5m away from any facade) and at a height of 1.5m above the ground level for a minimum of seven (7) valid days in accordance with the ENMM. A +2.5dB(A) facade correction was applied to the measured noise levels to convert the free-field measurements to equivalent measurements at 1m from the relevant building facade.

4.1.2 Short-Term Noise Monitoring

During the setup of the noise monitors, 15 minute short-term attended noise monitoring during the day and night periods was undertaken at each long-term monitoring location to aid in qualifying the characteristic of the ambient noise environment at the long-term monitoring locations.

For multi-storey dwellings, long-term (unattended) noise monitoring was conducted at the most accessible floor of the dwelling and additional short-term (attended) noise monitoring was conducted at a height of 1.5m above the corresponding floor level. Short-term monitoring was conducted concurrently with the long-term noise monitoring, using a Type 1 sound level meter [complying with IEC 61672 (parts 1-3) "*Electroacoustics - Sound Level Meters*"] during the deployment and / or the collection of the long-term noise monitor.

The measured short-term results were compared to the concurrent results of the corresponding long-term monitor to determine a correlation between the two measurement locations. This procedure is used to establish the equivalent traffic noise levels over the long-term monitoring period at the short-term monitoring location.

To illustrate this procedure, assume the following example:

Say a traffic noise level of 55dB(A) was measured during the day at the short-term location (Location A) and over exactly the same short-term period a traffic noise level of 52dB(A) was measured at the long-term location (Location B), where the traffic stream passing both locations is the same and is audible. That means that traffic noise levels at Location A are generally 3dB(A) louder than at Location B during the day. If this traffic noise level difference between the two locations is repeatable and found to be reasonably consistent throughout different periods in the day, then if at Location B a daytime traffic noise level of 57dB(A) was measured over a 7 day period, this means that at Location A daytime traffic noise levels would be expected to be 60dB(A). A similar process can be followed for night-time traffic noise levels.

Short-term (attended) noise monitoring was also conducted at selected residences where no long-term noise monitoring was conducted. These additional short-term monitoring locations were selected through consultation with TfNSW and the community and were chosen to represent noise sensitive areas further removed from the project.

4.1.3 Engine Brake Noise Monitoring

Engine brake noise levels from the Project were monitored continuously throughout the monitoring periods using ARL Ngara Real Time Sound Acquisition Systems which comply with IEC 61672 (parts 1-3) "Electroacoustics - Sound Level Meters" and are designated as Type 1 instruments suitable for laboratory and field use.

Engine brake noise levels were monitored at four (4) strategic locations where heavy vehicles are likely to engage engine braking.

4.1.4 Nambucca Rest Stop Noise Monitoring

Short-term attended noise monitoring was conducted during the night time period from 11pm to 12am on 21st May 2019 at the two (2) receiver locations nearest to the Nambucca Rest Stop.

4.1.5 Noise Monitors

All acoustic instrumentation used for the operational noise monitoring is designed to comply with the requirements of IEC 61672 (parts 1-3) "Electroacoustics - Sound Level Meters" and carries appropriate and current NATA (or manufacturer) calibration certificates.

4.1.6 Meteorology During Monitoring

Measurements affected by extraneous noise, wind (greater than 5m/s at the microphone) or rain were excluded from the recorded data.

Meteorological data was obtained from two (2) weather stations (Davis Instruments – Vantage Vue, Model no. 6357) installed and located at various locations along the Project during the two stages of long-term (unattended) noise monitoring. The measurements of meteorological data allowed for greater accuracy in checking weather conditions closer to the noise monitoring sites and more representative of heights similar to microphone heights above the ground level. During the noise monitoring there was a large amount of wet and windy weather and as a result the monitoring period was extended over a suitable length to obtain a minimum of seven (7) valid days in order to obtain valid data for each day of the week at all monitoring locations.

It is noted that analysis of noise enhancing or noise diminishing meteorological conditions from winds and temperature inversions do not form part of the requirements of the ECRTN and ENMM.

Upon processing the noise monitoring data, any noise levels monitored during adverse weather conditions were excluded. Adverse weather conditions include:

- Rain – traffic noise during wet weather conditions are considered to be atypical and not modelled or designed for, so would not provide an accurate representation of the three main sources of traffic noise, being tyre, engine and exhaust noise which the project design aims to mitigate
- Wind – wind greater than 5m/s at the microphone of a noise monitor would create noise that only occurs because of the presence of the microphone and this noise would act to mask noise from traffic which is the subject and reason for the noise monitoring.

Further to the exclusion of noise data affected by adverse weather, noise data was further reviewed to also discard extraneous non-road traffic noise. Extraneous noise was determined based on the following considerations:

- Unusually high $L_{Aeq(15min)}$ noise peaks in comparison to adjacent periods and in comparison to noise levels during the same period on other similar days of the week
- Unusually high peaks across all noise metrics within the same periods and equivalent periods on other similar days of the week
- Short periods of anomalous traffic flow in comparison to adjacent periods and the same periods on other similar days of the week
- Fauna noise (eg. Insects, birds etc) affecting noise levels, in particular during the night-time periods
- Moderate winds potentially increasing flora noise (eg. Rustling leaves) and potentially influencing noise propagation

- Review of audio files to confirm the likely cause of identified extraneous noise events.

Once extraneous noise data was removed, days and nights with the least amount of excluded data were preferred over those with large amounts of data missing, in order to adopt valid daytime and night-time noise levels representing each of the 7 days of the week.

4.2 Noise Monitoring Locations

Where possible, the noise monitoring sites were selected to be the same as those monitored as part of the design phase of the Project and as presented in the ONMR and the Operational Noise Modelling Assessment report to allow direct comparisons to be made with noise monitoring locations selected prior to the Project's construction.

Where it was not possible to conduct noise monitoring at the previously monitored locations, noise monitors were setup at suitable alternative locations within close proximity to the originally selected locations.

Additional noise monitoring locations to those monitored as part of the design phase of the Project were selected to monitor noise levels at properties where concerns have been raised by the community with regard to traffic noise. This provides an opportunity for TfNSW to address specific areas of concern raised by the community.

Other site specific conditions also influenced the selection of final noise monitoring locations, including access availability to a site, consideration of localised extraneous noise sources (eg. air conditioners, pool plant, other equipment etc) and building features (eg. covered balconies, verandahs, pergolas, awnings etc), which could adversely affect noise measurements.

4.2.1 Long-Term Noise Monitoring Locations

The locations where long-term (unattended) operational noise monitoring was conducted are listed in Table 4.1 below and presented in the aerial maps in Appendix F.

Table 4.1 – Long-Term Operational Noise Monitoring Locations

Location No.	Monitoring Address	Description
L1	38 Kerr Drive, Macksville	Noise monitor located in the backyard facing the Pacific Highway and approximately 65m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway. There is a single storey dwelling at this address. This location was monitored as part of the design phase and presented in the ONMR.

Location No.	Monitoring Address	Description
L2	4201 Pacific Highway, Eungai Creek	<p>Noise monitor located in the front yard facing the Pacific Highway and approximately 16m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway. There is a single storey dwelling at this address.</p> <p>This location was monitored as part of the Operational Noise Modelling and Assessment.</p>
L3	40-56 Albert Drive, Donnellyville	<p>Noise monitor located in the backyard facing the Pacific Highway and approximately 75m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway and Albert Drive East. There is a single storey dwelling at this address.</p> <p>This location was monitored as part of the Operational Noise Modelling and Assessment.</p>
L4	11 Albert Drive, Donnellyville	<p>Noise monitor located in the backyard facing the Pacific Highway and approximately 40m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway. There is a single storey dwelling at this address.</p> <p>This location was monitored as part of the Operational Noise Modelling and Assessment.</p>
L5	4723 Pacific Highway, Donnellyville	<p>Noise monitor located in the front yard facing the Pacific Highway and approximately 79m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway and the old Pacific Highway. There is a single storey dwelling at this address.</p> <p>This location was monitored as part of the Operational Noise Modelling and Assessment.</p>
L6	4 Scotts Head Road, Way Way	<p>Noise monitor located in the front yard facing the Pacific Highway and approximately 70m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway and the old Pacific Highway. There is a single storey dwelling at this address.</p> <p>This location was monitored as part of the Operational Noise Modelling and Assessment.</p>
L7	58 Harrimans Lane, Macksville	<p>Noise monitor located in the front yard facing the Pacific Highway and approximately 85m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway and the old Pacific Highway. There is a double storey dwelling at this address.</p> <p>This location was monitored as part of the Operational Noise Modelling and Assessment.</p>
L8	22 Letitia Close, North Macksville	<p>Noise monitor located in the backyard facing the Pacific Highway and approximately 135m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway and Old Coast Road. There is a single storey dwelling at this address.</p> <p>This location is an alternative location within close proximity to the location monitored as part of the design phase and presented in the ONMR.</p>
L9	4227 Queens Lane, North Macksville	<p>Noise monitor located in the front yard facing the Pacific Highway and approximately 27m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway. There is a single storey dwelling at this address.</p>

Location No.	Monitoring Address	Description
L10	46 Rosewood Road, Warrell Creek	Noise monitor located in the front yard facing the Pacific Highway and approximately 76m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway. There is a single storey dwelling at this address.
L11	12 Kerr Drive, Macksville	Noise monitor located in the backyard facing the Pacific Highway and approximately 110m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway and Bald Hill Road. There is a double storey dwelling at this address.
L12	41 Bald Hill Road, Macksville	Noise monitor located in the front yard facing the Pacific Highway and approximately 17m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway. There is a single storey dwelling at this address.
L13	75 River Street, Macksville	Noise monitor located in the front yard facing the Pacific Highway and approximately 91m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway and River Street. There is a single storey dwelling at this address.
L14	69 River Street, Macksville (Front)	Noise monitor located in the front yard facing the Pacific Highway and approximately 210m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway and River Street. There is a single storey dwelling at this address.
L15	69 River Street, Macksville (Rear)	Noise monitor located in the backyard facing the Pacific Highway and approximately 210m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway and River Street. There is a single storey dwelling at this address.
L16	63 River Street, Macksville	Noise monitor located in the front yard facing the Pacific Highway and approximately 310m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway and River Street. There is a single storey dwelling at this address.
L17	35 Old Coast Road, North Macksville	Noise monitor located in the front yard facing the Pacific Highway and approximately 35m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway and old Pacific Highway. There is a single storey dwelling at this address.
L18	18 Mattick Road, North Macksville	Noise monitor located in the backyard facing the Pacific Highway and approximately 60m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway. There is a single storey dwelling at this address.
L19	2 Mattick Road, North Macksville	Noise monitor located in the front yard facing the Pacific Highway and approximately 167m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway. There is a single storey dwelling at this address.
L20	101 Old Coast Road, North Macksville	Noise monitor located in the backyard facing the Pacific Highway and approximately 77m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway and Old Coast Road. There is a double storey dwelling at this address.

Location No.	Monitoring Address	Description
L21	309 Old Coast Road, North Macksville	Noise monitor located in the front yard facing the Pacific Highway and approximately 60m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway and Old Coast Road. There is a single storey dwelling at this address.
S11	4317 Pacific Highway, Warrell Creek	Noise monitor located in the front yard facing the Pacific Highway and approximately 630m from the edge of the carriageway. Noise environment is dominated by traffic noise from the old Pacific Highway. There is a single storey dwelling at this address.

Long-term noise monitoring was undertaken at the above locations over two stages as follows:

- Stage 1 – Locations L1 to L7, L9 to L12 and S11 between 7 and 21 May 2019
- Stage 2 – Locations L8, L13 to L21 between 22 May and 5 June 2019.

Traffic counts, vehicle classifications and vehicle speed data were monitored concurrently with the noise monitoring, by a third-party contractor who provided data enabling the commencement of the operational noise monitoring analysis on 8 May 2019.

4.2.2 Short-Term Noise Monitoring Locations

Short-term (attended) noise monitoring was carried out at the properties listed in Table 4.1 to qualify the characteristic of the ambient noise environment at the long-term monitoring locations.

Where there were multi-storey dwellings at the long-term monitoring locations or where it was not practical for long-term noise monitors to be installed over several weeks at the applicable habitable floor level requiring assessment, additional short-term noise monitoring was conducted concurrently with the corresponding long-term noise monitoring at the locations listed in Table 4.2 below.

Table 4.2 – Short-Term Operational Noise Monitoring Locations

Location No.	Monitoring Address	Details
LS7	58 Harrimans Lane, Macksville	Double storey dwelling
LS11	12 Kerr Drive, Macksville	Double storey dwelling
LS20	101 Old Coast Road, North Macksville	Double storey dwelling

In addition to the above short-term monitoring locations, short-term (attended) noise monitoring was also conducted at selected residences where no long-term noise monitoring was conducted. These additional short-term monitoring locations were selected through consultation with TfNSW and the community and were chosen to represent noise sensitive areas further removed from the project. Monitoring was carried out over 15-30 minutes during the day period (7am to 10pm) and 15-30 minutes during the night period (10pm to 7am).

The additional short-term monitoring locations are presented in Table 4.3 below.

Table 4.3 – Additional Short-Term Operational Noise Monitoring Locations

Location No.	Monitoring Address	Description
S1	180 Rosewood Road, Warrell Creek	Noise monitoring location in the backyard facing the Pacific Highway approximately 313m from the edge of the carriageway. Noise environment is dominated by distant traffic noise from the Pacific Highway.
S2	192 Giinagay Way, Urunga	Noise monitoring location in the backyard facing the Pacific Highway approximately 180m from the edge of the carriageway. Noise environment is dominated by distant traffic noise from the Pacific Highway.
S3	43 Albert Drive, Donnellyville	Noise monitoring location in the backyard facing the Pacific Highway approximately 120m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Pacific Highway, occasional traffic noise from Albert Drive, freight train passbys and general neighbourhood noise.
S4	273 Upper Warrell Creek Road, Congarinni	Noise monitoring location in the backyard facing the Pacific Highway approximately 835m from the edge of the carriageway. Noise environment is dominated by distant traffic noise from trucks along the Pacific Highway, bird noise, insect noise and train noise.
S5	34 Wedgewood Drive, Macksville	Noise monitoring location in the backyard facing the Pacific Highway approximately 260m from the edge of the carriageway. Noise environment is dominated by distant traffic noise from the Pacific Highway and bird noise.
S6	71 East Street, Macksville	Noise monitoring location in the backyard facing the Pacific Highway approximately 665m from the edge of the carriageway. Noise environment is dominated by distant traffic noise from the Pacific Highway, dogs barking and general neighbourhood noise.
S7	4 Bellevue Drive, North Macksville	Noise monitoring location in the front yard facing the Pacific Highway approximately 370m from the edge of the carriageway. Noise environment is dominated by distant traffic noise from the Pacific Highway and bird noise.
S8	32 Letitia Close, North Macksville	Noise monitoring location in the backyard facing the Pacific Highway approximately 325m from the edge of the carriageway. Noise environment is dominated by distant traffic noise from the Old Pacific Highway and the Pacific Highway, and bird noise. It is noted that traffic noise from the Old Pacific Highway is more dominant than from the Pacific Highway.
S9	219 Florence Wilmont Drive, Nambucca Heads	Noise monitoring location in the front yard facing the Pacific Highway approximately 460m from the edge of the carriageway. Noise environment is dominated by distant traffic noise from the Pacific Highway and the Old Coast Road, and insect noise.
S10	45 Old Coast Road, Nambucca Heads	Noise monitoring location along the southern boundary facing the Pacific Highway approximately 480m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Giinagay Way and distant traffic noise from the Pacific Highway.

Location No.	Monitoring Address	Description
S11	4317 Pacific Highway, Warrell Creek	Noise monitoring location in the front yard facing the Pacific Highway approximately 630m from the edge of the carriageway. Noise environment is dominated by traffic noise from the Old Pacific Highway and noise from the saw mill across the street when in operation during daytime.

4.2.3 Engine Brake Noise Monitoring Locations

Engine brake noise monitoring was carried out at four (4) locations shown in Table 4.4 below. The locations were selected through consultation with TfNSW and represented specific sections along the project where engine brake noise was considered prevalent due to factors where heavy vehicles are required to slow down such as a change in road grade or change in speed limits.

The engine brake noise monitoring was carried out by a third-party contractor, Acoustic Research Labs (ARL) Pty Ltd, who also analysed the monitored data and assessed the results.

Table 4.4 – Engine Brake Noise Monitoring Locations

Location No.	Monitoring Location	Side of Road
EB1	Along Pacific Highway, approx. 100m north of the Rosewood Road bridge	Eastern
EB2	Along Pacific Highway, approx. 500m south of the northbound Scotts Head Road exit	Eastern
EB3	Along Pacific Highway, approx. 200m south of Nambucca River	Eastern
EB4	Along Pacific Highway, approx. 2 kilometres north of the Mattick Road bridge	Eastern

Engine brake noise monitoring was carried during the following periods for each location:

- Locations EB1 – 6 May to 20 May 2019
- Locations EB2 – 6 May to 21 May 2019
- Location EB3 and EB4 – 22 May to 6 June 2019.

4.2.4 Nambucca Rest Stop Noise Monitoring Locations

Short-term (attended) noise monitoring for the Nambucca Rest Stop was conducted at the two (2) locations presented in Table 6.5 below. The locations were selected through consultation with TfNSW and represent the nearest affected receivers to the Nambucca Rest Stop.

Table 4.5 – Short-Term Attended Operational Noise Monitoring Locations

Location No.	Monitoring Address	Description
S12	70 Foxs Road, Nambucca Heads	Noise monitoring location at the road side of Foxs Road approximately 980m from the Nambucca Rest Stop. It is noted that the property is currently vacant and access was not granted to conduct the monitoring within the property. Noise environment is dominated by distant traffic noise from Pacific Highway, bat noise and insect noise.
S13	27 Boggy Creek Road, Valla	Noise monitoring location south of the dwelling approximately 320m from the Nambucca Rest Stop. Noise environment is dominated by distant traffic noise from Pacific Highway, frog noise and insect noise.

4.3 Noise Monitoring Results

The noise monitoring instruments typically stored L_{A90} , $L_{Aeq,15hr}$, $L_{Aeq,9hr}$ and L_{Amax} noise levels as a minimum on a continuous basis at 15-minute intervals. While measurement results for all these indices were retained, the study primarily focuses on the $L_{Aeq,15hr}$ and $L_{Aeq,9hr}$ results, as these are the noise assessment indices embodied in the ECRTN and applicable to the project.

The results of the long-term (unattended), short-term (attended) and engine brake noise monitoring are presented in the following sections.

4.3.1 Long-Term Noise Monitoring Results

Traffic noise levels are assessed separately for daytime and night-time periods, defined by the ECRTN as follows:

- **Day** is defined as 7:00am to 10:00pm
- **Night** is defined as 10:00pm to 7:00am.

Noise levels at all locations were measured in the free-field (ie. away from buildings) and the measured noise levels were corrected [+2.5dB(A)] to include facade reflections to represent traffic noise levels measured at 1 metre from a building facade as recommended in the ECRTN and the TfNSW procedures for traffic noise measurements in the free-field.

Therefore, the road traffic noise levels presented in Table 4.6 below represent the measured or equivalent noise levels at 1 metre from the subject building facade.

Table 4.6 – 2019 Long-Term Monitored L_{Aeq} Road Traffic Noise Levels

Noise Monitoring Location ¹	Approx. Distance from Pacific Highway	2019 Measured L_{Aeq} Traffic Noise Levels, dB(A)	
		$L_{Aeq,15hr}$ Day	$L_{Aeq,9hr}$ Night
L1 – 38 Kerr Drive, Macksville	65m	52	49

Noise Monitoring Location ¹	Approx. Distance from Pacific Highway	2019 Measured L _{Aeq} Traffic Noise Levels, dB(A)	
		L _{Aeq,15hr} Day	L _{Aeq,9hr} Night
L2 – 4201 Pacific Highway, Eungai Creek	16m	64	63
L3 – 40-56 Albert Drive, Donnellyville	75m	57	58
L4 – 11 Albert Drive, Donnellyville	40m	54	53
L5 – 4723 Pacific Highway, Donnellyville	79m	57	57
L6 – 4 Scotts Head Road, Way Way	70m	61	59
L7 – 58 Harrimans Lane, Macksville	85m	59	55
LS7 – 58 Harrimans Lane, Macksville		60 ¹	56 ¹
L8 – 22 Letitia Close, North Macksville	135m	59	57
L9 – 4227 Queens Lane, North Macksville	27m	60	59
L10 – 46 Rosewood Road, Warrell Creek	76m	53	53
L11 – 12 Kerr Drive, Macksville	110m	52	52
LS11 – 12 Kerr Drive, Macksville		53 ¹	53 ¹
L12 – 41 Bald Hill Road, Macksville	17m	63	61
L13 – 75 River Street, Macksville	91m	60	57
L14 – 69 River Street, Macksville (Front)	210m	59	54
L15 – 69 River Street, Macksville (Rear)	210m	53	54
L16 – 63 River Street, Macksville	310m	51	51
L17 – 35 Old Coast Road, North Macksville	35m	63	61
L18 – 18 Mattick Road, North Macksville	60m	56	54
L19 – 2 Mattick Road, North Macksville	167m	52	49
L20 – 101 Old Coast Road, North Macksville	77m	64	63
LS20 – 101 Old Coast Road, North Macksville		63 ¹	62 ¹
L21 – 309 Old Coast Road, North Macksville	60m	65	64
S11 – 4317 Pacific Highway, Warrell Creek	630m	54	49

Notes: 1. Short-term measurement location at multi-storey dwelling, where day and night noise levels for this location have been determined through correlation with the corresponding long-term monitoring location.

From the noise monitoring results presented in the table above, night-time traffic noise levels at Location L3, L15 and L16 were measured to be the same or higher than the traffic noise levels during the daytime period at the same location. A review of audio files captured at these locations was conducted and it was confirmed that the likely cause of the unusually high monitored night-time noise level was due to fauna noise (eg. insects and/or birds) that was clearly audible in the audio recordings.

The results of the long-term unattended noise monitoring at each monitoring location are presented graphically in Appendix G.

4.3.2 Short-Term Noise Monitoring Results

Short-term (attended) noise monitoring results at locations representing areas generally further removed from the project are presented in Table 4.7.

Table 4.7 – 2019 Short-Term Monitored L_{Aeq} Road Traffic Noise Levels

Noise Monitoring Location	Approx. Distance from Pacific Highway	2019 Measured Traffic Noise Levels, dB(A)	
		$L_{Aeq, (15min)}$ Day	$L_{Aeq, (15min)}$ Night
S1 – 180 Rosewood Road, Warrell Creek	313m	50	51
S2 – 192 Giinagay Way, Urunga	180m	50	53
S3 – 43 Albert Drive, Donnellyville	120m	54	54
S4 – 273 Upper Warrell Creek Road, Congarinni	835m	51	50
S5 – 34 Wedgewood Drive, Macksville (Ground)	260m	60	– ¹
S5 – 34 Wedgewood Drive, Macksville (Lower Floor)		59	55
S6 – 71 East Street, Macksville	665m	48	43
S7 – 4 Bellevue Drive, North Macksville (Ground)	370m	52	46
S7 – 4 Bellevue Drive, North Macksville (First)		53	– ¹
S8 – 32 Letitia Close, North Macksville	325m	45	50
S9 – 219 Florence Wilmont Drive, Nambucca Heads	460m	45	42
S10 – 45 Old Coast Road, Nambucca Heads	480m	55	47
S11 – 4317 Pacific Highway, Warrell Creek	630m	52	54

Notes: 1. Short-term noise measurements not conducted during the night-time period.

During the measurements at the short-term monitoring locations it was observed that although traffic noise from the project was audible, other sources of noise also contributed to the measured noise levels such as insects, birds, frogs and/or rustling of leaves.

4.3.3 Engine Brake Noise Monitoring Results

Engine brake noise monitoring was undertaken by Acoustic Research Labs (ARL) Pty Ltd at four (4) nominated locations, considered to represent areas of the Project where engine brake noise is most prevalent. Sound recordings at each monitoring location were listened to and categorised as either 'engine brake', 'general traffic' or 'miscellaneous / other' noise based on their noise content. Results of the engine brake noise monitoring are presented in the following figures.

Figure 3 – Engine Brake MRMS Level Distribution

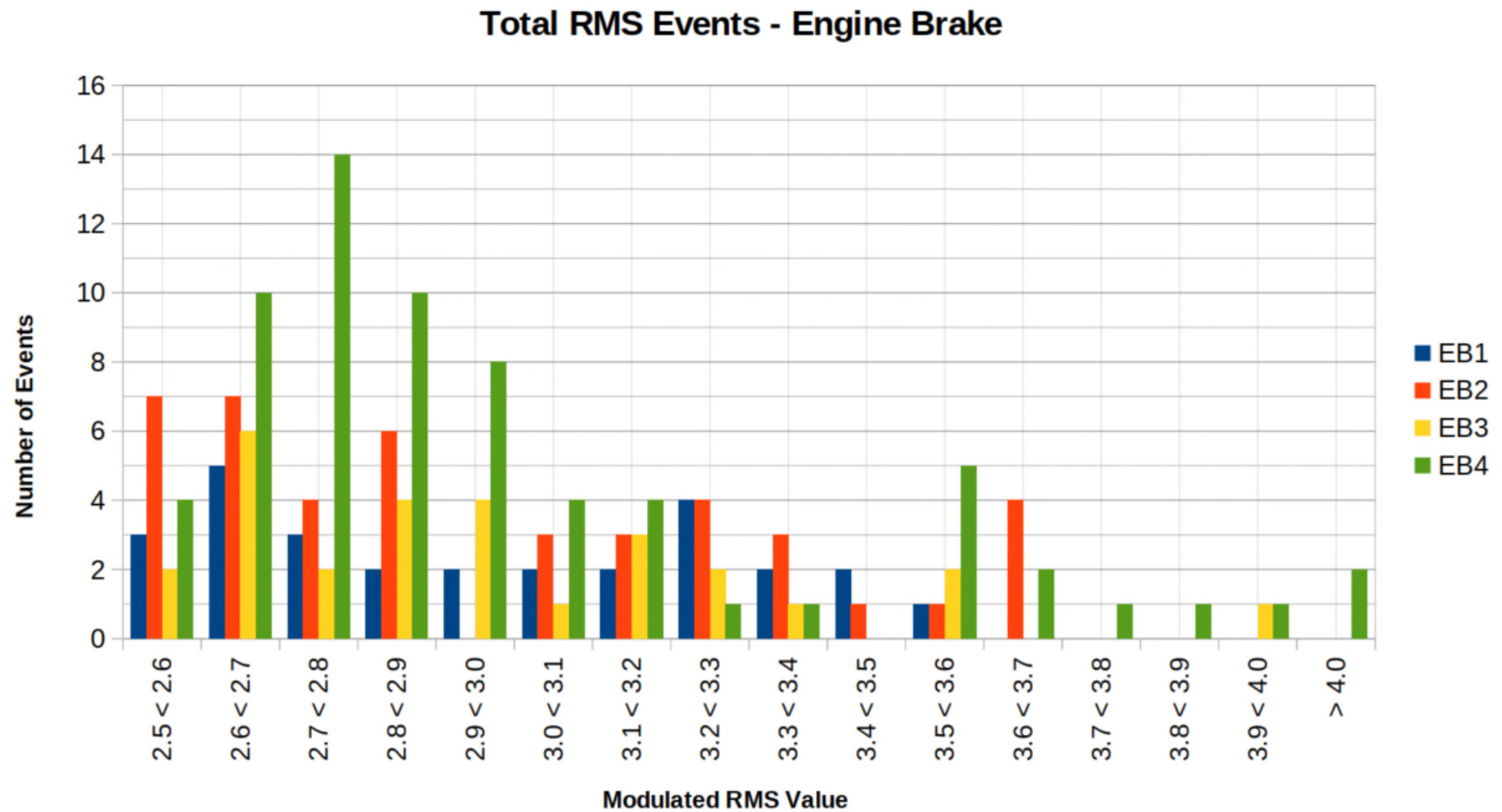


Figure 4 – Hourly Engine Brake Event Distribution (MRMS >2.5)

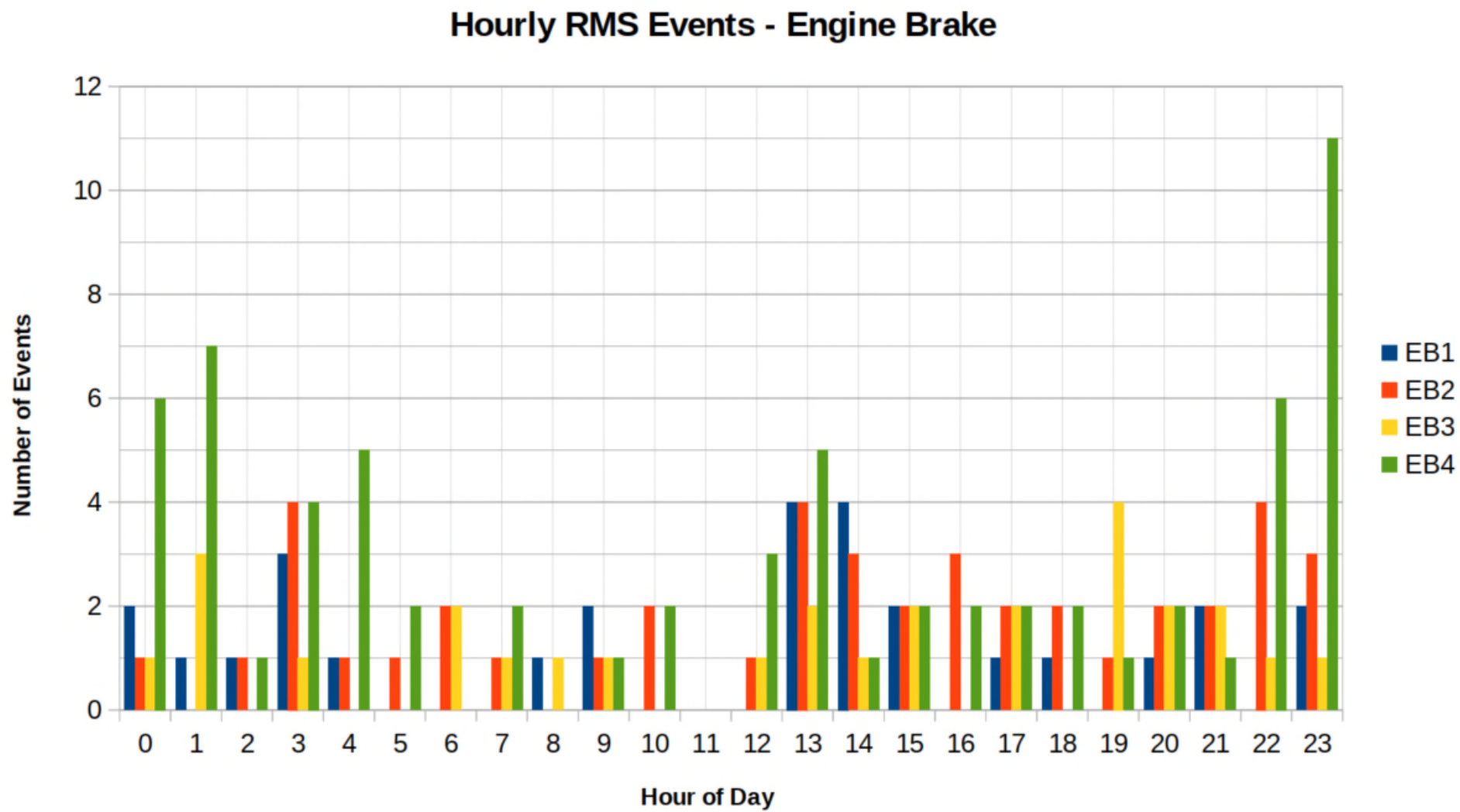
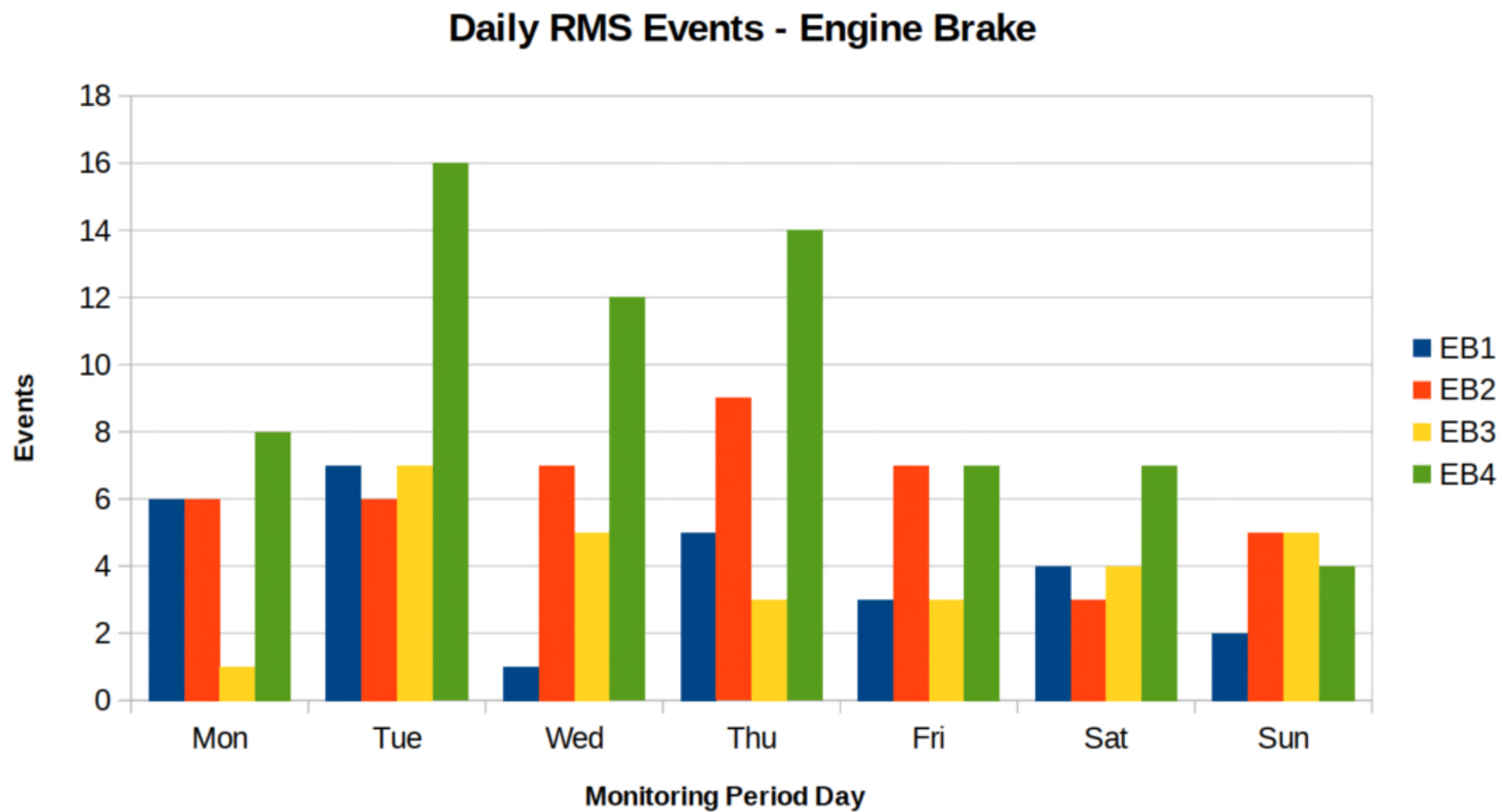


Figure 5 – Daily Engine Brake Event Distribution (MRMS >2.5)



A review of the above graphs presents the following outcomes of the engine brake noise monitoring. The results represent the total engine brake events over the monitoring period.

Location EB1

- Monitoring period from 6 May to 20 May 2019 (14 days)
- 28 total engine brake events where MRMS is greater than conservative value of 2.5
- 13 total engine brake events where MRMS is greater than NTC recommended value of 3.0.

Location EB2

- Monitoring period from 6 May to 21 May 2019 (15 days)
- 43 total engine brake events where MRMS is greater than conservative value of 2.5
- 19 total engine brake events where MRMS is greater than NTC recommended value of 3.0.

Location EB3

- Monitoring period from 22 May to 6 June 2019 (15 days).
- 28 total engine brake events where MRMS is greater than conservative value of 2.5
- 10 total engine brake events where MRMS is greater than NTC recommended value of 3.0

Location EB4

- Monitoring period from 22 May to 6 June 2019 (15 days)
- 68 total engine brake events where MRMS is greater than conservative value of 2.5
- 32 total engine brake events where MRMS is greater than NTC recommended value of 3.0.

The results indicate that engine brake noise occurs more often at Locations EB2 and EB4, compared to Locations EB1 and EB3. This may be due to heavy vehicles travelling southbound having to reduce speed in the vicinity of Locations EB2 and EB4 as a result of long declines in the road.

A further assessment of the percentage of engine brake noise events versus the number of heavy vehicles counted during the monitoring period was also carried out and results are as follows.

Location EB1

- Based on the average daily total heavy vehicles (class 4-12 vehicles) along the southbound carriageway (adjacent to the monitoring location), during the monitoring period from 6 May to 20 May 2019 (14 days) approx. 13,839 heavy vehicles travelled along the southbound carriageway
- 0.20% of total heavy vehicles where MRMS greater than 2.5 was detected

- 0.09% of total heavy vehicles where MRMS greater than 3.0 was detected.

Location EB2

- Based on the average daily total heavy vehicles (class 4-12 vehicles) along the southbound carriageway (adjacent to the monitoring location), during the monitoring period from 6 May to 21 May 2019 (15 days) approx. 14,828 heavy vehicles travelled along the southbound carriageway
- 0.29% of total heavy vehicles where MRMS greater than 2.5 was detected
- 0.13% of total heavy vehicles where MRMS greater than 3.0 was detected.

Location EB3

- Based on the average daily total heavy vehicles (class 4-12 vehicles) along the southbound carriageway (adjacent to the monitoring location), during the monitoring period from 22 May to 6 June 2019 (15 days) approx. 13,935 heavy vehicles travelled along the southbound carriageway
- 0.20% of total heavy vehicles where MRMS greater than 2.5 was detected
- 0.07% of total heavy vehicles where MRMS greater than 3.0 was detected.

Location EB4

- Based on the average daily total heavy vehicles (class 4-12 vehicles) along the southbound carriageway (adjacent to the monitoring location), during the monitoring period from 22 May to 6 June 2019 (15 days) approx. 13,935 heavy vehicles travelled along the southbound carriageway
- 0.49% of total heavy vehicles where MRMS greater than 2.5 was detected
- 0.16% of total heavy vehicles where MRMS greater than 3.0 was detected.

The results show that less than 0.5% of heavy vehicles exceed the MRMS value of 2.5 at all monitoring locations and less than 0.2% exceed the MRMS value of 3.0.

4.3.4 Nambucca Rest Stop Noise Monitoring Results

Short-term (attended) night-time noise monitoring results at the nearest receiver locations to the Nambucca Rest Stop are presented in Table 4.7. During the measurements it is noted that the noise environment at these locations was dominated by traffic noise from the Pacific Highway and insect noise, while actual noise from the Nambucca Rest Stop was inaudible throughout the measurement periods. Given that noise from the rest stop was inaudible over the ambient noise environment, noise contribution from the rest area would be at least 10dB(A) lower than the measured noise level.

Table 4.8 – Nambucca Rest Stop Monitored L_{Aeq} Noise Levels, dB(A)

Noise Monitoring Location	Approx. Distance from Nambucca Rest Stop	Monitored Night $L_{Aeq, (15min)}$ Noise Level	Estimated Contribution from Nambucca Rest Stop
S12 – 70 Foxs Road, Nambucca Heads	320m	49	<39
S13 – 27 Boggy Creek Road, Valla	980m	54	<44

Comparing the recorded noise levels against the nominated criterion of $L_{Aeq, (15min)}$ 49dB(A), the estimated noise contribution from the Nambucca Rest Stop is well below the nominated criteria and compliance is achieved at both receiver locations.

5 Traffic Volumes and Classification

In accordance with Practice Note viii of the ENMM, traffic volumes, classification of vehicles and vehicle speeds were monitored concurrently with the operational noise monitoring along the project corridor by a third-party contractor, Matrix Traffic and Transport Data Australia P/L.

The locations where traffic counting was conducted are listed below and presented in the aerial maps in Appendix F.

Pacific Highway Main Alignment

- Site T1A – approx. 200 metres south of Upper Warrell Creek Road – northbound
- Site T1B – approx. 200 metres south of Upper Warrell Creek Road – southbound
- Site T2A – approx. 80 metres north of Upper Warrell Creek Road – northbound
- Site T2B – approx. 80 metres north of Upper Warrell Creek Road – southbound
- Site T3A – approx. 2.78 kilometres north of Upper Warrell Creek Road – northbound
- Site T3B – approx. 2.78 kilometres north of Upper Warrell Creek Road – southbound
- Site T4A – between Bald Hill Road Interchange off-ramp and on-ramp – northbound
- Site T4B – between Bald Hill Road Interchange off-ramp and on-ramp – southbound
- Site T5A – approx. 1.28 kilometres north of Bald Hill Road Interchange – northbound
- Site T5B – approx. 1.28 kilometres north of Bald Hill Road Interchange – southbound.

Pacific Highway Ramps

- Site T6 – Warrell Creek interchange northbound off-ramp
- Site T7 – Warrell Creek interchange southbound off-ramp
- Site T8 – Warrell Creek interchange southbound on -ramp
- Site T9 – Bald Hill Road interchange northbound off-ramp
- Site T10 – Bald Hill Road interchange northbound on-ramp
- Site T11 – Bald Hill Road interchange southbound off-ramp
- Site T12 – Bald Hill Road interchange southbound on-ramp
- Site T13 – Macksville North interchange northbound on-ramp
- Site T14 – Macksville North interchange southbound off-ramp.

Local Roads and Overpasses

- Site T15 – Pacific Highway, approx. 100 metres north of Cockburns Lane
- Site T16 – Pacific Highway, approx. 554 metres south of Scotts Head Road
- Site T17 – Giinagay Way, approx. 300 metres north of Scotts Head Road
- Site T18 – Giinagay Way, between Ball Hill Road to Upper Warrell Road North
- Site T19 – Giinagay Way, approx. 630 metres north of Upper Warrell Creek Road
- Site T20 – Egan Street, between Casey Drive and Nursery Road
- Site T21 – Giinagay Way, approx. 1.42 kilometres south of Link Road
- Site T22 – Giinagay Way, approx. 60 metres north of Link Road
- Site T23 – Upper Warrell Creek Road, approx. 30 metres north of Pacific Highway
- Site T24 – Albert Drive, approx. 90 metres west of main alignment
- Site T25 – Albert Drive, approx. 290 metres east of main alignment
- Site T26 – Scotts Head Road, approx. 340 metres north of Pacific Highway
- Site T27 – Bald Hill Road, approx. 130 metres west of Bald Hill Road Interchange western roundabout
- Site T28 – Bald Hill Road, approx. 50 metres east of Bald Hill Road Interchange eastern roundabout
- Site T29 – Upper Warrell Creek Road, approx. 80 metres east of Wallace Street
- Site T30 – Gunma Road, approx. 870 metres east of East Street
- Site T31 – Ferry Street, between William Street and Cooper Street
- Site T32 – Rodeo Road, approx. 180 metres south of Wirrimbi Road
- Site T33 – Wirrimbi Road, approx. 140 metres east of Siding Road
- Site T34 – Old Coast Road, approx. 480 metres east of Siding Road.

Table 5.1 below presents the counted traffic volumes, vehicle classifications and vehicle speeds (based on average) at the traffic monitoring sites listed above.

Table 5.1 – Monitored 2019 Traffic Volumes, Vehicle Classifications and Speeds

Traffic Counting Site	Day – 7am to 10pm (15hr)			Night – 10pm to 7am (9hr)		
	Light Vehicles	Heavy Vehicles	Speed ¹ (km/h)	Light Vehicles	Heavy Vehicles	Speed ¹ (km/h)
Pacific Highway Main Alignment						
Site T1A	3,819	1,078	104	577	448	105
Site T1B	3,800	950	99	547	326	100
Site T2A	3,908	1,011	102	692	381	102
Site T2B	3,688	938	103	648	300	103
Site T3A	3,386	1,367	111	510	457	110
Site T3B	3,597	1,024	106	553	333	104
Site T4A	2,789	978	109	405	401	106
Site T4B	2,709	973	106	442	325	102
Site T5A	3,450	906	107	510	385	105
Site T5B	3,299	858	106	624	279	103
Pacific Highway Ramps						
Site T6	151	22	77	23	5	78
Site T7	24	11	61	2	3	76
Site T8	157	16	77	23	4	78
Site T9	785	144	72	102	40	72
Site T10	431	54	69	95	20	66
Site T11	420	48	70	64	9	71
Site T12	901	90	53	151	22	52
Site T13	844	66	81	151	27	82
Site T14	912	75	85	126	19	87
Local Roads & Overpasses – combined both directions						
Site T15	156	17	67	23	5	68
Site T16	277	74	87	40	16	89
Site T17	944	97	83	119	17	84
Site T18	1,893	244	67	276	57	67
Site T19	2,221	234	80	284	50	83
Site T20	2,509	153	75	292	39	77
Site T21	1,242	71	94	111	13	94
Site T22	3,243	169	59	404	38	60
Site T23	47	4	41	7	0	43
Site T24	118	16	41	19	3	42
Site T25	113	6	47	17	2	46
Site T26	690	84	65	80	16	66
Site T27	1,937	223	47	305	48	46
Site T28	91	15	37	12	2	38
Site T29	1,079	213	51	210	33	51

Traffic Counting Site	Day – 7am to 10pm (15hr)			Night – 10pm to 7am (9hr)		
	Light Vehicles	Heavy Vehicles	Speed ¹ (km/h)	Light Vehicles	Heavy Vehicles	Speed ¹ (km/h)
Site T30	486	59	53	79	10	56
Site T31	218	34	18	30	5	19
Site T32	310	27	63	41	5	64
Site T33	747	52	78	101	11	80
Site T34	31	8	52	4	1	55

Note: 1. Speed represents the average speed monitored during the traffic volume monitoring
 2. Data based on traffic survey undertaken by Matrix Traffic and Transport Data Australia P/L, concurrently with the noise monitoring.

The post construction traffic data presented in Table 5.1 are the outputs of a traffic survey carried out over a short period of a few weeks, and are not directly comparable to Annual Average Daily Traffic (AADT), which provides an average of all days over a one year period.

Therefore, the monitored 2019 traffic volume data presented in Table 5.1 was only used for the validation of the 'as-built' (surveyed road design) noise model.

Once the model was validated, the AADT traffic volumes forecast for the opening year and design year (10 years after opening) were inputted into the calibrated 'as-built' noise model to determine the Year 1 and Year 10 traffic noise levels at all the sensitive receiver locations as assessed in the ONMR.

The 2016 AADT traffic volume forecasts were presented in Appendix A of the ONMR (reproduced from Tables 9.10 of the SWTC), and the forecast 15 hour and 9 hour traffic data for 2016 are reproduced below.

It is noted that traffic volume forecasts for the on and off ramps of the Macksville interchange and the Pacific Highway main carriageways north of the Macksville interchange were not presented in Appendix A of the OMNR.

Table 5.2 – 2016 AADT Traffic Volumes and Compositions

Road Section	Day – 7am to 10pm (15hr)			Night – 10pm to 7am (9hr)		
	Light Vehicles	Heavy Vehicles	Speed ¹	Light Vehicles	Heavy Vehicles	Speed ¹
Pacific Highway Main Carriageways						
South of Existing Highway / Upper Warrell Creek Road south intersection	7,870	1,530	115	1,100	1,090	120
North of Existing Highway / Upper Warrell Creek Road south intersection to Warrell Creek interchange	7,060	1,320	115	980	930	120
Warrell Creek interchange to Bald Hill Road interchange	6,190	1,260	115	870	900	120
Bald Hill Road interchange (between off-ramp gore and on-ramp gore)	4,320	950	115	600	680	120
North of Bald Hill Road interchange	7,400	1,240	115	1,040	890	120

Road Section	Day – 7am to 10pm (15hr)			Night – 10pm to 7am (9hr)		
	Light Vehicles	Heavy Vehicles	Speed ¹	Light Vehicles	Heavy Vehicles	Speed ¹
Warrell Creek Interchange						
Northbound off-ramp	400	20	80	60	20	80
Southbound off-ramp	10	10	80	10	10	80
Southbound on-ramp	460	40	80	60	20	80
Bald Hill Road Interchange						
Northbound off-ramp	890	110	80	120	70	80
Northbound on-ramp	1,040	120	80	150	90	80
Southbound off-ramp	2,050	180	80	290	130	80
Southbound on-ramp	990	210	80	140	150	80
Existing Highway						
Upper Warrell Creek Road South to Albert Drive	860	60	100	120	40	100
Albert Drive to Scotts Head Road	1,070	50	100	150	30	100
Scotts Head Road to Bald Hill Road	2,910	570	100	400	400	100
Bald Hill Road to Upper Warrell Road North	4,480	380	100	620	270	100
Upper Warrell Road North to Ferry Street	4,310	430	50/100	610	300	50/100
Ferry Street to Riverside Drive	3,190	60	50	440	40	50
Riverside Drive to Link Road	1,430	40	50/100	200	30	50/100
North of Link Road	5,240	300	100	740	220	100
Local Roads						
Upper Warrell Creek Road South	820	250	80	110	180	80
Albert Drive (western side of Main Carriageway)	590	100	60	80	70	60
Albert Drive (eastern side of Main Carriageway)	10	10	60	10	10	60
Scotts Head Road	3,190	520	60	440	370	60
Bald Hill Road west of Bald Hill Road interchange western roundabout	4,470	380	60	620	270	60
Bald Hill Road west of Bald Hill Road interchange eastern roundabout	160	10	60	20	10	60
Upper Warrell Creek Road North	1,620	160	60	230	110	60
Gunma Road	870	50	60	120	40	60
Ferry Street	1,450	170	50	200	120	50
Rodeo Drive south of Wirrimbi Road intersection	80	10	60	10	10	60
Wirrimibi Road	80	10	60	10	10	60
Old Coast Road	80	10	60	10	10	60

Note: 1. Speeds based on the traffic speeds nominated in Appendix A of the ONMR and Section 4.21 of the SWTC
 2. Traffic data presented in Appendix A of the ONMR and used for detailed design (pre-construction) noise modelling.

In addition to the forecast 2016 AADT traffic volumes, the ONMR also provided forecast 2026 AADT traffic volumes (reproduced from Table 9.11 of the SWTC), and the 15 hour and 9 hour traffic data for 2026 as presented in the ONMR are reproduced below.

It is noted that traffic volume forecasts for the on and off ramps of the Macksville interchange and the Pacific Highway main carriageways north of the Macksville interchange were not presented in Appendix A of the OMNR.

Table 5.3 – 2026 AADT Traffic Volumes and Compositions

Road Section	Day – 7am to 10pm (15hr)			Night – 10pm to 7am (9hr)		
	Light Vehicles	Heavy Vehicles	Speed ¹	Light Vehicles	Heavy Vehicles	Speed ¹
Pacific Highway Main Carriageways						
South of Existing Highway / Upper Warrell Creek Road south intersection	9,350	1,900	115	1,310	1,350	120
North of Existing Highway / Upper Warrell Creek Road south intersection to Warrell Creek interchange	7,390	1,490	115	1,110	1,060	120
Warrell Creek interchange to Bald Hill Road interchange	6,920	1,430	115	970	1,020	120
Bald Hill Road Interchange (between off-ramp gore and on-ramp gore)	4,940	1,060	115	690	760	120
North of Bald Hill Road interchange	9,240	1,500	115	1,290	1,070	120
Warrell Creek Interchange						
Northbound off-ramp	520	20	80	70	20	80
Southbound off-ramp	10	10	80	10	10	80
Southbound on-ramp	490	30	80	70	20	80
Bald Hill Road Interchange						
Northbound off-ramp	900	140	80	130	100	80
Northbound on-ramp	1,490	210	80	210	150	80
Southbound off-ramp	2,780	230	80	390	160	80
Southbound on-ramp	1,050	220	80	150	160	80
Existing Highway						
Upper Warrell Creek Road South to Albert Drive	1,020	50	100	140	40	100
Albert Drive to Scotts Head Road	1,230	50	100	180	40	100
Scotts Head Road to Bald Hill Road	3,650	700	100	510	490	100
Bald Hill Road to Upper Warrell Road North	5,510	450	100	740	330	100
Upper Warrell Road North to Ferry Street	5,320	470	50/100	740	330	50/100
Ferry Street to Riverside Drive	2,820	40	50	390	30	50
Riverside Drive to Link Road	2,310	30	50/100	320	30	50/100
North of Link Road	5,960	330	100	830	240	100

Road Section	Day – 7am to 10pm (15hr)			Night – 10pm to 7am (9hr)		
	Light Vehicles	Heavy Vehicles	Speed ¹	Light Vehicles	Heavy Vehicles	Speed ¹
Local Roads						
Upper Warrell Creek Road South	1,740	490	80	240	350	80
Albert Drive (western side of Main Carriageway)	630	100	60	90	70	60
Albert Drive (eastern side of Main Carriageway)	10	10	60	10	0	60
Scotts Head Road	4,030	660	60	560	470	60
Bald Hill Road west of Bald Hill Road interchange western roundabout	4,640	450	60	650	320	60
Bald Hill Road west of Bald Hill Road interchange eastern roundabout	170	10	60	20	10	60
Upper Warrell Creek Road North	3,100	310	60	430	220	60
Gunma Road	940	60	60	130	40	60
Ferry Street	1,580	180	50	220	130	50
Rodeo Drive south of Wirrimbi Road intersection	80	10	60	10	10	60
Wirrimbi Road	80	10	60	10	10	60
Old Coast Road	80	10	60	10	10	60

Note: 1. Speeds based on the traffic speeds nominated in Appendix A of the ONMR and Section 4.21 of the SWTC
 2. Traffic data presented in the ONMR and used for detailed design (pre-construction) noise modelling.

Due to the delay of the opening of the project, the official opening year is 2018 and the corresponding design year is 2028. To adjust the AADT traffic volume forecasts for 2016 and 2026 from the ONMR to the years 2018 and 2028, calculated annual traffic growth rates were applied for a two year period to adjust 2016 traffic volumes to 2018 traffic volumes and similarly to adjust 2026 traffic volumes to 2028 traffic volumes for each road segment. The annual traffic growth rates were determined by assuming a linear growth from 2016 to 2026 for the traffic volumes for each road segment presented in Table 5.2 and Table 5.3, respectively.

The annual traffic growth rates used for each road segment are shown in Table 5.4 below.

Table 5.4 – Annual Traffic Growth Rate

Road Section	Day – 7am to 10pm (15hr)		Night – 10pm to 7am (9hr)	
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles
Pacific Highway Main Carriageways				
South of Existing Highway / Upper Warrell Creek Road south intersection	1.74%	2.19%	1.76%	2.16%
North of Existing Highway / Upper Warrell Creek Road south intersection to Warrell Creek interchange	0.46%	1.22%	1.25%	1.32%
Warrell Creek interchange to Bald Hill Road interchange	1.12%	1.27%	1.09%	1.26%

Road Section	Day – 7am to 10pm (15hr)		Night – 10pm to 7am (9hr)	
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles
Bald Hill Road interchange (between off-ramp gore and on-ramp gore)	1.41%	1.10%	1.41%	1.12%
North of Bald Hill Road interchange	2.25%	1.92%	2.18%	1.86%
Warrell Creek Interchange				
Northbound off-ramp	2.66%	0%	1.55%	0%
Southbound off-ramp	0%	0%	0%	0%
Southbound on-ramp	0.63%	-2.84%	1.55%	0%
Bald Hill Road Interchange				
Northbound off-ramp	0.11%	2.44%	0.80%	3.63%
Northbound on-ramp	3.66%	5.76%	3.42%	5.24%
Southbound off-ramp	3.09%	2.48%	3.01%	2.10%
Southbound on-ramp	0.59%	0.47%	0.69%	0.65%
Existing Highway				
Upper Warrell Creek Road South to Albert Drive	1.62%	-1.81%	1.55%	0%
Albert Drive to Scotts Head Road	1.40%	0%	1.84%	2.92%
Scotts Head Road to Bald Hill Road	2.29%	2.08%	2.46%	2.05%
Bald Hill Road to Upper Warrell Road North	2.09%	1.71%	1.79%	2.03%
Upper Warrell Road North to Ferry Street	2.13%	0.89%	1.95%	0.96%
Ferry Street to Riverside Drive	-1.23%	-3.97%	-1.20%	-2.84%
Riverside Drive to Link Road	4.91%	-2.84%	4.81%	0%
North of Link Road	1.30%	0.96%	1.15%	0.87%
Local Roads				
Upper Warrell Creek Road South	7.81%	6.96%	8.11%	6.88%
Albert Drive (western side of Main Carriageway)	0.66%	0%	1.18%	0%
Albert Drive (eastern side of Main Carriageway)	0%	0%	0%	0%
Scotts Head Road	2.36%	2.41%	2.44%	2.42%
Bald Hill Road west of Bald Hill Road interchange western roundabout	0.37%	1.71%	0.47%	1.71%
Bald Hill Road west of Bald Hill Road interchange eastern roundabout	0.61%	0%	0%	0%
Upper Warrell Creek Road North	6.70%	6.84%	6.46%	7.18%
Gunma Road	0.78%	1.84%	0.80%	0%
Ferry Street	0.86%	0.57%	0.96%	0.80%
Rodeo Drive south of Wirrimbi Road intersection	0%	0%	0%	0%
Wirrimibi Road	0%	0%	0%	0%
Old Coast Road	0%	0%	0%	0%

Furthermore, given that traffic volumes for the on and off ramps of the Macksville interchange were not presented in the ONMR, a review of the 2019 counted traffic data presented in Table 5.1 for the Macksville interchange ramps (represented by T13 and T14 for the on and off ramps, respectively) was undertaken to determine the applicable traffic volumes and compositions for the ramps to be used in the noise model. The counted 2019 total traffic volumes for the ramps were compared to the counted 2019 total traffic volumes for the main carriageways of the Pacific Highway north of the Bald Hill Road interchange (represented by T5A and T5B in Table 5.1) to calculate the traffic volume proportion of the ramps relative to the main carriageways. Using the calculated traffic volume proportions, the traffic volumes and compositions for the Macksville interchange ramps were determined for modelling purposes. Results of the review are presented below as percentages of the main carriageways.

Table 5.5 – Macksville Interchange Ramps Proportion to Pacific Highway Main Carriageways

Ramp	Percentage of Pacific Highway Main Carriageway	
	Day – 7am to 10pm (15hr)	Night – 10pm to 7am (9hr)
Macksville interchange northbound on-ramp	11.2%	10.5%
Macksville interchange southbound off-ramp	12.2%	8.6%

Based on the calculated annual growth rates presented in Table 5.4 and the traffic volume proportions presented in Table 5.5, the corresponding opening year 2018 (Year 1) and design year 2028 (Year 10) AADT traffic volumes and compositions are presented in Table 5.6 and Table 5.7, respectively.

It is noted that the section of Old Coast Road between the roundabout leading to the Macksville interchange ramps and Giinagay Way was not included in Appendix A of the OMNR. Therefore, it has been conservatively assumed that the traffic volumes along this section of road are based on the sum of the total traffic volume from the Macksville interchange ramps and the northern section of Old Coast Road (north of the Macksville interchange).

Additionally, the traffic volumes along the Pacific Highway main carriageways north of the Macksville interchange are based on the sum of the Pacific Highway main carriageways north of the Bald Hill Road interchange and the Macksville interchange ramps.

Table 5.6 – Opening Year 2018 (Year 1) AADT Traffic Volumes and Compositions

Road Section	Day – 7am to 10pm (15hr)			Night – 10pm to 7am (9hr)		
	Light Vehicles	Heavy Vehicles	Speed ¹	Light Vehicles	Heavy Vehicles	Speed ¹
Pacific Highway Main Carriageways						
South of Existing Highway / Upper Warrell Creek Road south intersection	8,146	1,598	115	1,139	1,138	120
North of Existing Highway / Upper Warrell Creek Road south intersection to Warrell Creek interchange	7,125	1,352	115	1,005	955	120
Warrell Creek interchange to Bald Hill Road Interchange	6,330	1,292	115	889	923	120
Bald Hill Road interchange (between off-ramp gore and on-ramp gore)	4,443	971	115	617	695	120

Road Section	Day – 7am to 10pm (15hr)			Night – 10pm to 7am (9hr)		
	Light Vehicles	Heavy Vehicles	Speed ¹	Light Vehicles	Heavy Vehicles	Speed ¹
North of Bald Hill Road interchange	7,736	1,288	115	1,086	923	120
North of Macksville interchange	9,691	1,445	115	1,415	978	120
Warrell Creek Interchange						
Northbound off-ramp	422	20	80	62	20	80
Southbound off-ramp	10	10	80	10	10	80
Southbound on-ramp	466	38	80	62	20	80
Bald Hill Road Interchange						
Northbound off-ramp	892	115	80	122	75	80
Northbound on-ramp	1,118	134	80	160	100	80
Southbound off-ramp	2,179	189	80	308	136	80
Southbound on-ramp	1,002	212	80	142	152	80
Macksville Interchange²						
Northbound on-ramp	940	73	80	179	32	80
Southbound off-ramp	1,015	83	80	150	23	80
Existing Highway						
Upper Warrell Creek Road South to Albert Drive	888	58	100	124	40	100
Albert Drive to Scotts Head Road	1,100	50	100	156	32	100
Scotts Head Road to Bald Hill Road	3,045	594	100	420	417	100
Bald Hill Road to Upper Warrell Road North	4,669	393	100	642	281	100
Upper Warrell Road North to Ferry Street	4,495	438	50/100	634	306	50/100
Ferry Street to Riverside Drive	3,112	55	50	430	38	50
Riverside Drive to Link Road	1,574	38	50/100	220	30	50/100
North of Link Road	5,377	306	100	757	224	100
Local Roads						
Upper Warrell Creek Road South	953	286	80	129	206	80
Albert Drive (western side of Main Carriageway)	598	100	60	82	70	60
Albert Drive (eastern side of Main Carriageway)	10	10	60	10	10	60
Scotts Head Road	3,343	545	60	462	388	60
Bald Hill Road west of Bald Hill Road interchange western roundabout	4,503	393	60	626	279	60
Bald Hill Road west of Bald Hill Road interchange eastern roundabout	162	10	60	20	10	60
Upper Warrell Creek Road North	1,845	183	60	261	126	60
Gunma Road	884	52	60	122	40	60
Ferry Street	1,475	172	50	204	122	50

Road Section	Day – 7am to 10pm (15hr)			Night – 10pm to 7am (9hr)		
	Light Vehicles	Heavy Vehicles	Speed ¹	Light Vehicles	Heavy Vehicles	Speed ¹
Rodeo Drive south of Wirrimbi Road intersection	80	10	60	10	10	60
Wirrimibi Road	80	10	60	10	10	60
Old Coast Road	80	10	60	10	10	60
Old Coast Road between Macksville interchange ramps roundabout and Giinagay Way ³	2,035	167	60	340	65	60

Note: 1. Speeds based on the traffic speeds nominated in Appendix A of the ONMR and Section 4.21 of the SWTC
 2. Traffic volumes for Macksville interchange ramps based on proportions presented in Table 5.5
 3. Traffic volumes for this section of Old Coast Road based on the sum of the volumes of the Macksville interchange ramps and Old Coast Road
 4. Traffic volumes calculated based on annual traffic growth rates determined for each road segment and applied to the 2016 traffic volumes presented in Table 5.2 to obtain 2018 volumes.

Table 5.7 – Design Year 2028 (Year 10) AADT Traffic Volumes and Compositions

Road Section	Day – 7am to 10pm (15hr)			Night – 10pm to 7am (9hr)		
	Light Vehicles	Heavy Vehicles	Speed ¹	Light Vehicles	Heavy Vehicles	Speed ¹
Pacific Highway Main Carriageways						
South of Existing Highway / Upper Warrell Creek Road south intersection	9,678	1,984	115	1,357	1,409	120
North of Existing Highway / Upper Warrell Creek Road south intersection to Warrell Creek interchange	7,458	1,527	115	1,138	1,088	120
Warrell Creek interchange to Bald Hill Road Interchange	7,076	1,467	115	991	1,046	120
Bald Hill Road interchange (between off-ramp gore and on-ramp gore)	5,111	1,083	115	710	777	120
North of Bald Hill Road Interchange	9,660	1,558	115	1,347	1,110	120
North of Macksville interchange	12,094	1,753	115	1,745	1,177	120
Warrell Creek Interchange						
Northbound off-ramp	548	20	80	72	20	80
Southbound off-ramp	10	10	80	10	10	80
Southbound on-ramp	496	28	80	72	20	80
Bald Hill Road Interchange						
Northbound off-ramp	902	147	80	132	107	80
Northbound on-ramp	1,601	235	80	225	166	80
Southbound off-ramp	2,955	242	80	414	167	80
Southbound on-ramp	1,062	222	80	152	162	80
Macksville Interchange²						
Northbound on-ramp	1,168	91	80	219	39	80
Southbound off-ramp	1,267	104	80	179	28	80

Road Section	Day – 7am to 10pm (15hr)			Night – 10pm to 7am (9hr)		
	Light Vehicles	Heavy Vehicles	Speed ¹	Light Vehicles	Heavy Vehicles	Speed ¹
Existing Highway						
Upper Warrell Creek Road South to Albert Drive	1,043	48	100	144	40	100
Albert Drive to Scotts Head Road	1,265	50	100	187	42	100
Scotts Head Road to Bald Hill Road	3,819	729	100	535	510	100
Bald Hill Road to Upper Warrell Road North	5,743	465	100	767	344	100
Upper Warrell Road North to Ferry Street	5,549	478	50/100	769	336	50/100
Ferry Street to Riverside Drive	2,751	37	50	381	28	50
Riverside Drive to Link Road	2,543	28	50/100	352	30	50/100
North of Link Road	6,115	336	100	849	244	100
Local Roads						
Upper Warrell Creek Road South	2,023	561	80	281	400	80
Albert Drive (western side of Main Carriageway)	638	100	60	92	70	60
Albert Drive (eastern side of Main Carriageway)	10	10	60	10	10	60
Scotts Head Road	4,223	692	60	588	493	60
Bald Hill Road west of Bald Hill Road interchange western roundabout	4,675	465	60	656	331	60
Bald Hill Road west of Bald Hill Road interchange eastern roundabout	172	10	60	20	10	60
Upper Warrell Creek Road North	3,530	354	60	487	253	60
Gunma Road	955	62	60	132	40	60
Ferry Street	1,607	182	50	224	132	50
Rodeo Drive south of Wirrimbi Road intersection	80	10	60	10	10	60
Wirrimibi Road	80	10	60	10	10	60
Old Coast Road	80	10	60	10	10	60
Old Coast Road between Macksville interchange ramps roundabout and Giinagay Way ³	2,515	205	60	408	77	60

- Note:
1. Speeds based on the traffic speeds nominated in Appendix A of the ONMR and Section 4.21 of the SWTC
 2. Traffic volumes for Macksville interchange ramps based on proportions presented in Table 5.5
 3. Traffic volumes for this section of Old Coast Road based on the sum of the volumes of the Macksville interchange ramps and Old Coast Road
 4. Traffic volumes calculated based on annual traffic growth rates determined for each road segment and applied to the 2026 traffic volumes presented in Table 5.3 to obtain 2028 volumes.

6 Noise Assessment Methodology

6.1 Noise Assessment Protocol

According to Practice Note viii of the ENMM, the operational noise monitoring and assessment protocol is as follows:

"Post-construction monitoring is undertaken to determine whether the mitigation measures have been adequate for the predicted design noise levels to be met.

The "Design Noise Level for Year 1" is the noise level for the road development at project opening, after all feasible and reasonable mitigation strategies have been applied.

Provided traffic flows and mixes following the road's opening are in line with those used for the predictions, it can be expected that if the predicted noise levels for Year 1 are achieved the predicted Year 10 noise levels will also be achieved.

It should be recognised that noise prediction modelling has some accuracy limitations and will commonly produce acceptable errors of around 2 dB(A). In addition, when noise levels for a new road are being monitored short-term and uncharacteristic variations in traffic flow need to be taken into account when comparing the measured and predicted noise levels."

Also, according to Practice Note viii of the ENMM, if the monitoring indicates operational noise levels exceeding the design noise levels for Year 1 then the following action shall be taken:

1. *"If the measured noise levels exceed the design noise levels for Year 1 by 2 dB(A) or less, the noise data should be examined, the prediction methodology and suitability of mitigation measures should be reassessed and the reasons for the marginal exceedance(s) be identified and reported.*
2. *If measured noise levels exceed the design noise level for Year 1 by more than 2 dB(A), the adequacy of the noise mitigation needs to be reviewed, and if problems are identified steps need to be taken to rectify the situation. Additional noise treatments may be required to achieve the design noise level, where this is feasible and reasonable."*

6.2 Compliance Assessment Procedure

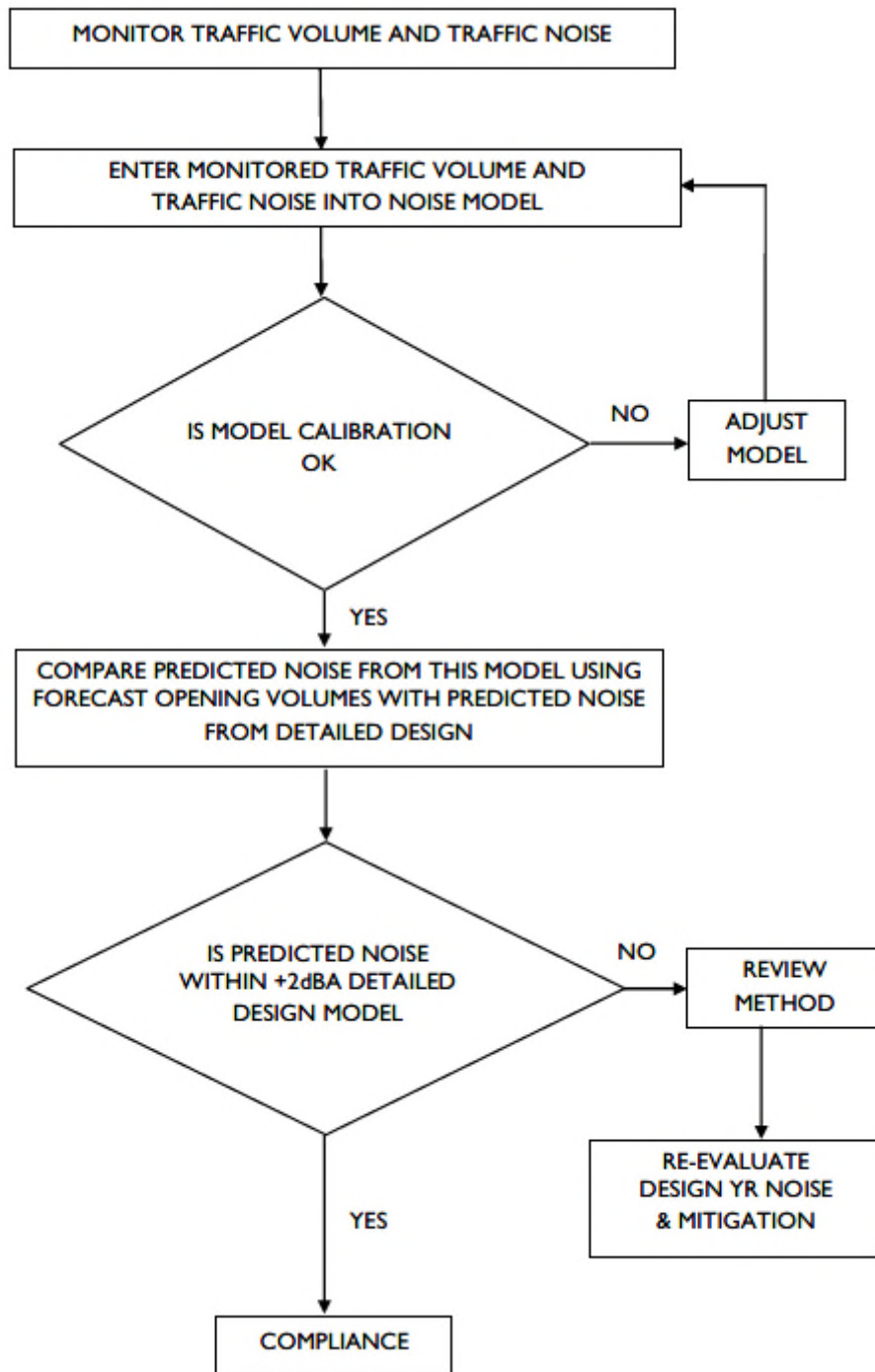
Compliance was assessed for the operational noise levels predicted in the review of operational noise mitigation measures presented in the ONMR, as required by MCoA E1. The methodology used for the assessment is as follows:

1. Monitor operational traffic noise levels of the project at the monitoring locations presented in Table 4.1 and Table 4.2 of this ONR

2. Correlate the long-term monitoring with the short-term monitoring at relevant location/s on each property and apply a correction to establish equivalent traffic noise levels at all critical floor levels and positions of buildings selected for assessment
3. Concurrently with the noise monitoring, monitor traffic volumes, vehicle classifications and vehicle speeds (May 2019) along the main alignment, ramps and local roads
4. Using the monitored traffic noise levels and the monitored traffic data in Table 5.1, validate the 'as-built' noise model by comparing the monitored traffic noise levels to the traffic noise levels modelled using the 'as-built' model
5. Where the comparison between monitored and modelled noise levels is within $\pm 2\text{dB(A)}$, then the 'as-built' noise model predicts results that are generally in agreement with the noise monitoring and there is a reasonable level of confidence that can be placed on the 'as-built' noise model for predicting traffic noise levels
6. Using the validated 'as-built' noise model and the forecasted 2018 (Year 1) traffic data presented in Table 5.2, model the Year 1 traffic noise levels for all receivers impacted by the Project and assessed in the ONMR
7. Compare the Year 1 traffic noise levels modelled during the preparation of the ONMR ('design' noise model) with the Year 1 traffic noise levels modelled using the validated 'as-built' noise model as part of this ONR (operational stage)
8. Where the operational 'as-built' noise levels for Year 1 are found to exceed the predicted Year 1 'design' noise levels by 2dB(A) or less, the operational noise levels are deemed to comply with the design objectives
9. Where the operational 'as-built' noise levels for Year 1 are found to exceed the predicted Year 1 'design' noise levels by more than 2dB(A) , then a detailed analysis is required including:
 - i. Predicting 2028 (Year 10) noise levels using the 'as-built' noise model for the applicable receiver locations
 - ii. Checking predicted 2028 noise levels for compliance with the relevant noise criteria
 - iii. Evaluating the adequacy of the noise mitigation measures implemented
 - iv. Considering additional reasonable and feasible noise mitigation measures, where necessary.

A summary of the above methodology is presented in Figure 6, which forms part of the Transport for NSW procedure document 'Preparing a Post Construction Noise Assessment Report', dated June 2014.

Figure 6 – Summary of Compliance Assessment Procedure



Source: Transport for NSW 'Procedure – Preparing a Post Construction Noise Assessment Report', June 2014

6.3 Additional Noise Mitigation Measures

In accordance with the ENMM, additional mitigation measures will be considered where modelled 2016 operational 'as-built' noise levels are found to be greater than 2dB(A) in comparison to modelled 2016 design noise levels [ie. operational noise levels are greater than +2dB(A) of design noise levels]. For those properties, any necessary additional mitigation measures will be determined and provided where feasible and reasonable in accordance with the ECRTN and the ENMM.

'Feasibility' relates to engineering considerations and what can practically be built. 'Reasonableness' is judged in terms of noise mitigation benefits and costs, and many other aspects such as community views, aesthetic impacts, existing and future noise levels at the affected sites and the benefits arising from the development.

7 Noise Modelling Results and Assessment

7.1 Noise Prediction Model

Noise modelling was carried out using the Road Traffic Noise Module in the SoundPLAN noise modelling software. This method is recognised and accepted by both Transport for NSW and EPA.

The traffic noise prediction model adopted by SoundPLAN is based on a method developed by the United Kingdom Department of Environment entitled "Calculation of Road Traffic Noise (1988)" known as the CoRTN88 method. This method has been adapted to Australian conditions and extensively tested by the Australian Road Research Board. The model predicts noise levels for free-flowing traffic and a modified method has been developed which enables an accurate prediction of noise from high truck exhausts to be taken into account.

The SoundPLAN noise model developed by Aecom during the pre-construction detailed design stage of the Project was provided to Renzo Tonin & Associates in order to provide a reliable comparison of pre- and post construction noise levels. The pre-construction 'design' noise model was updated with the 'as-built' road design, which included all the noise barriers and headlight screens implemented, to provide an 'as-built' post construction noise model.

Table 7.1 following sets out the inputs and assumptions used in the as-built post construction traffic noise prediction model.

Table 7.1 – Summary of SoundPLAN Noise Modelling Inputs

Input Parameters	Data Acquired From
Traffic volumes and mix	<p><u>Noise model validation</u>: using 2019 traffic classifications (total vehicles and % heavy vehicles) from traffic survey by Matrix Traffic and Transport Data Australia P/L (see Table 5.1 of Section 5)</p> <p><u>Noise prediction modelling</u>: using 2019 forecasted traffic volumes (total vehicles and % heavy vehicles) provided by Arup Aurecon Design Joint (see Table 5.2 of Section 5)</p>
Vehicle speed	<p><u>Noise model validation</u>: using 2019 traffic speeds based on traffic speeds (85th percentile) from traffic survey by Matrix Traffic and Transport Data Australia P/L (see Table 5.1 of Section 5)</p> <p><u>Noise prediction modelling</u>: 2019 traffic speeds based on posted speed limits along the Pacific Highway, ramps and service roads (see Table 5.2 of Section 5)</p>
Gradient of roadway	From 'as-built' road design provided by Transport for NSW
Source height	0.5m for car exhaust, 1.5m for car and truck engines and 3.6m for truck exhaust and detailed within CoRTN88
Ground topography at receiver and road	Digital topographic data and road design drawings provided by Transport for NSW
Angles of view from receiver	Determined during site inspections and aerial photos
Structures and cuttings on opposite side of road	Determined during site inspections and review of surveys
Ground absorption	Global factor of 0.75 except bushland and water which are 1 and 0, respectively
Receiver Heights	1.5m above ground level for ground floor and 4.5m above ground level for first floor
Facade correction	+2.5dB(A)

Input Parameters	Data Acquired From
Correction for Australian conditions	<ul style="list-style-type: none"> -1.7 dB(A) for 'at 1m from facade' conditions -0.7 dB(A) for 'free field' conditions <p>from the Australian Road Research Board (ARRB) Transport Research (Saunders et al 1983) and referred to in Austroads Research Report (ARR), 'An Approach to the Validation of Road Traffic Noise Models' (2002).</p> <p><i>NB. No Australian conditions correction is applicable for the night time period</i></p>
Acoustic properties of road surfaces	<ul style="list-style-type: none"> <u>Stone Mastic Asphalt (SMA)</u> on main carriageway from southern end of Project at chainage 41800 to chainage 54850 = -2dB(A) noise reduction <u>Plain Concrete Pavement (PCP)</u> on main carriageway from chainage 54800 to chainage 61800 = +3dB(A) <u>Dense Graded Asphalt (DGA)</u> on all ramps, local and service roads, including the old Pacific Highway = 0dB(A) noise reduction
Roadside barriers	Details of 'as-built' noise barriers provided by Transport for NSW
Traffic noise levels (L_{Aeq})	Based on long-term monitoring results (see Section 4.1.1)

7.2 Model Validation

The 'as-built' post construction noise model was validated using the 2019 long-term noise monitoring results and 2019 traffic classification counts obtained concurrently during the post construction noise monitoring.

Table 7.2 summarises the results of the traffic noise model validation, providing a comparison of the modelled traffic noise levels for existing conditions compared to the measured traffic noise levels, all presented to one decimal point for the purpose of the validation process.

Table 7.2 – Noise Model Validation Results

Monitoring Locations	$L_{Aeq}(15hr)$ Noise Level, dB(A)			$L_{Aeq}(9hr)$ Noise Level, dB(A)		
	Measured	Modelled	Variation	Measured	Modelled	Variation
L1 – 38 Kerr Drive, Macksville	51.9	51.8	0.1	48.9	48.7	0.2
L2 – 4201 Pacific Highway, Eungai Creek	63.9	64.2	-0.3	62.8	61.7	1.1
L3 – 40-56 Albert Drive, Donnellyville	57.2	57.8	-0.6	56.0	55.1	0.9
L4 – 11 Albert Drive, Donnellyville	53.9	54.8	-0.9	53.2	52.0	1.2
L5 – 4723 Pacific Highway, Donnellyville	57.5	58.8	-1.3	57.1	55.9	1.2
L6 – 4 Scotts Head Road, Way Way	61.4	61.5	-0.1	59.1	58.3	0.8
L7 – 58 Harrimans Lane, Macksville	59.1	58.7	0.4	55.3	54.7	0.6
L8 – 22 Letitia Close, North Macksville	59.2	57.7	1.5	56.4	54.8	1.6
L9 – 4227 Queens Lane, North Macksville	60.0	61.5	-1.5	59.2	58.8	0.4
L10 – 46 Rosewood Road, Warrell Creek	53.3	54.4	-1.1	52.8	51.7	1.1
L11 – 12 Kerr Drive, Macksville	53.2	54.7	-1.5	52.2	51.4	0.8
L12 – 41 Bald Hill Road, Macksville	62.5	63.2	-0.7	61.2	60.3	0.9
L13 – 75 River Street, Macksville	59.4	60.4	-1.0	57.3	57.2	0.1
L14 – 69 River Street, Macksville (Front)	59.1	59.7	-0.6	53.5	54.1	-0.6
L15 – 69 River Street, Macksville (Rear)	52.7	52.6	0.1	52.7	50.1	2.6

Monitoring Locations	L _{Aeq} (15hr) Noise Level, dB(A)			L _{Aeq} (9hr) Noise Level, dB(A)		
	Measured	Modelled	Variation	Measured	Modelled	Variation
L16 – 63 River Street, Macksville	51.4	51.1	0.3	50.2	48.3	1.9
L17 – 35 Old Coast Road, North Macksville	63.0	62.3	0.7	60.6	59.8	0.8
L18 – 18 Mattick Road, North Macksville	55.6	54.4	1.2	53.7	51.9	1.8
L19 – 2 Mattick Road, North Macksville	51.6	50.6	1.0	49.1	48.1	1.0
L20 – 101 Old Coast Road, North Macksville	63.7	64.8	-1.1	62.6	62.1	0.5
L21 – 309 Old Coast Road, North Macksville	64.6	65.3	-0.7	63.5	62.7	0.8
Median (all data)			-0.6			0.9
Median (excluding fauna affected data)			-0.6			0.8

Notes: 1. Measured noise levels may differ to those presented in Table 6.6 as these noise levels are for a selected period of days consistent with the traffic counting duration.

The noise model validation results presented in Table 7.2 above show that the as-built noise model predicts results that are generally in good agreement with the noise monitoring at each location. However, the validation results for the night-time period at the monitoring Location L15 show that the noise model significantly under-predicts traffic noise levels when compared to the noise monitoring result for night-time at this location. That is, the monitored noise levels during the night-time period were significantly higher [$> 2\text{dB(A)}$] than the predicted noise levels from the noise modelling. A review of audio files captured at these monitoring locations was conducted and it was confirmed that the likely cause of the unusually high monitored noise levels was due to fauna noise (eg. insects and/or birds) that was clearly audible in the audio recordings.

The median differences in the day and night-time periods are less than 1dB(A) ; therefore, the post construction as-built noise model is found to validate well and there is a reasonable level of confidence that can be placed on the ability of the model to predict future traffic noise levels.

7.3 Predicted Post Construction Traffic Noise Levels

Noise levels for the receiver locations assessed as part of the detailed design (pre-construction) noise assessment and presented in the ONMR, were predicted using the validated post construction 'as-built' noise model and forecasted traffic classification data for both the 2018 opening year and 2028 design year (2028), as presented in Table 5.6 and Table 5.7, respectively. Results of the noise modelling were then compared to the 2016 opening year and 2026 design year noise levels that were predicted in the detailed design (pre-construction) noise assessment and presented in Appendix D of the ONMR at the same receiver locations, in order to compare noise levels in accordance with Practice Note VIII of the ENMM and MCoA E1.

It is noted that the 2016 and 2026 predicted noise levels from the detailed design (pre-construction) noise assessment and presented in the ONMR were rounded whole levels. In order to conduct a detailed and relevant comparison of the detailed design pre-construction noise levels with the post construction noise levels, noise levels to one decimal place should be compared. With this in mind, it is expected that differences of up to $\pm 0.5\text{dB(A)}$ change in noise level may result when the ONMR noise

levels are presented to one decimal place. For example, if the noise level in the ONMR is presented as 58dB(A), then the actual noise level to one decimal place could range from 57.5dB(A) to 58.4dB(A).

Table C.1 in Appendix C presents the opening year (Year 1) noise modelling results at the receiver locations and also details the comparison between the post construction and the design (pre-construction) Year 1 (2016 vs 2018) noise levels for the day and night periods.

Table C.2 in Appendix C presents the design year (Year 10) noise modelling results at the receiver locations and also details the comparison between the post construction and the design (pre-construction) Year 10 (2026 vs 2028) noise levels for the day and night periods.

Table C.3 in Appendix C presents the future existing predicted 2018 day and night noise levels (ie. without the WC2NH project constructed) and the 'as-built' design year (Year 10) noise modelling results. The table also identifies receivers eligible for at-property treatment and those locations that have been treated. It is noted that the some receivers were not assessed as part of the ONMR and therefore, future-existing noise levels are not presented for these receivers.

Noise modelling was conducted for a total of 276 receiver locations and four (4) additional dwellings have been identified for consideration of at-property treatment.

Based on the modelling results and the comparison of the pre and post construction modelled noise levels, there is a clear trend of compliance. That is, the post construction noise levels are within +2dB(A) of the pre-construction noise levels for all receivers. The maximum difference was determined to be +1dB(A), where the post construction modelled noise level was higher than the pre-construction modelled noise level by 1.1dB(A). As discussed previously, should the ONMR noise level be rounded to one decimal place, then the difference would increase to a maximum of +1.6dB(A), which is still within the +2dB(A) requirement.

Therefore, the outcome of the comparison indicates that the noise prediction model used during the design (pre-construction) stage was adequate in predicting future traffic noise levels, and the noise mitigation performance of the as-built construction of the upgrade is found to be adequate in accordance with ENMM's Practice Note VIII and the documented procedures

8 Conclusion

Renzo Tonin & Associates (NSW) Pty Ltd has completed the operational noise monitoring and assessment of road traffic noise for the Warrell Creek to Nambucca Heads Pacific Highway upgrade in accordance with the requirements set out in the relevant Ministers Conditions of Approval, the NSW 'Environmental Criteria for Road Traffic Noise' and the NSW 'Environmental Noise Management Manual'.

Operational noise levels for the 2018 opening year and the 2028 design year (10 years after opening) were predicted using a validated post construction 'as-built' noise model. The predicted noise levels were compared to the previously predicted design noise levels for the proposed 2016 opening year and the proposed 2026 design year. Results of the comparison were found to be less +2dB(A) and in accordance with the ENMM and relevant procedures. This result confirmed 149 properties that received at-property noise treatment, based on the predicted noise levels (as identified in the project's Environmental Assessment and Operational Noise Management Report), have the appropriate level of mitigation and no additional noise mitigation treatment is required to these properties.

During construction, road design modifications (including the use of SMA pavement for the section south of Mattick Road and the use of noise / landscape mounds) were implemented. These design modifications provided additional noise benefits to nearby receivers but were not included in the predictive noise model which formed part of the Operational Noise Management Report. As a result, the Post Construction Operational Noise Report determined that only 30 properties exceeded the noise criteria and are eligible for at-property noise treatment.

Of these 30 eligible properties

- 21 properties have received at house noise treatments
- Three (3) properties were demolished as part of the project
- Two (2) properties declined the offer for treatment
- Four (4) additional properties have been identified for consideration for at-property treatment once the report is approved and published.

APPENDIX A Glossary of Terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

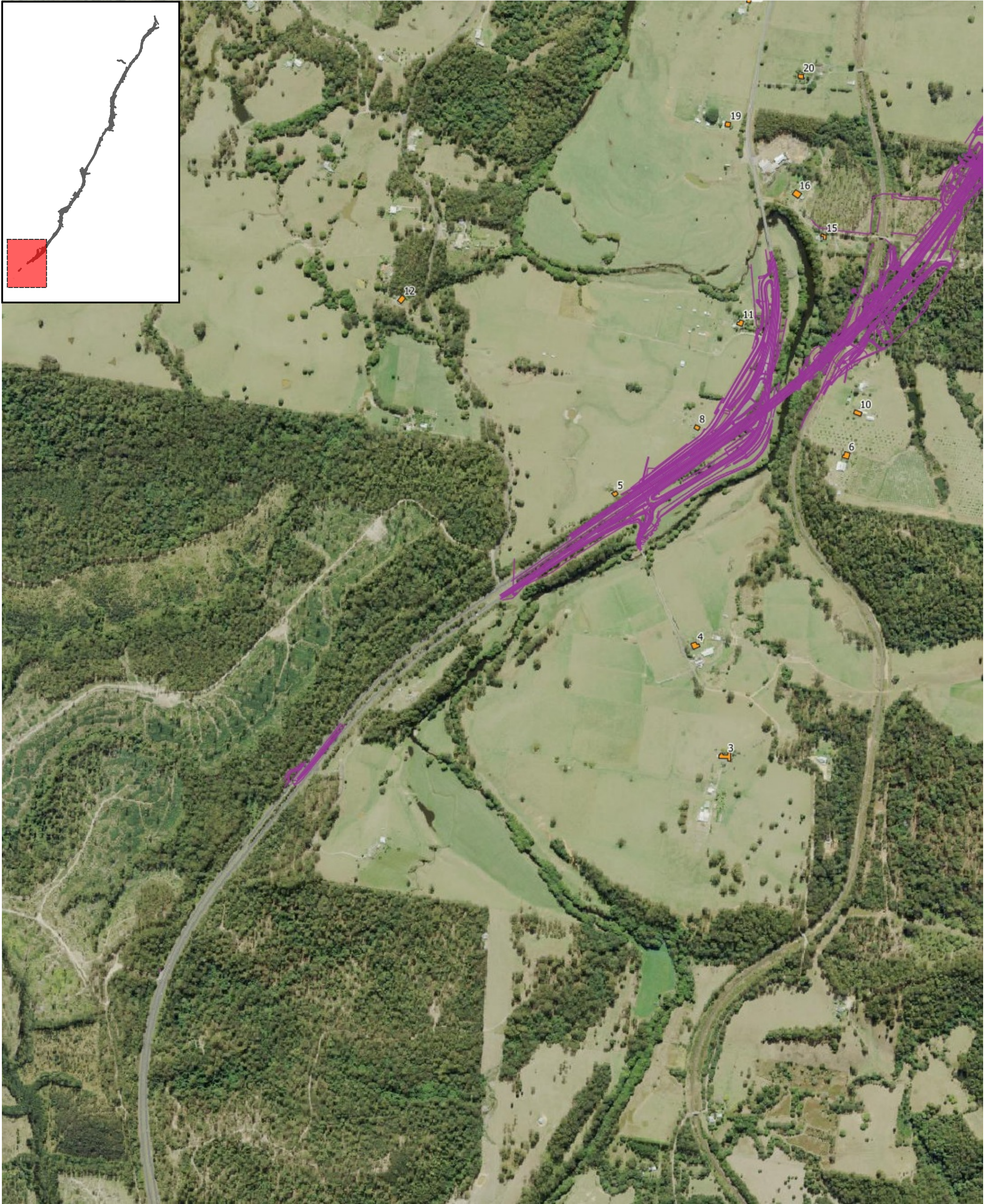
Adverse weather	Weather effects that enhance noise (particularly wind and temperature inversions) occurring at a site for a significant period of time. In the NSW INP this occurs when wind occurs for more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of nights in winter.
Air-borne noise	Noise which is fundamentally transmitted by way of the air and can be attenuated by the use of barriers and walls placed physically between the noise source and receiver.
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Amenity	A desirable or useful feature or facility of a building or place.
AS	Australian Standard
Assessment period	The time period in which an assessment is made. e.g. Day 7am-10pm & Night 10pm-7am.
Assessment Point	A location at which a noise or vibration measurement is taken or estimated.
Attenuation	The reduction in the level of sound or vibration.
Audible Range	The limits of frequency which are audible or heard as sound. The normal hearing in young adults detects ranges from 20 Hz to 20 kHz, although some people can detect sound with frequencies outside these limits.
A-weighting	A filter applied to the sound recording made by a microphone to approximate the response of the human ear.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the LA90 noise level if measured as an overall level or an L90 noise level when measured in octave or third-octave bands.
Barrier (Noise)	A natural or constructed physical barrier which impedes the propagation of sound and includes fences, walls, earth mounds or berms and buildings.
Berm	Earth or overburden mound.
Buffer	An area of land between a source and a noise-sensitive receiver and may be an open space or a noise-tolerant land use.
Bund	A bund is an embankment or wall of brick, stone, concrete or other impervious material, which may form part or all of the perimeter of a compound.
BS	British Standard
CoRTN	United Kingdom Department of Environment entitled "Calculation of Road Traffic Noise (1988)"

Decibel [dB]	<p>The units of sound measurement. The following are examples of the decibel readings of every day sounds:</p> <p>0dB The faintest sound we can hear, defined as 20 micro Pascal</p> <p>30dB A quiet library or in a quiet location in the country</p> <p>45dB Typical office space. Ambience in the city at night</p> <p>60dB CBD mall at lunch time</p> <p>70dB The sound of a car passing on the street</p> <p>80dB Loud music played at home</p> <p>90dB The sound of a truck passing on the street</p> <p>100dB The sound of a rock band</p> <p>110dB Operating a chainsaw or jackhammer</p> <p>120dB Deafening</p>
dB(A)	A-weighted decibel. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz) but is less effective outside these frequencies. The dB(C) level is not widely used but has some applications.
Diffraction	The distortion of sound waves caused when passing tangentially around solid objects.
DIN	German Standard
ECRTN	Environmental Criteria for Road Traffic Noise, NSW, 1999
EPA	Environment Protection Authority
Field Test	<p>A test of the sound insulation performance in-situ. See also 'Laboratory Test'</p> <p>The sound insulation performance between building spaces can be measured by conducting a field test, for example, early during the construction stage or on completion.</p> <p>A field test is conducted in a non-ideal acoustic environment. It is generally not possible to measure the performance of an individual building element accurately as the results can be affected by numerous field conditions.</p>
Fluctuating Noise	Noise that varies continuously to an appreciable extent over the period of observation.
Free-field	An environment in which there are no acoustic reflective surfaces. Free field noise measurements are carried out outdoors at least 3.5m from any acoustic reflecting structures other than the ground.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Ground-borne noise	Vibration propagated through the ground and then radiated as noise by vibrating building elements such as wall and floor surfaces. This noise is more noticeable in rooms that are well insulated from other airborne noise. An example would be vibration transmitted from an underground rail line radiating as sound in a bedroom of a building located above.
Habitable Area	<p>Includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre and sunroom.</p> <p>Excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.</p>
Heavy Vehicle	A truck, transporter or other vehicle with a gross weight above a specified level (for example: over 8 tonnes).
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.

INP	NSW Industrial Noise Policy, EPA 1999
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
Intrusive noise	Refers to noise that intrudes above the background level by more than 5 dB(A).
L1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L10	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L10(1hr)	The L10 level measured over a 1 hour period.
L10(18hr)	The arithmetic average of the L10(1hr) levels for the 18 hour period between 6am and 12 midnight on a normal working day.
L90	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
LAeq or Leq	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time, which would produce the same energy as a fluctuating sound level. When A-weighted, this is written as the LAeq.
LAeq(1hr)	The LAeq noise level for a one-hour period. In the context of the NSW EPA's Road Noise Policy it represents the highest tenth percentile hourly A-weighted Leq during the period 7am to 10pm, or 10pm to 7am (whichever is relevant).
LAeq(8hr)	The LAeq noise level for the period 10pm to 6am.
LAeq(9hr)	The LAeq noise level for the period 10pm to 7am.
LAeq(15hr)	The LAeq noise level for the period 7am to 10pm.
LAeq (24hr)	The LAeq noise level during a 24 hour period, usually from midnight to midnight.
Lmax	The maximum sound pressure level measured over a given period. When A-weighted, this is usually written as the Lmax.
Lmin	The minimum sound pressure level measured over a given period. When A-weighted, this is usually written as the Lmin.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on. That is, the sound of 85 dB is four times or 400% the loudness of a sound of 65 dB.
Microphone	An electro-acoustic transducer which receives an acoustic signal and delivers a corresponding electric signal.
NCA	Noise Catchment Area. An area of study within which the noise environment is substantially constant.
Noise	Unwanted sound
Pre-construction	Work in respect of the proposed project that includes design, survey, acquisitions, fencing, investigative drilling or excavation, building/road dilapidation surveys, minor clearing (except where threatened species, populations or ecological communities would be affected), establishing ancillary facilities such as site compounds, or other relevant activities determined to have minimal environmental impact (e.g. minor access roads).
Reflection	Sound wave reflected from a solid object obscuring its path.
RMS	Root Mean Square value representing the average value of a signal.
RNP	Road Noise Policy, NSW, March 2011
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.

Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 pico watt.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone referenced to 20 micro Pascal.
Spoil	Soil or materials arising from excavation activities.
Structure-borne Noise	<p>Audible noise generated by vibration induced in the ground and/or a structure. Vibration can be generated by impact or by solid contact with a vibrating machine.</p> <p>Structure-borne noise cannot be attenuated by barriers or walls but requires the isolation of the vibration source itself. This can be achieved using a resilient element placed between the vibration source and its support such as rubber, neoprene or springs or by physical separation (using an air gap for example).</p> <p>Examples of structure-borne noise include the noise of trains in underground tunnels heard to a listener above the ground, the sound of footsteps on the floor above a listener and the sound of a lift car passing in a shaft. See also 'Impact Noise'.</p>
Tonal Noise	Sound containing a prominent frequency and characterised by a definite pitch.

APPENDIX B **Receiver Locations**



Legend

- Road Alignment
- Noise Wall
- Receiver

Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

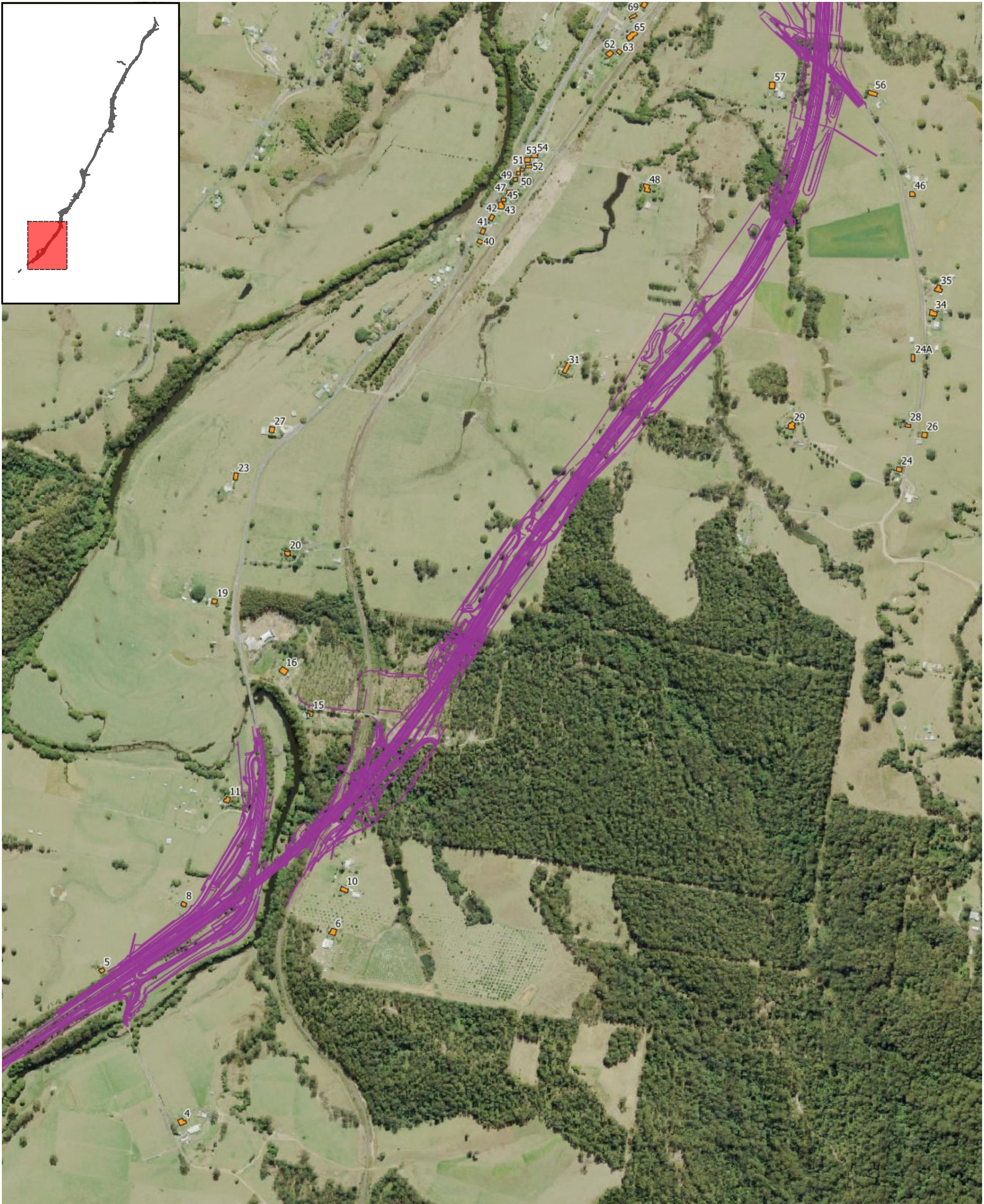
Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Receiver Locations

Figure No: TK363-01.6.1.3.1 AppB (r3)-1
Date: 25-02-2020
Created by: DK

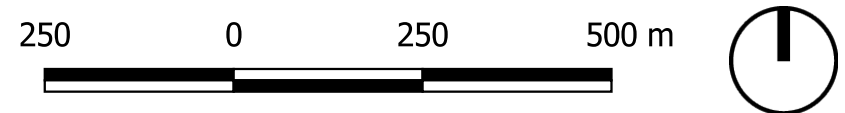
Rev: R3
Sheet: A3
Scale: 1:10000

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Legend

- Road Alignment
- Noise Wall
- Receiver



Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

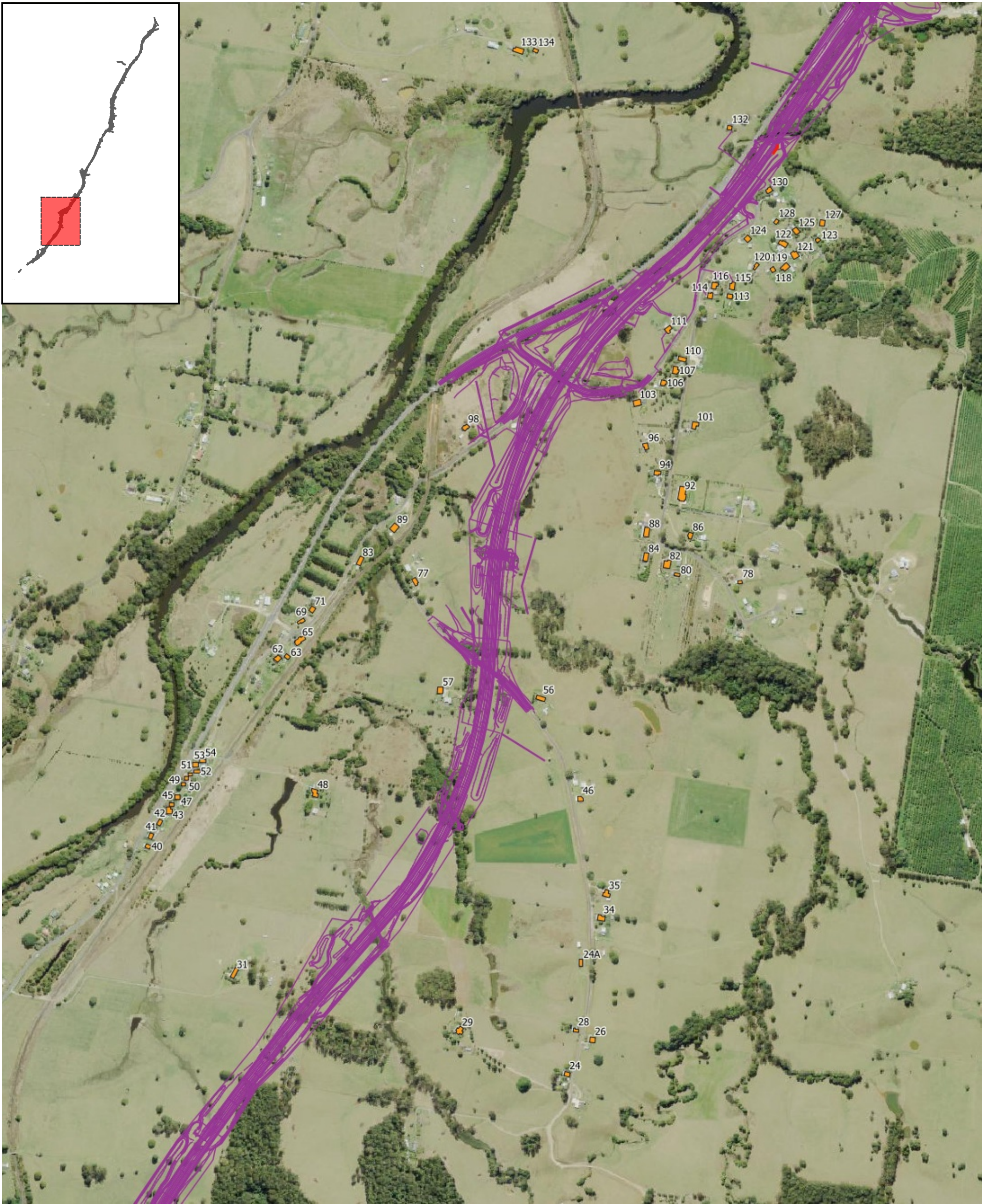
Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Receiver Locations

Figure No: TK363-01.6.1.3.1 AppB (r3)-2
Date: 25-02-2020
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Legend

- Road Alignment
- Noise Wall
- Receiver

Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

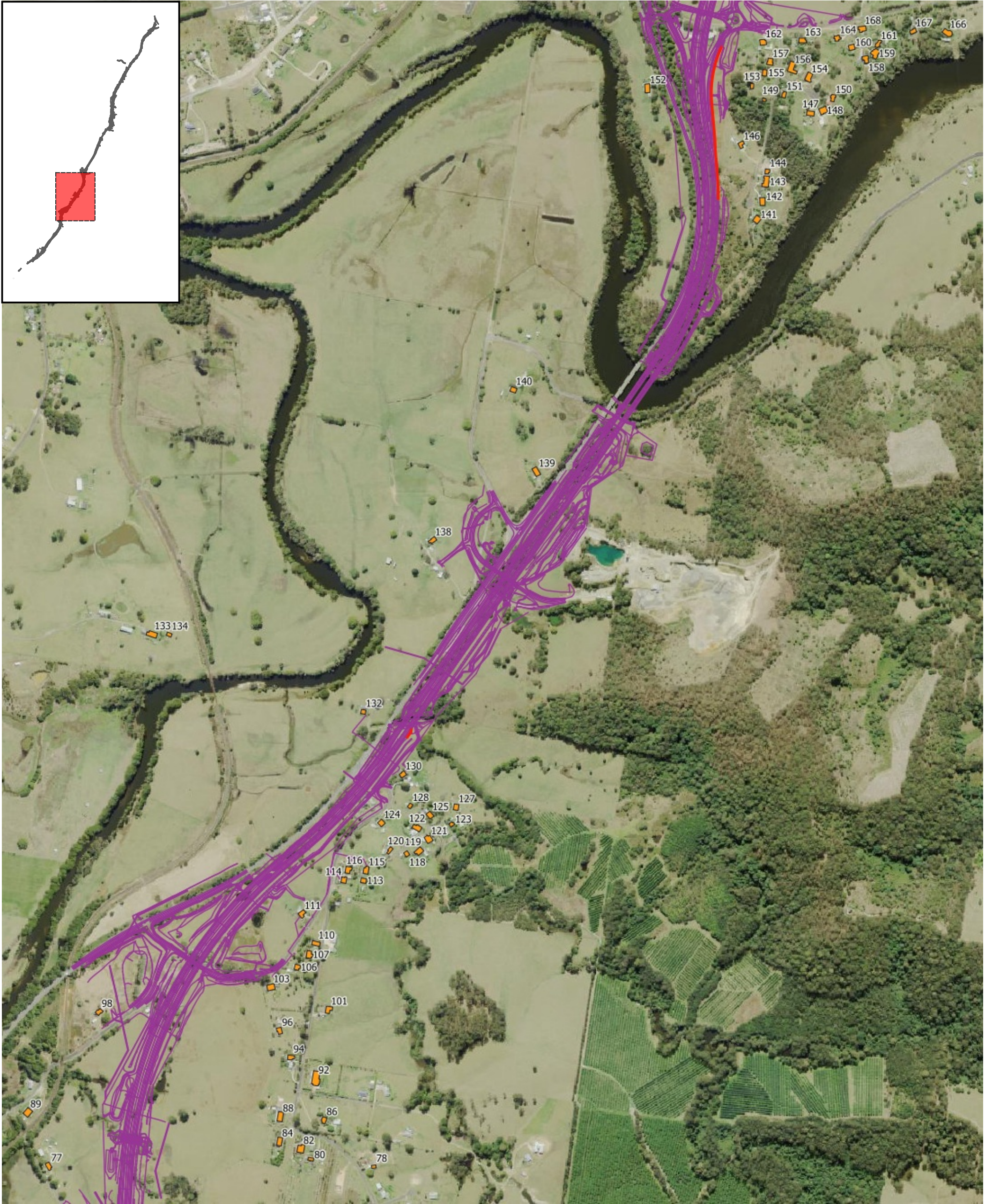
Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Receiver Locations

Figure No: TK363-01.6.1.3.1 AppB (r3)-3
Date: 25-02-2020
Created by: DK

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Scale: 1:10000

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Legend

- Road Alignment
- Noise Wall
- Receiver

250 0 250 500 m



Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

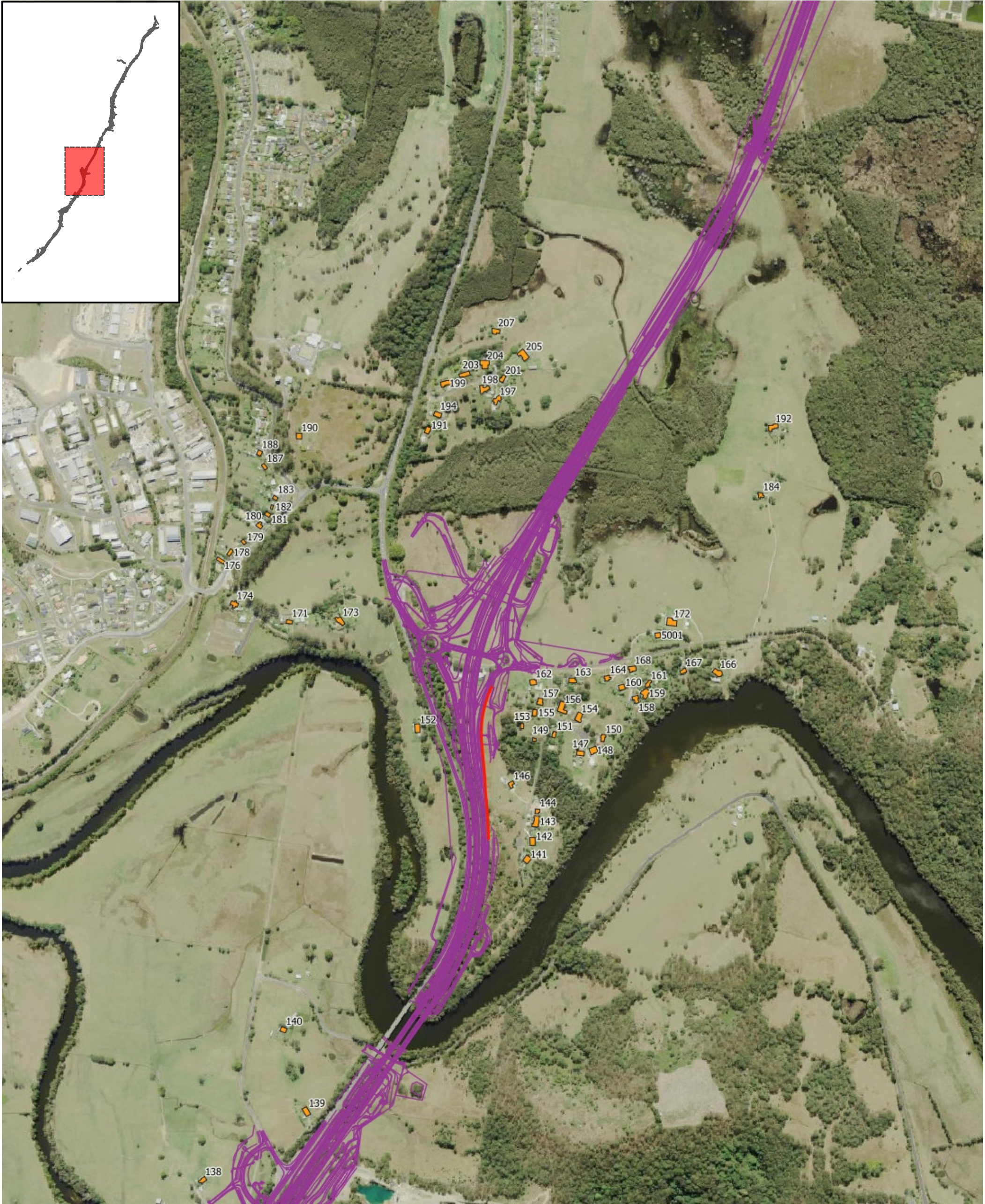
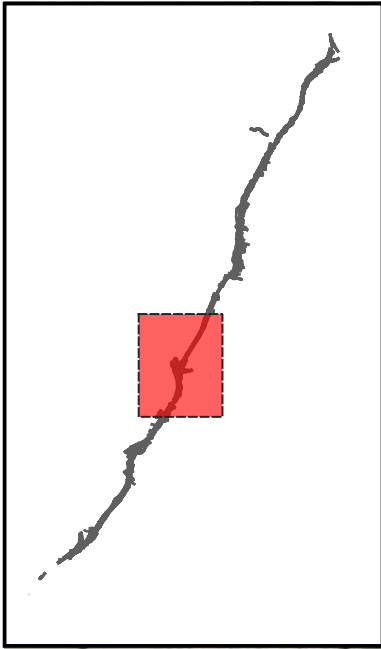
Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Receiver Locations

Figure No: TK363-01.6.1.3.1 AppB (r3)-4
Date: 25-02-2020
Created by: DK

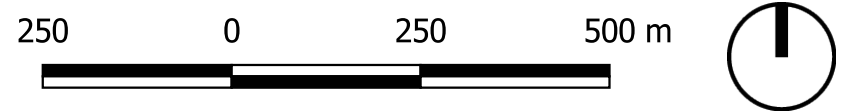
Rev: R3
Sheet: A3
Scale: 1:10000

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Legend

- Road Alignment
- Noise Wall
- Receiver



Consultant:
RENZO TONIN & ASSOCIATES
inspired to achieve
1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

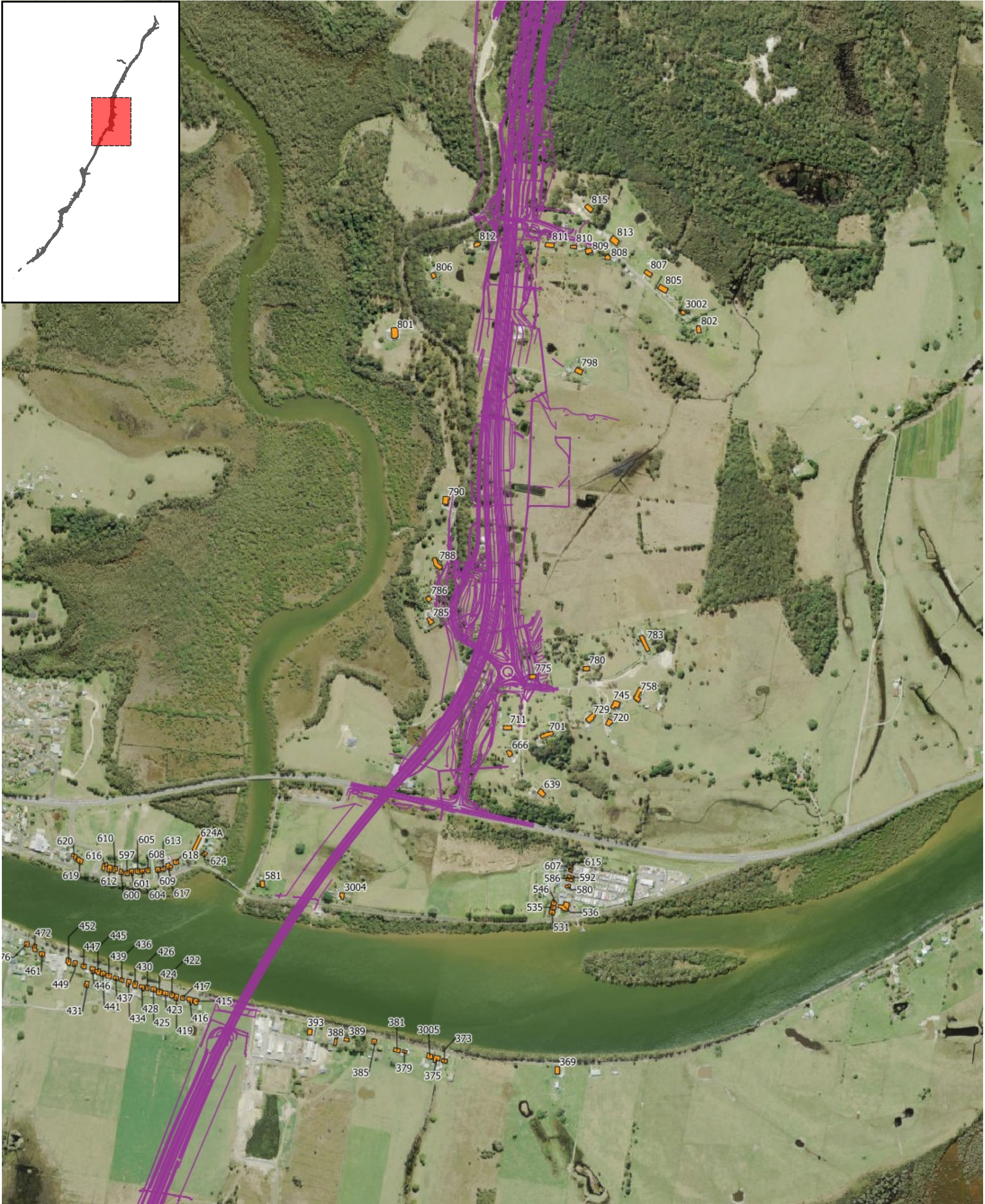
Client:
Roads & Maritime

Project:
Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

Description:
Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Receiver Locations

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Figure No: TK363-01.6.1.3.1 AppB (r3)-5
Date: 25-02-2020
Created by: DK
Rev: R3
Sheet: A3
Scale: 1:10000



Legend

- Road Alignment
- Noise Wall
- Receiver



Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

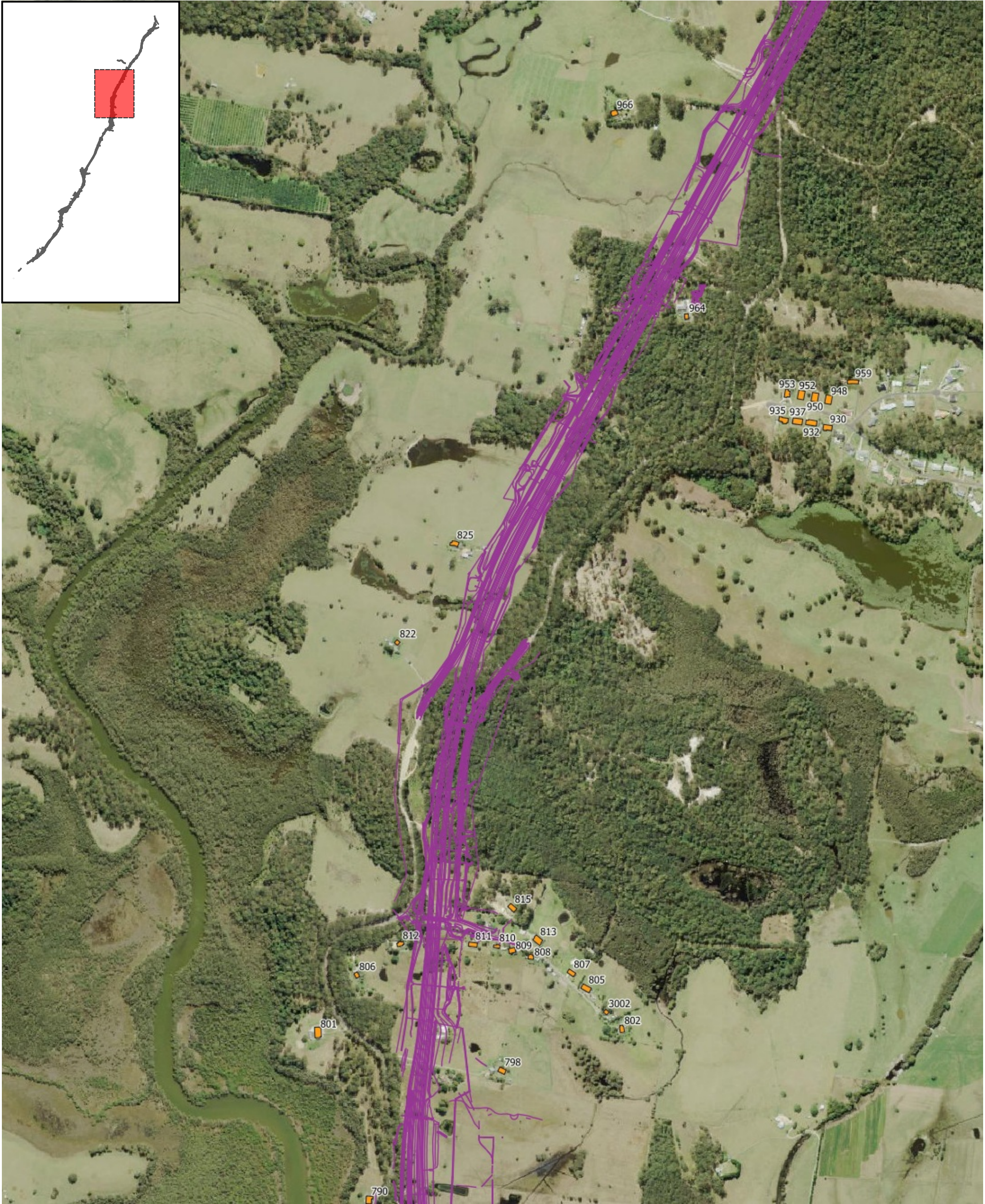
Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Receiver Locations

Figure No: TK363-01.6.1.3.1 AppB (r3)-7
Date: 25-02-2020
Created by: DK

Rev: R3
Sheet: A3
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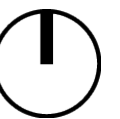
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Legend

- Road Alignment
- Noise Wall
- Receiver

250 0 250 500 m



Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

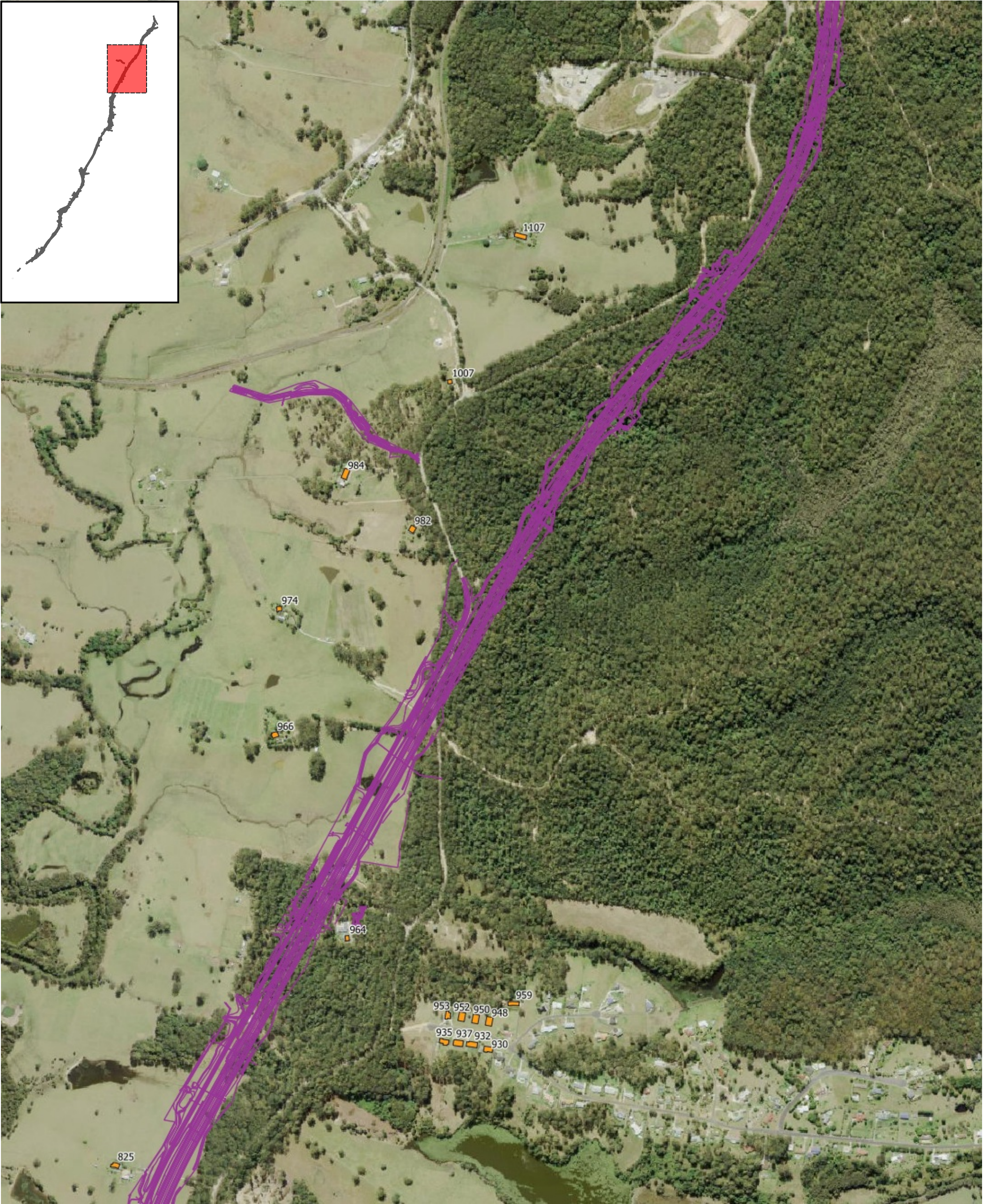
Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Receiver Locations

Figure No: TK363-01.6.1.3.1 AppB (r3)-8
Date: 25-02-2020
Created by: DK

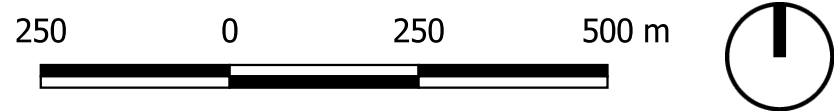
Rev: R3
Sheet: A3
Scale: 1:10000

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Legend

- Road Alignment
- Noise Wall
- Receiver



Consultant:
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inspired to achieve
1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

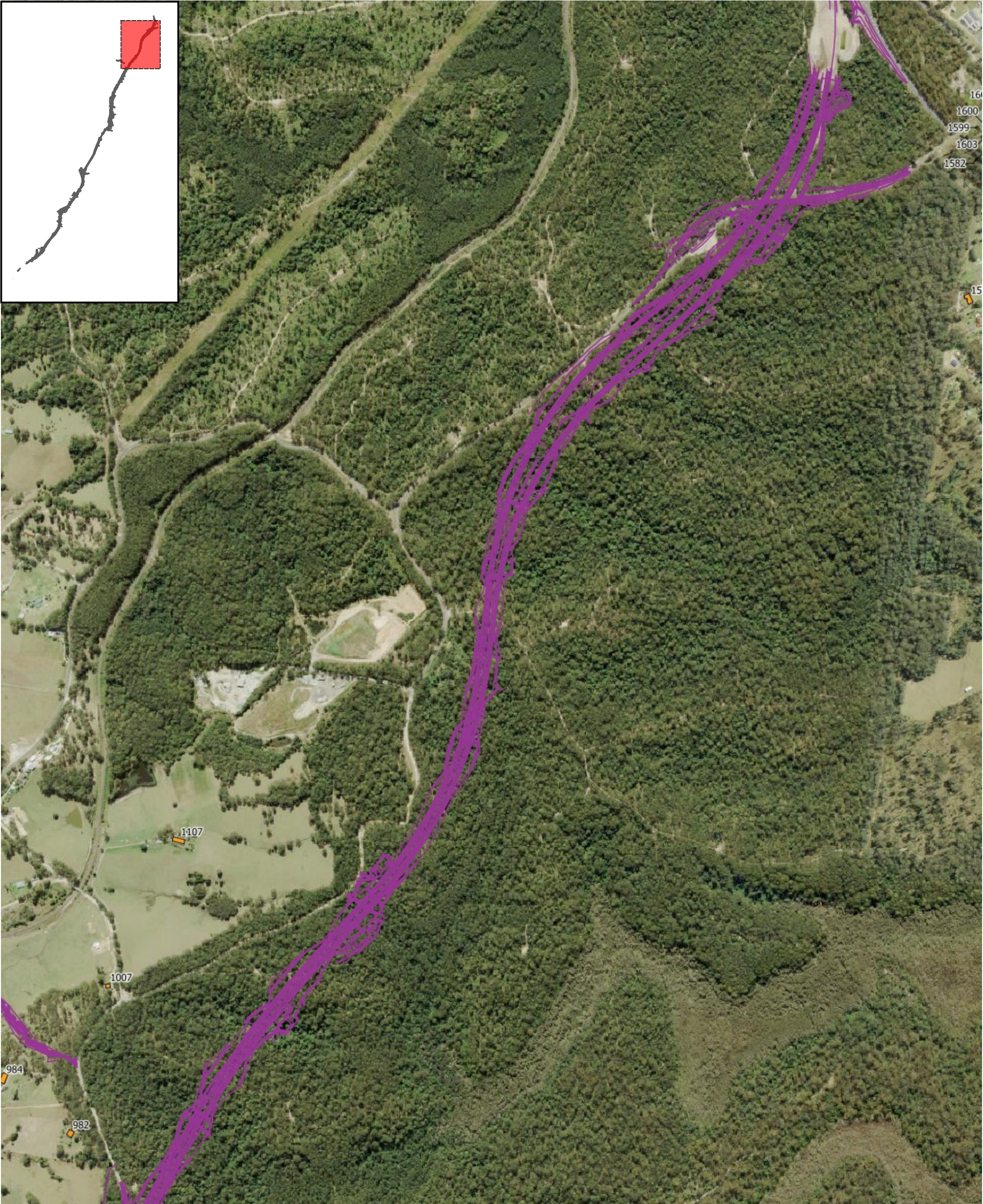
Client:
Roads & Maritime

Project:
Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

Description:
Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Receiver Locations

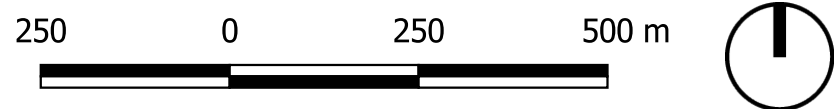
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Figure No: TK363-01.6.1.3.1 AppB (r3)-9
Date: 25-02-2020
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Rev: R3
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Scale: 1:10000



Legend

- Road Alignment
- Noise Wall
- Receiver



Consultant:
RENZO TONIN & ASSOCIATES
inspired to achieve
1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

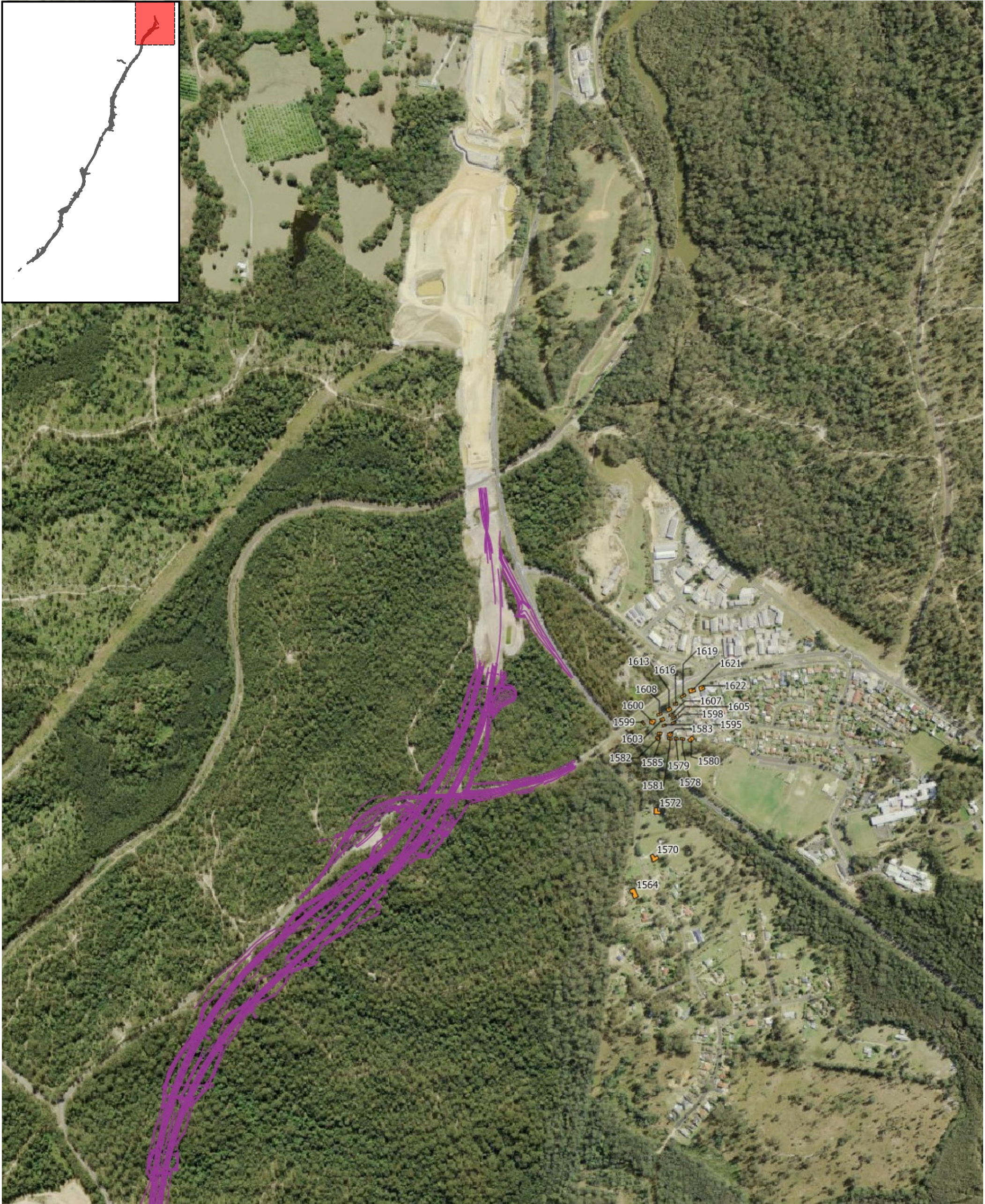
Client:
Roads & Maritime

Project:
Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

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Description:
Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Receiver Locations

Figure No: TK363-01.6.1.3.1 AppB (r3)-10
Date: 25-02-2020
Created by: DK
Rev: R3
Sheet: A3
Scale: 1:10000



Legend

- Road Alignment
- Noise Wall
- Receiver

Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Receiver Locations

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Figure No: TK363-01.6.1.3.1 AppB (r3)-11 Rev: R3
Date: 25-02-2020 Sheet: A3
Created by: DK Scale: 1:10000

APPENDIX C **Comparison of Design (Pre-Construction) & As-Built Traffic Noise Levels**

Table C.1 – Comparison of Traffic Noise Levels for Opening Year, dB(A)

Receiver ID	Pre-Construction Predicted 2016 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2018 Day L _{Aeq} (15hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2016 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2018 Night L _{Aeq} (9hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?
4	51	49.9	-1.1	-	49	47.6	-1.4	-
5	68	66.9	-1.1	-	66	64.2	-1.8	-
6	56	55.0	-1.0	-	54	52.5	-1.5	-
8	62	61.9	-0.1	-	60	59.3	-0.7	-
10	57	56.0	-1.0	-	55	53.5	-1.5	-
11	56	54.6	-1.4	-	54	52.3	-1.7	-
12	57	55.0	-2.0	-	56	56.0	0.0	-
15	53	51.6	-1.4	-	51	49.4	-1.6	-
16	50	49.0	-1.0	-	48	47.3	-0.7	-
19	55	51.3	-3.7	-	52	50.3	-1.7	-
20	49	47.5	-1.5	-	47	46.8	-0.2	-
23	55	50.5	-4.5	-	52	49.6	-2.4	-
24	48	47.2	-0.8	-	46	45.0	-1.0	-
26	46	44.9	-1.1	-	44	42.8	-1.2	-
27	57	52.0	-5.0	-	53	51.3	-1.7	-
28	49	47.7	-1.3	-	47	45.5	-1.5	-
29	51	50.3	-0.7	-	49	47.9	-1.1	-
31	53	51.9	-1.1	-	51	49.6	-1.4	-
34	48	46.8	-1.2	-	46	44.7	-1.3	-
35	49	47.5	-1.5	-	47	45.4	-1.6	-
40	48	46.9	-1.1	-	46	44.7	-1.3	-
41	48	46.7	-1.3	-	46	44.5	-1.5	-
42	47	46.4	-0.6	-	45	44.2	-0.8	-
43	48	47.0	-1.0	-	46	44.8	-1.2	-
45	49	47.4	-1.6	-	47	45.7	-1.3	-
46	51	50.4	-0.6	-	50	48.2	-1.8	-
47	49	47.6	-1.4	-	47	45.7	-1.3	-
48	51	50.6	-0.4	-	50	48.2	-1.8	-

Receiver ID	Pre-Construction Predicted 2016 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2018 Day L _{Aeq} (15hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2016 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2018 Night L _{Aeq} (9hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?
49	48	46.5	-1.5	-	46	44.2	-1.8	-
50	47	46.1	-0.9	-	45	43.9	-1.1	-
51	49	46.7	-2.3	-	46	44.9	-1.1	-
52	49	47.4	-1.6	-	47	45.3	-1.7	-
53	49	47.0	-2.0	-	47	45.3	-1.7	-
54	51	48.6	-2.4	-	48	47.0	-1.0	-
56	54	53.1	-0.9	-	52	51.0	-1.0	-
57	55	53.0	-2.0	-	53	50.7	-2.3	-
62	48	46.6	-1.4	-	46	44.5	-1.5	-
63	49	46.8	-2.2	-	48	47.0	-1.0	-
65	56	53.0	-3.0	-	54	53.6	-0.4	-
69	61	57.5	-3.5	-	59	57.5	-1.5	-
71	61	56.9	-4.1	-	59	57.2	-1.8	-
77	54	54.3	0.3	-	53	51.8	-1.2	-
78	46	44.2	-1.8	-	44	42.4	-1.6	-
80	48	46.5	-1.5	-	46	44.7	-1.3	-
82	49	47.7	-1.3	-	47	45.8	-1.2	-
83	52	49.5	-2.5	-	50	48.0	-2.0	-
84	50	49.2	-0.8	-	49	47.3	-1.7	-
86	50	48.8	-1.2	-	48	46.9	-1.1	-
88	51	49.9	-1.1	-	49	47.9	-1.1	-
89	52	49.7	-2.3	-	51	47.9	-3.1	-
92	49	48.3	-0.7	-	47	46.3	-0.7	-
94	50	49.2	-0.8	-	49	47.2	-1.8	-
96	50	49.1	-0.9	-	48	47.2	-0.8	-
98	58	55.6	-2.4	-	56	54.5	-1.5	-
101	43	41.3	-1.7	-	41	39.6	-1.4	-
103	52	50.4	-1.6	-	50	49.1	-0.9	-
106	50	47.5	-2.5	-	48	46.7	-1.3	-
107	49	46.9	-2.1	-	48	45.8	-2.2	-

Receiver ID	Pre-Construction Predicted 2016 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2018 Day L _{Aeq} (15hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2016 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2018 Night L _{Aeq} (9hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?
110	50	47.6	-2.4	-	49	46.7	-2.3	-
111	55	54.8	-0.2	-	53	52.8	-0.2	-
113	48	45.9	-2.1	-	46	44.2	-1.8	-
114	54	52.6	-1.4	-	53	51.2	-1.8	-
115	50	48.4	-1.6	-	48	46.3	-1.7	-
116	56	54.5	-1.5	-	54	52.5	-1.5	-
118	51	49.1	-1.9	-	49	46.9	-2.1	-
119	47	45.9	-1.1	-	45	43.7	-1.3	-
120	54	52.3	-1.7	-	52	50.1	-1.9	-
121	49	47.5	-1.5	-	47	45.3	-1.7	-
122	53	51.2	-1.8	-	51	49.2	-1.8	-
123	50	48.6	-1.4	-	48	46.4	-1.6	-
124	58	56.8	-1.2	-	56	55.0	-1.0	-
125	53	51.5	-1.5	-	51	49.4	-1.6	-
127	51	49.8	-1.2	-	49	47.6	-1.4	-
128	55	53.4	-1.6	-	53	51.5	-1.5	-
130	57	55.5	-1.5	-	55	53.4	-1.6	-
132	59	57.7	-1.3	-	57	55.6	-1.4	-
133	48	48.2	0.2	-	46	46.4	0.4	-
134	49	48.5	-0.5	-	47	46.7	-0.3	-
138	55	53.9	-1.1	-	53	53.6	0.6	-
139	61	59.7	-1.3	-	59	58.9	-0.1	-
140	60	56.8	-3.2	-	58	56.7	-1.3	-
141	50	49.0	-1.0	-	48	47.7	-0.3	-
142	51	47.6	-3.4	-	49	47.0	-2.0	-
143	51	48.9	-2.1	-	49	48.6	-0.4	-
144	50	47.4	-2.6	-	48	46.9	-1.1	-
146	49	47.7	-1.3	-	48	46.9	-1.1	-
147	50	46.6	-3.4	-	48	46.8	-1.2	-
148	51	47.1	-3.9	-	49	47.5	-1.5	-

Receiver ID	Pre-Construction Predicted 2016 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2018 Day L _{Aeq} (15hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2016 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2018 Night L _{Aeq} (9hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?
149	51	48.8	-2.2	-	50	48.5	-1.5	-
150	48	45.2	-2.8	-	47	45.2	-1.8	-
151	53	49.9	-3.1	-	51	49.9	-1.1	-
152	62	58.8	-3.2	-	61	59.2	-1.8	-
153	53	50.2	-2.8	-	52	49.8	-2.2	-
154	50	47.2	-2.8	-	49	46.6	-2.4	-
155	55	52.6	-2.4	-	54	52.6	-1.4	-
156	53	50.4	-2.6	-	52	50.6	-1.4	-
157	58	54.8	-3.2	-	56	54.6	-1.4	-
158	51	47.2	-3.8	-	49	47.7	-1.3	-
159	46	42.8	-3.2	-	43	41.9	-1.1	-
160	51	47.9	-3.1	-	49	48.5	-0.5	-
161	47	44.2	-2.8	-	44	43.7	-0.3	-
162	60	57.3	-2.7	-	58	57.1	-0.9	-
163	52	48.0	-4.0	-	50	47.2	-2.8	-
164	53	49.1	-3.9	-	51	48.8	-2.2	-
166	50	47.0	-3.0	-	48	45.8	-2.2	-
167	53	49.2	-3.8	-	51	49.4	-1.6	-
168	54	51.2	-2.8	-	52	50.4	-1.6	-
171	52	49.1	-2.9	-	50	49.0	-1.0	-
172	54	51.5	-2.5	-	52	49.4	-2.6	-
173	56	54.9	-1.1	-	54	54.4	0.4	-
174	53	49.3	-3.7	-	50	49.0	-1.0	-
184	53	51.8	-1.2	-	51	49.8	-1.2	-
187	53	47.3	-5.7	-	51	47.0	-4.0	-
188	54	46.6	-7.4	-	52	46.4	-5.6	-
190	53	51.6	-1.4	-	51	51.4	0.4	-
191	55	52.7	-2.3	-	53	51.9	-1.1	-
192	53	52.4	-0.6	-	51	50.2	-0.8	-
194	54	52.8	-1.2	-	52	51.1	-0.9	-

Receiver ID	Pre-Construction Predicted 2016 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2018 Day L _{Aeq} (15hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2016 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2018 Night L _{Aeq} (9hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?
197	56	54.8	-1.2	-	54	52.7	-1.3	-
198	55	53.7	-1.3	-	53	51.9	-1.1	-
199	55	51.7	-3.3	-	53	51.0	-2.0	-
201	55	54.3	-0.7	-	53	52.0	-1.0	-
203	52	49.8	-2.2	-	50	48.7	-1.3	-
204	50	50.2	0.2	-	47	47.8	0.8	-
205	56	55.1	-0.9	-	54	52.7	-1.3	-
207	50	47.8	-2.2	-	48	45.9	-2.1	-
369	57	52.1	-4.9	-	54	50.9	-3.1	-
373	47	45.4	-1.6	-	44	43.0	-1.0	-
375	48	45.6	-2.4	-	45	44.4	-0.6	-
379	55	51.7	-3.3	-	52	50.8	-1.2	-
381	57	54.7	-2.3	-	54	52.9	-1.1	-
385	59	56.4	-2.6	-	55	54.4	-0.6	-
388	56	55.8	-0.2	-	54	53.4	-0.6	-
389	57	56.0	-1.0	-	55	54.0	-1.0	-
393	58	58.0	0.0	-	56	55.7	-0.3	-
415	62	60.2	-1.8	-	59	57.8	-1.2	-
416	61	59.5	-1.5	-	58	57.3	-0.7	-
417	61	59.3	-1.7	-	58	57.0	-1.0	-
419	61	58.6	-2.4	-	57	56.5	-0.5	-
422	61	58.9	-2.1	-	57	56.7	-0.3	-
423	61	58.2	-2.8	-	57	56.1	-0.9	-
424	61	58.2	-2.8	-	57	56.1	-0.9	-
425	61	58.3	-2.7	-	57	56.2	-0.8	-
426	61	58.2	-2.8	-	57	56.1	-0.9	-
428	59	56.7	-2.3	-	56	55.0	-1.0	-
430	61	57.9	-3.1	-	57	55.9	-1.1	-
431	51	50.1	-0.9	-	49	47.5	-1.5	-
434	60	57.5	-2.5	-	56	55.6	-0.4	-

Receiver ID	Pre-Construction Predicted 2016 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2018 Day L _{Aeq} (15hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2016 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2018 Night L _{Aeq} (9hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?
436	60	56.8	-3.2	-	56	55.1	-0.9	-
437	59	56.5	-2.5	-	56	54.9	-1.1	-
439	59	56.3	-2.7	-	56	54.7	-1.3	-
441	60	56.5	-3.5	-	56	54.9	-1.1	-
445	60	56.8	-3.2	-	56	55.1	-0.9	-
446	60	56.4	-3.6	-	56	54.8	-1.2	-
447	59	56.0	-3.0	-	56	54.5	-1.5	-
449	59	56.0	-3.0	-	56	54.5	-1.5	-
452	60	56.1	-3.9	-	56	54.6	-1.4	-
461	57	53.5	-3.5	-	54	52.6	-1.4	-
472	60	56.3	-3.7	-	56	54.8	-1.2	-
476	59	55.3	-3.7	-	55	54.0	-1.0	-
531	52	50.5	-1.5	-	49	48.0	-1.0	-
535	52	50.5	-1.5	-	49	48.0	-1.0	-
536	50	47.5	-2.5	-	46	44.9	-1.1	-
546	52	50.6	-1.4	-	49	48.1	-0.9	-
580	53	50.4	-2.6	-	49	47.9	-1.1	-
581	57	55.5	-1.5	-	56	52.8	-3.2	-
586	53	50.8	-2.2	-	50	48.3	-1.7	-
592	53	50.9	-2.1	-	50	48.4	-1.6	-
597	53	52.1	-0.9	-	51	49.8	-1.2	-
600	52	51.4	-0.6	-	50	49.2	-0.8	-
601	53	52.4	-0.6	-	51	50.0	-1.0	-
604	53	52.6	-0.4	-	51	50.1	-0.9	-
605	53	52.6	-0.4	-	51	50.1	-0.9	-
607	54	51.4	-2.6	-	50	48.9	-1.1	-
608	53	52.8	-0.2	-	51	50.4	-0.6	-
609	54	53.4	-0.6	-	52	50.8	-1.2	-
610	52	51.0	-1.0	-	50	48.9	-1.1	-
612	52	50.9	-1.1	-	50	48.8	-1.2	-

Receiver ID	Pre-Construction Predicted 2016 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2018 Day L _{Aeq} (15hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2016 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2018 Night L _{Aeq} (9hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?
613	54	53.6	-0.4	-	52	51.0	-1.0	-
615	55	52.2	-2.8	-	51	49.7	-1.3	-
616	52	50.7	-1.3	-	50	48.6	-1.4	-
617	54	53.8	-0.2	-	52	51.1	-0.9	-
618	54	53.9	-0.1	-	52	51.1	-0.9	-
619	52	50.7	-1.3	-	49	48.4	-0.6	-
620	50	44.8	-5.2	-	47	42.6	-4.4	-
624	55	55.2	0.2	-	53	52.4	-0.6	-
639	52	51.5	-0.5	-	50	48.9	-1.1	-
666	59	57.2	-1.8	-	57	54.6	-2.4	-
701	55	52.1	-2.9	-	53	49.6	-3.4	-
711	60	57.6	-2.4	-	58	55.2	-2.8	-
720	47	44.0	-3.0	-	45	41.4	-3.6	-
729	54	51.5	-2.5	-	52	49.0	-3.0	-
745	55	50.1	-4.9	-	53	47.6	-5.4	-
758	54	48.9	-5.1	-	52	46.4	-5.6	-
775	51	47.5	-3.5	-	50	44.6	-5.4	-
780	53	50.8	-2.2	-	51	48.3	-2.7	-
783	54	49.5	-4.5	-	52	46.9	-5.1	-
785	55	54.3	-0.7	-	53	51.7	-1.3	-
786	54	52.1	-1.9	-	51	49.5	-1.5	-
788	57	52.2	-4.8	-	56	49.9	-6.1	-
790	62	56.0	-6.0	-	60	53.7	-6.3	-
798	57	50.9	-6.1	-	55	48.2	-6.8	-
801	54	48.5	-5.5	-	52	46.2	-5.8	-
802	52	50.2	-1.8	-	50	47.8	-2.2	-
805	49	49.2	0.2	-	47	47.1	0.1	-
806	57	51.0	-6.0	-	55	48.3	-6.7	-
807	51	48.6	-2.4	-	49	46.2	-2.8	-
808	53	50.2	-2.8	-	51	47.5	-3.5	-

Receiver ID	Pre-Construction Predicted 2016 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2018 Day L _{Aeq} (15hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2016 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2018 Night L _{Aeq} (9hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?
809	55	51.8	-3.2	-	53	49.1	-3.9	-
810	57	54.1	-2.9	-	56	51.4	-4.6	-
811	59	55.9	-3.1	-	58	53.2	-4.8	-
812	65	58.6	-6.4	-	63	55.9	-7.1	-
813	54	52.1	-1.9	-	52	49.8	-2.2	-
815	57	54.8	-2.2	-	55	52.6	-2.4	-
822	60	58.7	-1.3	-	58	56.6	-1.4	-
825	64	62.7	-1.3	-	62	60.6	-1.4	-
930	49	48.2	-0.8	-	47	46.1	-0.9	-
932	48	47.5	-0.5	-	46	45.3	-0.7	-
935	51	49.5	-1.5	-	49	47.4	-1.6	-
937	48	48.3	0.3	-	46	46.2	0.2	-
948	46	45.6	-0.4	-	44	43.4	-0.6	-
950	47	45.6	-1.4	-	44	43.4	-0.6	-
952	47	45.5	-1.5	-	45	43.3	-1.7	-
953	48	46.8	-1.2	-	46	44.6	-1.4	-
959	45	44.4	-0.6	-	43	42.3	-0.7	-
964	65	64.4	-0.6	-	63	62.4	-0.6	-
966	54	53.4	-0.6	-	52	51.3	-0.7	-
974	54	52.7	-1.3	-	52	50.8	-1.2	-
982	50	49.0	-1.0	-	48	47.2	-0.8	-
984	49	49.3	0.3	-	47	47.4	0.4	-
1007	53	52.2	-0.8	-	51	50.4	-0.6	-
1107	54	52.9	-1.1	-	52	50.8	-1.2	-
1564	51	49.4	-1.6	-	48	47.5	-0.5	-
1570	50	48.9	-1.1	-	48	47.0	-1.0	-
1572	49	47.8	-1.2	-	47	46.4	-0.6	-
1578	53	49.2	-3.8	-	49	47.9	-1.1	-
1579	52	48.4	-3.6	-	48	47.0	-1.0	-
1580	52	48.9	-3.1	-	49	47.6	-1.4	-

Receiver ID	Pre-Construction Predicted 2016 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2018 Day L _{Aeq} (15hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2016 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2018 Night L _{Aeq} (9hr) Noise Level	Difference Between 2018 & 2016 Noise Levels	>2dB(A) Difference?
1581	52	49.5	-2.5	-	49	48.2	-0.8	-
1582	56	51.8	-4.2	-	52	50.7	-1.3	-
1583	50	48.0	-2.0	-	47	46.6	-0.4	-
1585	51	47.2	-3.8	-	48	46.0	-2.0	-
1595	50	47.5	-2.5	-	47	46.1	-0.9	-
1598	48	46.4	-1.6	-	45	44.7	-0.3	-
1599	55	51.4	-3.6	-	51	50.3	-0.7	-
1600	51	48.7	-2.3	-	48	47.5	-0.5	-
1603	49	47.2	-1.8	-	46	45.7	-0.3	-
1605	48	46.4	-1.6	-	45	44.6	-0.4	-
1607	48	46.4	-1.6	-	45	44.7	-0.3	-
1608	50	47.8	-2.2	-	47	46.6	-0.4	-
1613	49	47.3	-1.7	-	47	46.0	-1.0	-
1616	50	48.1	-1.9	-	47	47.0	0.0	-
1619	50	48.6	-1.4	-	47	47.4	0.4	-
1621	49	48.3	-0.7	-	47	47.0	0.0	-
1622	47	47.1	0.1	-	45	45.6	0.6	-
3002	51	50.4	-0.6	-	49	48.0	-1.0	-
3004	61	60.8	-0.2	-	59	57.9	-1.1	-
3005	58	54.7	-3.3	-	55	52.9	-2.1	-
5001	55	50.5	-4.5	-	53	50.6	-2.4	-

Notes: 1. Pre-construction 2016 predicted noise levels presented as rounded whole numbers in the ONMR

Table C.2 – Comparison of Traffic Noise Levels for Design Year (10 Years After Opening), dB(A)

Receiver ID	Pre-Construction Predicted 2026 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2028 Day L _{Aeq} (15hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2026 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2028 Night L _{Aeq} (9hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?
4	52	50.8	-1.2	-	50	48.7	-1.3	-
5	69	67.7	-1.3	-	67	65.1	-1.9	-
6	56	55.7	-0.3	-	54	53.3	-0.7	-
8	63	62.5	-0.5	-	61	59.9	-1.1	-
10	57	56.6	-0.4	-	55	54.2	-0.8	-
11	56	55.1	-0.9	-	54	52.8	-1.2	-
12	60	58.1	-1.9	-	59	58.8	-0.2	-
15	54	52.2	-1.8	-	52	50.1	-1.9	-
16	50	49.5	-0.5	-	48	48	0.0	-
19	55	51.4	-3.6	-	52	50.7	-1.3	-
20	50	48.4	-1.6	-	48	48.1	0.1	-
23	56	50.6	-5.4	-	52	50	-2.0	-
24	49	47.8	-1.2	-	47	45.8	-1.2	-
26	47	45.6	-1.4	-	45	43.6	-1.4	-
27	57	52	-5.0	-	54	51.7	-2.3	-
28	49	48.4	-0.6	-	47	46.3	-0.7	-
29	52	50.9	-1.1	-	50	48.6	-1.4	-
31	53	52.4	-0.6	-	52	50.2	-1.8	-
34	49	47.4	-1.6	-	47	45.5	-1.5	-
35	50	48.2	-1.8	-	48	46.2	-1.8	-
40	49	47.4	-1.6	-	46	45.2	-0.8	-
41	48	47.2	-0.8	-	46	45.1	-0.9	-
42	48	46.9	-1.1	-	46	44.8	-1.2	-
43	49	47.5	-1.5	-	47	45.4	-1.6	-
45	50	47.9	-2.1	-	47	46.3	-0.7	-
46	52	51	-1.0	-	50	48.9	-1.1	-
47	50	48	-2.0	-	47	46.3	-0.7	-
48	52	51.1	-0.9	-	50	48.7	-1.3	-
49	48	47	-1.0	-	46	44.8	-1.2	-

Receiver ID	Pre-Construction Predicted 2026 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2028 Day L _{Aeq} (15hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2026 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2028 Night L _{Aeq} (9hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?
50	48	46.6	-1.4	-	46	44.5	-1.5	-
51	49	47.2	-1.8	-	47	45.5	-1.5	-
52	49	47.9	-1.1	-	47	46	-1.0	-
53	50	47.3	-2.7	-	47	45.7	-1.3	-
54	52	48.9	-3.1	-	49	47.5	-1.5	-
56	55	53.6	-1.4	-	53	51.6	-1.4	-
57	55	53.5	-1.5	-	53	51.3	-1.7	-
62	49	47.1	-1.9	-	46	45.1	-0.9	-
63	50	47.6	-2.4	-	48	47.9	-0.1	-
65	58	53.5	-4.5	-	54	53.7	-0.3	-
69	65	58	-7.0	-	59	57.6	-1.4	-
71	65	57.4	-7.6	-	59	57.3	-1.7	-
77	55	54.8	-0.2	-	53	52.4	-0.6	-
78	47	44.9	-2.1	-	45	43.2	-1.8	-
80	49	47.2	-1.8	-	47	45.4	-1.6	-
82	50	48.3	-1.7	-	48	46.5	-1.5	-
83	53	50	-3.0	-	50	48.4	-1.6	-
84	51	49.8	-1.2	-	49	48	-1.0	-
86	51	49.4	-1.6	-	49	47.5	-1.5	-
88	52	50.4	-1.6	-	50	48.5	-1.5	-
89	54	50.2	-3.8	-	51	48.3	-2.7	-
92	50	48.9	-1.1	-	48	47	-1.0	-
94	51	49.8	-1.2	-	49	47.8	-1.2	-
96	51	49.7	-1.3	-	49	47.8	-1.2	-
98	60	56.1	-3.9	-	56	54.8	-1.2	-
101	43	41.7	-1.3	-	41	40.1	-0.9	-
103	52	50.8	-1.2	-	50	49.6	-0.4	-
106	50	47.9	-2.1	-	47	47.1	0.1	-
107	50	47.3	-2.7	-	46	46.2	0.2	-
110	51	48	-3.0	-	47	47	0.0	-

Receiver ID	Pre-Construction Predicted 2026 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2028 Day L _{Aeq} (15hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2026 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2028 Night L _{Aeq} (9hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?
111	55	55.3	0.3	-	54	53.4	-0.6	-
113	48	46.5	-1.5	-	46	44.8	-1.2	-
114	55	53	-2.0	-	52	51.6	-0.4	-
115	50	48.9	-1.1	-	48	46.9	-1.1	-
116	56	55	-1.0	-	54	53.1	-0.9	-
118	51	49.5	-1.5	-	50	47.5	-2.5	-
119	48	46.4	-1.6	-	46	44.3	-1.7	-
120	54	52.8	-1.2	-	53	50.7	-2.3	-
121	50	48	-2.0	-	48	45.9	-2.1	-
122	53	51.7	-1.3	-	51	49.8	-1.2	-
123	51	49.1	-1.9	-	49	47	-2.0	-
124	58	57.2	-0.8	-	56	55.5	-0.5	-
125	53	52	-1.0	-	52	49.9	-2.1	-
127	52	50.3	-1.7	-	50	48.2	-1.8	-
128	55	53.8	-1.2	-	54	52	-2.0	-
130	57	56	-1.0	-	56	54	-2.0	-
132	60	58.2	-1.8	-	58	56.2	-1.8	-
133	49	48.7	-0.3	-	47	47.1	0.1	-
134	50	49	-1.0	-	48	47.4	-0.6	-
138	55	54.7	-0.3	-	54	54.5	0.5	-
139	62	60.4	-1.6	-	60	59.7	-0.3	-
140	61	57.6	-3.4	-	59	57.6	-1.4	-
141	51	49.7	-1.3	-	49	48.4	-0.6	-
142	51	48.3	-2.7	-	50	47.8	-2.2	-
143	51	49.6	-1.4	-	50	49.4	-0.6	-
144	50	48.1	-1.9	-	49	47.7	-1.3	-
146	50	48.3	-1.7	-	49	47.6	-1.4	-
147	50	47.5	-2.5	-	49	47.6	-1.4	-
148	52	48.1	-3.9	-	50	48.5	-1.5	-
149	52	49.5	-2.5	-	51	49.2	-1.8	-

Receiver ID	Pre-Construction Predicted 2026 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2028 Day L _{Aeq} (15hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2026 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2028 Night L _{Aeq} (9hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?
150	49	46	-3.0	-	47	46.1	-0.9	-
151	54	50.7	-3.3	-	52	50.7	-1.3	-
152	63	59.6	-3.4	-	62	60	-2.0	-
153	54	50.8	-3.2	-	53	50.5	-2.5	-
154	51	48	-3.0	-	49	47.4	-1.6	-
155	56	53.4	-2.6	-	54	53.3	-0.7	-
156	54	51.3	-2.7	-	52	51.5	-0.5	-
157	58	55.5	-2.5	-	57	55.4	-1.6	-
158	52	48.2	-3.8	-	50	48.7	-1.3	-
159	46	43.4	-2.6	-	44	42.6	-1.4	-
160	52	48.9	-3.1	-	50	49.5	-0.5	-
161	47	44.8	-2.2	-	45	44.3	-0.7	-
162	61	58	-3.0	-	59	57.8	-1.2	-
163	52	48.6	-3.4	-	50	47.9	-2.1	-
164	54	49.9	-4.1	-	52	49.6	-2.4	-
166	51	47.6	-3.4	-	49	46.6	-2.4	-
167	54	50	-4.0	-	52	50.2	-1.8	-
168	54	51.7	-2.3	-	52	50.9	-1.1	-
171	53	50.1	-2.9	-	51	50.1	-0.9	-
172	55	52.4	-2.6	-	53	50.3	-2.7	-
173	57	55.7	-1.3	-	55	55.4	0.4	-
174	54	50.6	-3.4	-	52	50.4	-1.6	-
184	54	52.7	-1.3	-	52	50.7	-1.3	-
187	55	48.9	-6.1	-	53	48.9	-4.1	-
188	56	48.1	-7.9	-	54	48.2	-5.8	-
190	55	53.4	-1.6	-	52	53	1.0	-
191	56	53.6	-2.4	-	53	52.8	-0.2	-
192	54	52.6	-1.4	-	52	50.1	-1.9	-
194	55	53.6	-1.4	-	53	52	-1.0	-
197	57	55.7	-1.3	-	55	53.5	-1.5	-

Receiver ID	Pre-Construction Predicted 2026 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2028 Day L _{Aeq} (15hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2026 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2028 Night L _{Aeq} (9hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?
198	56	54.6	-1.4	-	54	52.8	-1.2	-
199	56	52.4	-3.6	-	53	51.6	-1.4	-
201	56	55.1	-0.9	-	54	52.8	-1.2	-
203	53	50.6	-2.4	-	51	49.6	-1.4	-
204	51	51.1	0.1	-	48	48.7	0.7	-
205	57	56	-1.0	-	55	53.6	-1.4	-
207	51	48.6	-2.4	-	48	46.6	-1.4	-
369	58	53	-5.0	-	54	50.9	-3.1	-
373	47	46.2	-0.8	-	45	43.7	-1.3	-
375	49	46.2	-2.8	-	46	44.7	-1.3	-
379	56	52.3	-3.7	-	53	50.9	-2.1	-
381	57	55.5	-1.5	-	54	53.4	-0.6	-
385	59	57.3	-1.7	-	56	54.8	-1.2	-
388	57	56.7	-0.3	-	55	54.1	-0.9	-
389	58	56.8	-1.2	-	55	54.5	-0.5	-
393	59	58.9	-0.1	-	57	56.3	-0.7	-
415	62	61.1	-0.9	-	59	58.3	-0.7	-
416	62	60.4	-1.6	-	58	57.7	-0.3	-
417	62	60.2	-1.8	-	58	57.4	-0.6	-
419	62	59.6	-2.4	-	58	56.9	-1.1	-
422	62	59.9	-2.1	-	58	57	-1.0	-
423	62	59.1	-2.9	-	57	56.5	-0.5	-
424	62	59.1	-2.9	-	57	56.5	-0.5	-
425	62	59.3	-2.7	-	57	56.5	-0.5	-
426	62	59.1	-2.9	-	57	56.4	-0.6	-
428	60	57.6	-2.4	-	56	55.3	-0.7	-
430	61	58.9	-2.1	-	57	56.2	-0.8	-
431	52	51	-1.0	-	50	48.3	-1.7	-
434	61	58.4	-2.6	-	57	55.9	-1.1	-
436	60	57.7	-2.3	-	56	55.4	-0.6	-

Receiver ID	Pre-Construction Predicted 2026 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2028 Day L _{Aeq} (15hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2026 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2028 Night L _{Aeq} (9hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?
437	60	57.3	-2.7	-	56	55.2	-0.8	-
439	60	57.1	-2.9	-	56	55	-1.0	-
441	61	57.4	-3.6	-	56	55.1	-0.9	-
445	61	57.7	-3.3	-	57	55.3	-1.7	-
446	61	57.3	-3.7	-	56	55	-1.0	-
447	60	56.8	-3.2	-	56	54.7	-1.3	-
449	60	56.9	-3.1	-	56	54.8	-1.2	-
452	60	57	-3.0	-	56	54.8	-1.2	-
461	58	54.2	-3.8	-	54	52.8	-1.2	-
472	61	57.1	-3.9	-	56	55	-1.0	-
476	60	56.1	-3.9	-	56	54.2	-1.8	-
531	53	51	-2.0	-	50	48.7	-1.3	-
535	53	51	-2.0	-	50	48.6	-1.4	-
536	50	47.5	-2.5	-	46	45.5	-0.5	-
546	53	51	-2.0	-	50	48.7	-1.3	-
580	53	50.7	-2.3	-	50	48.5	-1.5	-
581	58	56.3	-1.7	-	57	53.5	-3.5	-
586	53	50.9	-2.1	-	50	48.8	-1.2	-
592	53	51	-2.0	-	50	48.9	-1.1	-
597	54	52.9	-1.1	-	51	50.4	-0.6	-
600	53	52.3	-0.7	-	51	49.8	-1.2	-
601	54	53.2	-0.8	-	52	50.7	-1.3	-
604	54	53.4	-0.6	-	52	50.8	-1.2	-
605	54	53.4	-0.6	-	52	50.8	-1.2	-
607	54	51.4	-2.6	-	50	49.4	-0.6	-
608	54	53.7	-0.3	-	52	51	-1.0	-
609	55	54.2	-0.8	-	53	51.6	-1.4	-
610	53	51.8	-1.2	-	50	49.5	-0.5	-
612	53	51.7	-1.3	-	50	49.4	-0.6	-
613	55	54.4	-0.6	-	53	51.7	-1.3	-

Receiver ID	Pre-Construction Predicted 2026 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2028 Day L _{Aeq} (15hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2026 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2028 Night L _{Aeq} (9hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?
615	55	51.2	-3.8	-	51	49.9	-1.1	-
616	53	51.5	-1.5	-	50	49.2	-0.8	-
617	55	54.6	-0.4	-	53	51.9	-1.1	-
618	55	54.5	-0.5	-	53	51.9	-1.1	-
619	52	51.2	-0.8	-	50	49	-1.0	-
620	51	44.3	-6.7	-	48	43.1	-4.9	-
624	56	55.9	-0.1	-	54	53.2	-0.8	-
639	53	52	-1.0	-	51	49.6	-1.4	-
666	60	57.9	-2.1	-	58	55.4	-2.6	-
701	56	52.8	-3.2	-	54	50.5	-3.5	-
711	61	58.1	-2.9	-	59	56	-3.0	-
720	48	44.2	-3.8	-	46	42	-4.0	-
729	55	52.2	-2.8	-	53	49.8	-3.2	-
745	56	50.9	-5.1	-	54	48.4	-5.6	-
758	55	49.7	-5.3	-	53	47.2	-5.8	-
775	52	48.2	-3.8	-	50	45.4	-4.6	-
780	54	51.6	-2.4	-	52	49.2	-2.8	-
783	55	50.3	-4.7	-	53	47.7	-5.3	-
785	56	55.1	-0.9	-	54	52.5	-1.5	-
786	55	52.8	-2.2	-	52	50.3	-1.7	-
788	58	53	-5.0	-	56	50.6	-5.4	-
790	63	56.8	-6.2	-	61	54.4	-6.6	-
798	58	51.8	-6.2	-	55	49	-6.0	-
801	55	49.3	-5.7	-	53	46.9	-6.1	-
802	53	51	-2.0	-	51	48.6	-2.4	-
805	50	50.1	0.1	-	48	47.9	-0.1	-
806	58	51.8	-6.2	-	56	49.1	-6.9	-
807	52	49.4	-2.6	-	50	47	-3.0	-
808	54	51	-3.0	-	52	48.3	-3.7	-
809	55	52.6	-2.4	-	54	49.9	-4.1	-

Receiver ID	Pre-Construction Predicted 2026 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2028 Day L _{Aeq} (15hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2026 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2028 Night L _{Aeq} (9hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?
810	58	54.9	-3.1	-	57	52.2	-4.8	-
811	60	56.7	-3.3	-	58	54	-4.0	-
812	66	59.4	-6.6	-	64	56.7	-7.3	-
813	55	53	-2.0	-	53	50.6	-2.4	-
815	58	55.7	-2.3	-	56	53.5	-2.5	-
822	61	59.5	-1.5	-	59	57.5	-1.5	-
825	65	63.6	-1.4	-	62	61.4	-0.6	-
930	50	49.1	-0.9	-	48	47	-1.0	-
932	49	48.4	-0.6	-	46	46.2	0.2	-
935	52	50.4	-1.6	-	50	48.2	-1.8	-
937	49	49.2	0.2	-	47	47	0.0	-
948	47	46.5	-0.5	-	45	44.3	-0.7	-
950	48	46.5	-1.5	-	45	44.2	-0.8	-
952	48	46.4	-1.6	-	45	44.1	-0.9	-
953	49	47.7	-1.3	-	47	45.5	-1.5	-
959	46	45.3	-0.7	-	44	43.1	-0.9	-
964	66	65.3	-0.7	-	64	63.2	-0.8	-
966	55	54.3	-0.7	-	53	52.1	-0.9	-
974	55	53.6	-1.4	-	52	51.6	-0.4	-
982	51	49.8	-1.2	-	49	48	-1.0	-
984	50	50.1	0.1	-	48	48.2	0.2	-
1007	54	53.1	-0.9	-	52	51.2	-0.8	-
1107	55	53.8	-1.2	-	52	51.6	-0.4	-
1564	52	50.1	-1.9	-	49	48.2	-0.8	-
1570	52	49.5	-2.5	-	49	47.7	-1.3	-
1572	50	47.9	-2.1	-	47	46.9	-0.1	-
1578	55	49.1	-5.9	-	50	48.3	-1.7	-
1579	54	48.3	-5.7	-	49	47.4	-1.6	-
1580	54	48.9	-5.1	-	49	48	-1.0	-
1581	54	49.4	-4.6	-	49	48.6	-0.4	-

Receiver ID	Pre-Construction Predicted 2026 Day L _{Aeq} (15hr) Noise Level ¹	Post-Construction Predicted 2028 Day L _{Aeq} (15hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?	Pre-Construction Predicted 2026 Night L _{Aeq} (9hr) Noise Level ¹	Post-Construction Predicted 2028 Night L _{Aeq} (9hr) Noise Level	Difference Between 2028 & 2026 Noise Levels	>2dB(A) Difference?
1582	58	51.6	-6.4	-	53	51.1	-1.9	-
1583	52	48.2	-3.8	-	47	47.1	0.1	-
1585	52	46.9	-5.1	-	48	46.3	-1.7	-
1595	52	47.6	-4.4	-	48	46.6	-1.4	-
1598	50	46.7	-3.3	-	46	45.2	-0.8	-
1599	56	51.5	-4.5	-	52	50.7	-1.3	-
1600	53	48.7	-4.3	-	49	47.9	-1.1	-
1603	51	47.3	-3.7	-	47	46.2	-0.8	-
1605	49	46.7	-2.3	-	46	45.2	-0.8	-
1607	49	46.7	-2.3	-	45	45.3	0.3	-
1608	51	48.1	-2.9	-	48	47	-1.0	-
1613	50	47.6	-2.4	-	47	46.5	-0.5	-
1616	50	48.4	-1.6	-	48	47.4	-0.6	-
1619	50	48.9	-1.1	-	48	47.8	-0.2	-
1621	50	48.6	-1.4	-	47	47.5	0.5	-
1622	48	47.4	-0.6	-	45	46.1	1.1	-
3002	52	51.3	-0.7	-	50	48.9	-1.1	-
3004	61	61.6	0.6	-	60	58.7	-1.3	-
3005	59	55.5	-3.5	-	55	53.3	-1.7	-
5001	55	51.1	-3.9	-	53	51.2	-1.8	-

Notes: 1. Pre-construction 2026 predicted noise levels presented as rounded whole numbers in the ONMR

Table C.3 – Assessment of At-Property Treatment, dB(A)

Receiver ID	Future existing Predicted 2018	Future existing Predicted 2018	Post Construction Predicted Year 10	Post Construction Predicted Year 10	L _{Aeq} (15hr) Day Criteria		L _{Aeq} (9hr) Night Criteria		Acute? (Yes/No)	Exceed base / allowance criteria? (Yes/No)	Level of exceedance over Base criteria	Eligible for at house treatment? (Yes/No)	At house treatment received? (Yes/No)	Additional Treatment Required? (Yes/No)
	L _{Aeq} (15hr) Day Noise Level	L _{Aeq} (9hr) Night Noise Level	L _{Aeq} (15hr) Day Noise Level	L _{Aeq} (9hr) Night Noise Level	Base criteria	Allowance criteria	Base criteria	Allowance criteria						
3	51	51	48	46	60	-	55	-	No	No	-	No	Yes	No
4	41	51	51	49	60	-	55	-	No	No	-	No	Yes	No
5	69	67	68	65	60	71	55	69	Yes	No	10	Yes	No ¹	No ¹
6	58	55	56	53	60	60	55	57	No	No	-	No	Yes	No
7	51	51	50	51	60	-	55	-	No	No	-	No	No	No
8	65	63	63	60	60	67	55	65	Yes	No	5	Yes	Yes	No
9	52	52	53	53	60	-	55	-	No	No	-	No	No	No
10	55	55	57	54	60	-	55	57	No	No	-	No	Yes	No
11	62	59	55	53	60	64	55	61	No	No	-	No	Yes	No
12	56	54	58	59	60	-	55	56	No	Yes	4	Yes	Yes	No
13	51	51	49	49	60	-	55	-	No	No	-	No	No	No
15	59	56	52	50	60	61	55	58	No	No	-	No	Yes	No
16	60	57	50	48	60	62	55	59	No	No	-	No	Yes	No
19	63	61	51	51	60	65	55	63	No	No	-	No	No	No
20	59	57	48	48	60	61	55	59	No	No	-	No	Yes	No
23	63	61	51	50	60	65	55	63	No	No	-	No	No	No
24	35	33	48	46	55	-	50	-	No	No	-	No	Yes	No
24A ³	-	-	49	47	55	-	50	-	No	No	-	No	Yes	No
26	45	43	46	44	55	-	50	-	No	No	-	No	Yes	No
27	64	62	52	52	60	66	55	64	No	No	-	No	No	No
28	43	40	48	46	55	-	50	-	No	No	-	No	Yes	No
29	45	43	51	49	55	-	50	-	No	No	-	No	Yes	No
31	51	51	52	50	60	-	55	-	No	No	-	No	Yes	No
34	48	46	47	46	55	-	50	-	No	No	-	No	Yes	No
35	48	45	48	46	55	-	50	-	No	No	-	No	Yes	No
40	69	67	47	45	60	71	55	69	No	No	-	No	Yes	No
41	71	69	47	45	60	73	55	71	No	No	-	No	Yes	No

Receiver ID	Future existing Predicted 2018 <small>L_{Aeq(15hr)}</small> Day Noise Level	Future existing Predicted 2018 <small>L_{Aeq(9hr)}</small> Night Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq(15hr)}</small> Day Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq(9hr)}</small> Night Noise Level	<small>L_{Aeq(15hr)}</small> Day Criteria		<small>L_{Aeq(9hr)}</small> Night Criteria		Acute? (Yes/No)	Exceed base / allowance criteria? (Yes/No)	Level of exceedance over Base criteria	Eligible for at house treatment? (Yes/No)	At house treatment received? (Yes/No)	Additional Treatment Required? (Yes/No)
					Base criteria	Allowance criteria	Base criteria	Allowance criteria						
42	69	67	47	45	60	71	55	69	No	No	-	No	Yes	No
43	68	66	48	45	60	70	55	68	No	No	-	No	Yes	No
45	68	66	48	46	60	70	55	68	No	No	-	No	No	No
46	49	46	51	49	55	-	50	-	No	No	-	No	Yes	No
47	67	65	48	46	60	69	55	67	No	No	-	No	No	No
48	52	50	51	49	60	-	55	-	No	No	-	No	Yes	No
49	69	67	47	45	60	71	55	69	No	No	-	No	No	No
50	70	68	47	45	60	72	55	70	No	No	-	No	No	No
51	68	66	47	46	60	70	55	68	No	No	-	No	No	No
52	65	62	48	46	60	67	55	64	No	No	-	No	No	No
53	70	68	47	46	60	72	55	70	No	No	-	No	No	No
54	66	64	49	48	60	68	55	66	No	No	-	No	No	No
56	45	48	54	52	55	-	50	-	No	Yes	2	Yes	Yes	No
57	52	49	54	51	60	-	55	-	No	No	-	No	Yes	No
62	64	62	47	45	60	66	55	64	No	No	-	No	No	No
63	61	58	48	48	60	63	55	60	No	No	-	No	Yes	No
65	62	60	54	54	60	64	55	62	No	No	-	No	Yes	No
69	63	61	58	58	60	65	55	63	No	No	-	No	Yes	No
71	63	60	57	57	60	65	55	62	No	No	-	No	Yes	No
75	57	57	55	55	55	58	50	58	No	No	-	No	No	No
77	55	53	55	52	60	-	55	55	No	No	-	No	Yes	No
78	48	45	45	43	55	-	50	-	No	No	-	No	No	No
80	37	35	47	45	55	-	50	-	No	No	-	No	No	No
82	38	36	48	47	55	-	50	-	No	No	-	No	Yes	No
83	63	61	50	48	60	65	55	63	No	No	-	No	Yes	No
84	39	36	50	48	55	-	50	-	No	No	-	No	Yes	No
86	41	39	49	48	55	-	50	-	No	No	-	No	Yes	No
88	39	48	50	49	55	-	50	-	No	No	-	No	Yes	No

Receiver ID	Future existing Predicted 2018 <small>L_{Aeq}(15hr)</small> Day Noise Level	Future existing Predicted 2018 <small>L_{Aeq}(9hr)</small> Night Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq}(15hr)</small> Day Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq}(9hr)</small> Night Noise Level	<small>L_{Aeq}(15hr)</small> Day Criteria		<small>L_{Aeq}(9hr)</small> Night Criteria		Acute? (Yes/No)	Exceed base / allowance criteria? (Yes/No)	Level of exceedance over Base criteria	Eligible for at house treatment? (Yes/No)	At house treatment received? (Yes/No)	Additional Treatment Required? (Yes/No)
					Base criteria	Allowance criteria	Base criteria	Allowance criteria						
89	61	59	50	48	60	63	55	61	No	No	-	No	Yes	No
92	47	44	49	47	55	-	50	-	No	No	-	No	Yes	No
94	51	48	50	48	60	-	55	-	No	No	-	No	Yes	No
96	51	48	50	48	60	-	55	-	No	No	-	No	Yes	No
98	60	58	56	55	60	62	55	60	No	No	-	No	No ²	No ²
101	46	44	42	40	55	-	50	-	No	No	-	No	No	No
103	56	54	51	50	60	-	55	56	No	No	-	No	Yes	No
106	54	54	48	47	60	-	55	56	No	No	-	No	No	No
107	54	53	47	46	60	-	55	55	No	No	-	No	No	No
110	56	54	48	47	60	-	55	56	No	No	-	No	No	No
111	56	55	55	53	60	-	55	57	No	No	-	No	Yes	No
113	48	45	47	45	60	-	55	-	No	No	-	No	No	No
114	59	57	53	52	60	61	55	59	No	No	-	No	No	No
115	55	53	49	47	60	-	55	55	No	No	-	No	No	No
116	59	57	55	53	60	61	55	59	No	No	-	No	Yes	No
118	54	51	50	48	60	-	55	-	No	No	-	No	No	No
119	50	48	46	44	60	-	55	-	No	No	-	No	No	No
120	54	53	53	51	60	-	55	55	No	No	-	No	No	No
121	52	49	48	46	60	-	55	-	No	No	-	No	No	No
122	48	53	52	50	60	-	55	55	No	No	-	No	No	No
123	50	47	49	47	60	-	55	-	No	No	-	No	No	No
124	63	61	57	56	60	65	55	63	No	No	-	No	No	No
125	51	54	52	50	60	-	55	56	No	No	-	No	No	No
127	54	52	50	48	60	-	55	-	No	No	-	No	No	No
128	59	56	54	52	60	61	55	58	No	No	-	No	No	No
130	62	59	56	54	60	64	55	61	No	No	-	No	No	No
132	64	62	58	56	60	66	55	64	No	No	-	No	Yes	No
133	49	47	49	47	60	-	55	-	No	No	-	No	No	No

Receiver ID	Future existing Predicted 2018 <small>L_{Aeq(15hr)}</small> Day Noise Level	Future existing Predicted 2018 <small>L_{Aeq(9hr)}</small> Night Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq(15hr)}</small> Day Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq(9hr)}</small> Night Noise Level	<small>L_{Aeq(15hr)}</small> Day Criteria		<small>L_{Aeq(9hr)}</small> Night Criteria		Acute? (Yes/No)	Exceed base / allowance criteria? (Yes/No)	Level of exceedance over Base criteria	Eligible for at house treatment? (Yes/No)	At house treatment received? (Yes/No)	Additional Treatment Required? (Yes/No)
					Base criteria	Allowance criteria	Base criteria	Allowance criteria						
134	49	51	49	47	60	-	55	-	No	No	-	No	No	No
138	59	57	55	55	60	61	55	59	No	No	-	No	Yes	No
139	64	61	60	60	60	66	55	63	Yes	No	5	Yes	Yes	No
140	61	59	58	58	60	63	55	61	No	No	-	No	Yes	No
141	59	57	50	48	60	61	55	59	No	No	-	No	Yes	No
142	55	54	48	48	60	-	55	56	No	No	-	No	No	No
143	55	55	50	49	60	-	55	57	No	No	-	No	No	No
144	55	52	48	48	60	-	55	-	No	No	-	No	No	No
146	56	54	48	48	60	-	55	56	No	No	-	No	No	No
147	53	53	48	48	60	-	55	55	No	No	-	No	No	No
148	52	53	48	49	60	-	55	55	No	No	-	No	No	No
149	50	54	50	49	60	-	55	56	No	No	-	No	No	No
150	50	53	46	46	60	-	55	55	No	No	-	No	No	No
151	55	55	51	51	60	-	55	57	No	No	-	No	No	No
152	66	64	60	60	60	68	55	66	Yes	No	5	Yes	Yes	No
153	58	56	51	51	60	60	55	58	No	No	-	No	No	No
154	52	53	48	47	60	-	55	55	No	No	-	No	No	No
155	50	56	53	53	60	-	55	58	No	No	-	No	No	No
156	53	53	51	52	60	-	55	55	No	No	-	No	Yes	No
157	50	54	56	55	60	-	55	56	No	No	-	No	Yes	No
158	52	52	48	49	60	-	55	-	No	No	-	No	No	No
159	50	52	43	43	60	-	55	-	No	No	-	No	No	No
160	50	52	49	50	60	-	55	-	No	No	-	No	No	No
161	51	51	45	44	60	-	55	-	No	No	-	No	No	No
162	56	55	58	58	60	-	55	57	No	Yes	3	Yes	Yes	No
163	52	52	49	48	60	-	50	53	No	No	-	No	No	No
164	52	53	50	50	60	-	55	55	No	No	-	No	No	No
166	51	53	48	47	60	-	55	55	No	No	-	No	No	No

Receiver ID	Future existing Predicted 2018 <small>L_{Aeq}(15hr)</small> Day Noise Level	Future existing Predicted 2018 <small>L_{Aeq}(9hr)</small> Night Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq}(15hr)</small> Day Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq}(9hr)</small> Night Noise Level	<small>L_{Aeq}(15hr)</small> Day Criteria		<small>L_{Aeq}(9hr)</small> Night Criteria		Acute? (Yes/No)	Exceed base / allowance criteria? (Yes/No)	Level of exceedance over Base criteria	Eligible for at house treatment? (Yes/No)	At house treatment received? (Yes/No)	Additional Treatment Required? (Yes/No)
					Base criteria	Allowance criteria	Base criteria	Allowance criteria						
167	52	53	50	50	60	-	55	55	No	No	-	No	No	No
168	57	55	52	51	55	58	50	56	No	No	-	No	No	No
171	56	53	50	50	60	-	55	55	No	No	-	No	No	No
172	52	54	52	50	60	-	55	56	No	No	-	No	Yes	No
173	62	59	56	55	60	64	55	61	No	No	-	No	No	No
174	59	58	51	50	60	61	55	60	No	No	-	No	No	No
176	66	67	65	64	60	68	55	69	Yes	No	9	Yes	No	Yes
178	66	67	62	62	60	68	55	69	Yes	No	7	Yes	No	Yes
179	67	68	63	63	60	69	55	70	Yes	No	8	Yes	No	Yes
180	65	66	61	61	60	67	55	68	Yes	No	6	Yes	No	Yes
181	63	64	59	59	60	65	55	66	No	No	-	No	No	No
182	61	61	56	56	60	63	55	63	No	No	-	No	No	No
183	60	61	55	55	60	62	55	63	No	No	-	No	No	No
184	43	48	53	51	55	-	50	-	No	Yes	1	Yes	Yes	No
185	59	60	54	54	60	61	55	62	No	No	-	No	No	No
187	52	52	49	49	60	-	55	-	No	No	-	No	No	No
188	54	52	48	48	60	-	55	-	No	No	-	No	No	No
190	59	56	53	53	60	61	55	58	No	No	-	No	No	No
191	59	56	54	53	60	61	55	58	No	No	-	No	Yes	No
192	49	46	53	51	55	-	50	-	No	Yes	1	Yes	No ¹	No ¹
194	54	55	54	52	55	-	50	56	No	No	-	No	Yes	No
197	53	51	56	54	55	-	50	52	No	Yes	4	Yes	Yes	No
198	54	53	55	53	55	-	50	54	No	No	-	No	Yes	No
199	65	63	52	52	55	66	50	64	No	No	-	No	Yes	No
201	54	52	55	53	55	-	50	53	No	Yes	3	Yes	Yes	No
203	63	60	51	50	55	64	50	61	No	No	-	No	Yes	No
204	62	59	51	49	55	63	50	60	No	No	-	No	Yes	No
205	58	55	56	54	60	60	55	57	No	No	-	No	Yes	No

Receiver ID	Future existing Predicted 2018 <small>L_{Aeq(15hr)}</small> Day Noise Level	Future existing Predicted 2018 <small>L_{Aeq(9hr)}</small> Night Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq(15hr)}</small> Day Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq(9hr)}</small> Night Noise Level	<small>L_{Aeq(15hr)}</small> Day Criteria		<small>L_{Aeq(9hr)}</small> Night Criteria		Acute? (Yes/No)	Exceed base / allowance criteria? (Yes/No)	Level of exceedance over Base criteria	Eligible for at house treatment? (Yes/No)	At house treatment received? (Yes/No)	Additional Treatment Required? (Yes/No)
					Base criteria	Allowance criteria	Base criteria	Allowance criteria						
207	61	58	49	47	60	63	55	60	No	No	-	No	Yes	No
369	64	63	53	51	60	66	55	65	No	No	-	No	Yes	No
373	61	59	46	44	60	63	55	61	No	No	-	No	Yes	No
375	63	61	46	45	60	65	55	63	No	No	-	No	Yes	No
379	61	60	52	51	60	63	55	62	No	No	-	No	Yes	No
381	61	60	56	53	60	63	55	62	No	No	-	No	Yes	No
385	65	63	57	55	60	67	55	65	No	No	-	No	Yes	No
388	58	57	57	54	60	60	55	59	No	No	-	No	No	No
389	61	60	57	55	60	63	55	62	No	No	-	No	Yes	No
393	61	60	59	56	60	63	55	62	No	No	-	No	Yes	No
415	65	64	61	58	60	67	55	66	No	No	-	No	Yes	No
416	65	64	60	58	60	67	55	66	No	No	-	No	Yes	No
417	65	64	60	57	60	67	55	66	No	No	-	No	Yes	No
419	64	63	60	57	60	66	55	65	No	No	-	No	Yes	No
422	65	64	60	57	60	67	55	66	No	No	-	No	Yes	No
423	64	63	59	57	60	66	55	65	No	No	-	No	Yes	No
424	64	63	59	57	60	66	55	65	No	No	-	No	Yes	No
425	65	64	59	57	60	67	55	66	No	No	-	No	Yes	No
426	65	64	59	56	60	67	55	66	No	No	-	No	Yes	No
428	64	62	58	55	60	66	55	64	No	No	-	No	Yes	No
430	66	65	59	56	60	68	55	67	No	No	-	No	Yes	No
431	50	48	51	48	60	-	50	-	No	No	-	No	Yes	No
434	65	64	58	56	60	67	55	66	No	No	-	No	Yes	No
436	64	63	58	55	60	66	55	65	No	No	-	No	Yes	No
437	65	63	57	55	60	67	55	65	No	No	-	No	Yes	No
439	65	63	57	55	60	67	55	65	No	No	-	No	Yes	No
441	65	63	57	55	60	67	55	65	No	No	-	No	Yes	No
445	66	64	58	55	60	68	55	66	No	No	-	No	Yes	No

Receiver ID	Future existing Predicted 2018 <small>L_{Aeq(15hr)}</small> Day Noise Level	Future existing Predicted 2018 <small>L_{Aeq(9hr)}</small> Night Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq(15hr)}</small> Day Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq(9hr)}</small> Night Noise Level	<small>L_{Aeq(15hr)}</small> Day Criteria		<small>L_{Aeq(9hr)}</small> Night Criteria		Acute? (Yes/No)	Exceed base / allowance criteria? (Yes/No)	Level of exceedance over Base criteria	Eligible for at house treatment? (Yes/No)	At house treatment received? (Yes/No)	Additional Treatment Required? (Yes/No)
					Base criteria	Allowance criteria	Base criteria	Allowance criteria						
446	65	64	57	55	60	67	55	66	No	No	-	No	Yes	No
447	64	63	57	55	60	66	55	65	No	No	-	No	No	No
449	64	63	57	55	60	66	55	65	No	No	-	No	Yes	No
452	64	63	57	55	60	66	55	65	No	No	-	No	Yes	No
461	60	58	54	53	60	62	55	60	No	No	-	No	Yes	No
472	64	63	57	55	60	66	55	65	No	No	-	No	Yes	No
476	63	62	56	54	60	65	55	64	No	No	-	No	Yes	No
531	55	53	51	49	60	-	55	55	No	No	-	No	Yes	No
535	56	53	51	49	60	-	55	55	No	No	-	No	No	No
536	55	55	48	46	60	-	55	57	No	No	-	No	No	No
542	50	50	47	45	55	-	50	51	No	No	-	No	No	No
546	57	54	51	49	60	-	55	56	No	No	-	No	No	No
547	49	49	46	44	55	-	50	-	No	No	-	No	No	No
549	50	49	46	44	55	-	50	-	No	No	-	No	No	No
580	58	55	51	49	60	60	55	57	No	No	-	No	No	No
581	56	53	56	54	60	-	55	55	No	No	-	No	Yes	No
586	59	56	51	49	60	61	55	58	No	No	-	No	No	No
592	59	56	51	49	60	61	55	58	No	No	-	No	No	No
597	52	53	53	50	60	-	55	55	No	No	-	No	Yes	No
600	56	53	52	50	60	-	55	55	No	No	-	No	Yes	No
601	56	53	53	51	60	-	55	55	No	No	-	No	No	No
604	56	53	53	51	60	-	55	55	No	No	-	No	Yes	No
605	51	53	53	51	55	-	50	54	No	No	-	No	Yes	No
607	61	58	51	49	60	63	55	60	No	No	-	No	No	No
608	56	53	54	51	55	57	50	54	No	No	-	No	Yes	No
609	56	54	54	52	55	57	50	55	No	No	-	No	Yes	No
610	54	54	52	50	55	-	50	55	No	No	-	No	Yes	No
612	56	53	52	49	55	57	50	54	No	No	-	No	Yes	No

Receiver ID	Future existing Predicted 2018 <small>L_{Aeq}(15hr)</small> Day Noise Level	Future existing Predicted 2018 <small>L_{Aeq}(9hr)</small> Night Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq}(15hr)</small> Day Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq}(9hr)</small> Night Noise Level	<small>L_{Aeq}(15hr)</small> Day Criteria		<small>L_{Aeq}(9hr)</small> Night Criteria		Acute? (Yes/No)	Exceed base / allowance criteria? (Yes/No)	Level of exceedance over Base criteria	Eligible for at house treatment? (Yes/No)	At house treatment received? (Yes/No)	Additional Treatment Required? (Yes/No)
					Base criteria	Allowance criteria	Base criteria	Allowance criteria						
613	55	54	54	52	60	-	55	56	No	No	-	No	Yes	No
615	64	61	51	50	60	66	55	63	No	No	-	No	No	No
616	55	54	52	49	60	-	55	56	No	No	-	No	Yes	No
617	52	54	55	52	60	-	55	56	No	No	-	No	Yes	No
618	53	54	55	52	60	-	55	56	No	No	-	No	Yes	No
619	57	54	51	49	60	-	55	56	No	No	-	No	Yes	No
620	58	56	44	43	60	60	55	58	No	No	-	No	No	No
624	57	54	56	53	60	-	55	56	No	No	-	No	Yes	No
624A ³	-	-	54	51	60	-	55	-	No	No	-	No	Yes	No
639	58	55	52	50	60	60	55	57	No	No	-	No	Yes	No
666	59	56	58	55	60	61	55	58	No	No	-	No	Yes	No
701	55	52	53	51	60	-	55	-	No	No	-	No	Yes	No
711	50	47	58	56	55	-	50	-	No	Yes	6	Yes	Yes	No
720	54	52	44	42	60	-	55	-	No	No	-	No	No	No
729	52	53	52	50	60	-	55	55	No	No	-	No	Yes	No
745	54	52	51	48	60	-	55	-	No	No	-	No	Yes	No
758	52	51	50	47	60	-	55	-	No	No	-	No	Yes	No
775	43	41	48	45	55	-	50	-	No	No	-	No	No ²	No ²
780	45	42	52	49	55	-	50	-	No	No	-	No	Yes	No
783	51	48	50	48	60	-	55	-	No	No	-	No	Yes	No
785	51	48	55	53	60	-	55	-	No	No	-	No	Yes	No
786	51	48	53	50	60	-	55	-	No	No	-	No	Yes	No
788	51	48	53	51	55	-	50	-	No	Yes	1	Yes	Yes	No
790	52	49	57	54	60	-	50	-	No	Yes	4	Yes	Yes	No
798	42	39	52	49	55	-	50	-	No	No	-	No	Yes	No
801	47	44	49	47	55	-	50	-	No	No	-	No	Yes	No
802	43	40	51	49	55	-	50	-	No	No	-	No	Yes	No
805	39	36	50	48	55	-	50	-	No	No	-	No	Yes	No

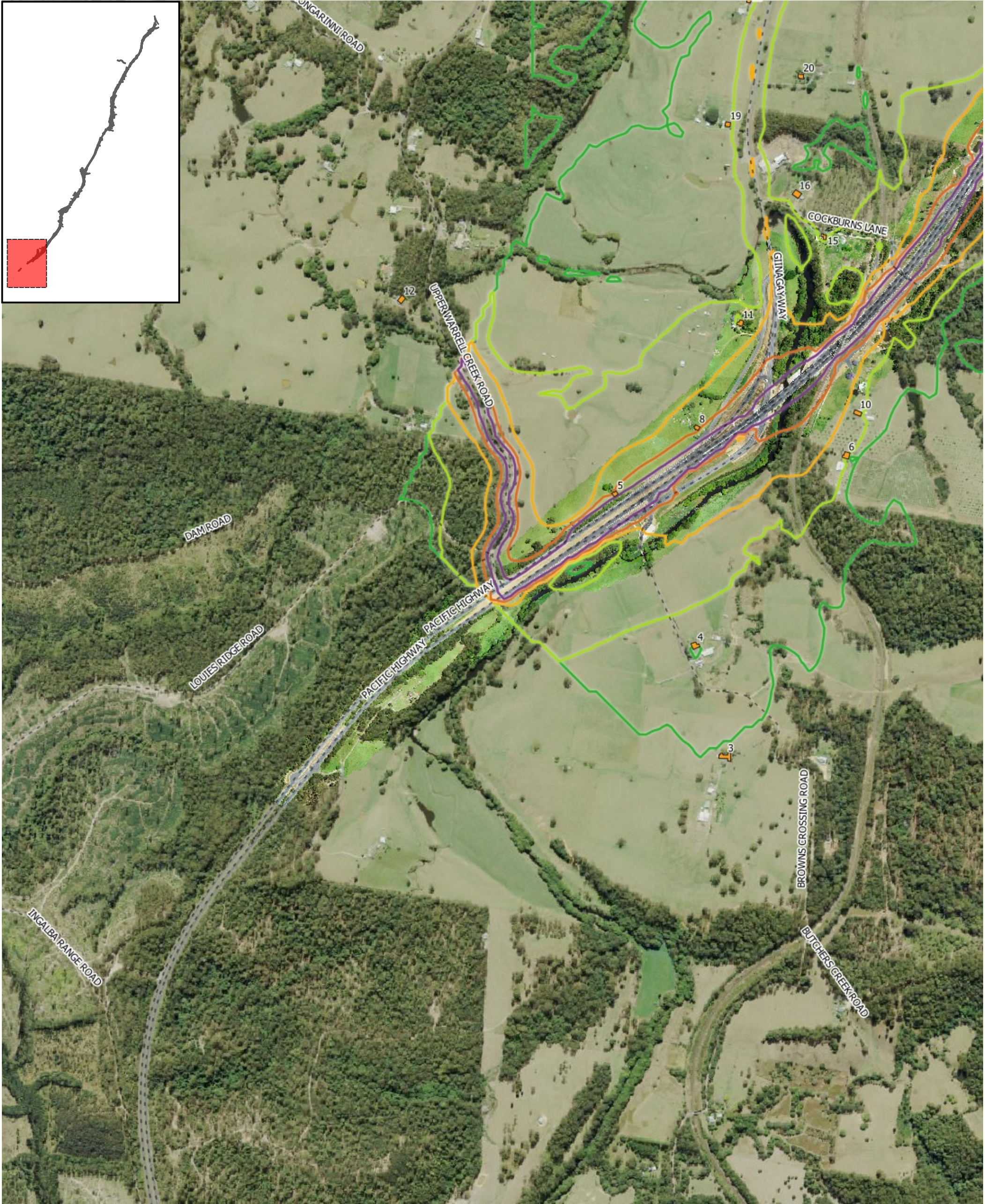
Receiver ID	Future existing Predicted 2018 <small>L_{Aeq(15hr)}</small> Day Noise Level	Future existing Predicted 2018 <small>L_{Aeq(9hr)}</small> Night Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq(15hr)}</small> Day Noise Level	Post Construction Predicted Year 10 <small>L_{Aeq(9hr)}</small> Night Noise Level	<small>L_{Aeq(15hr)}</small> Day Criteria		<small>L_{Aeq(9hr)}</small> Night Criteria		Acute? (Yes/No)	Exceed base / allowance criteria? (Yes/No)	Level of exceedance over Base criteria	Eligible for at house treatment? (Yes/No)	At house treatment received? (Yes/No)	Additional Treatment Required? (Yes/No)
					Base criteria	Allowance criteria	Base criteria	Allowance criteria						
806	42	39	52	49	55	-	50	-	No	No	-	No	Yes	No
807	42	39	49	47	55	-	50	-	No	No	-	No	Yes	No
808	42	39	51	48	55	-	50	-	No	No	-	No	Yes	No
809	42	39	53	50	55	-	50	-	No	No	-	No	Yes	No
810	45	42	55	52	55	-	50	-	No	Yes	2	Yes	Yes	No
811	40	37	57	54	55	-	50	-	No	Yes	4	Yes	Yes	No
812	42	39	59	57	55	-	50	-	No	Yes	7	Yes	Yes	No
813	44	41	53	51	55	-	50	-	No	Yes	1	Yes	Yes	No
815	39	36	56	54	55	-	50	-	No	Yes	4	Yes	No ²	No ²
822	35	32	60	58	55	-	50	-	No	Yes	8	Yes	No ²	No ²
825	41	37	64	61	55	-	50	-	Yes	Yes	11	Yes	Yes	No
930	43	40	49	47	55	-	50	-	No	No	-	No	No	No
932	38	35	48	46	55	-	50	-	No	No	-	No	No	No
935	41	38	50	48	55	-	50	-	No	No	-	No	Yes	No
937	39	36	49	47	55	-	50	-	No	No	-	No	No	No
948	36	33	47	44	55	-	50	-	No	No	-	No	No	No
950	39	36	47	44	55	-	50	-	No	No	-	No	No	No
952	37	34	46	44	55	-	50	-	No	No	-	No	No	No
953	39	36	48	46	55	-	50	-	No	No	-	No	No	No
959	36	33	45	43	55	-	50	-	No	No	-	No	No	No
964	40	37	65	63	55	-	50	-	Yes	Yes	13	Yes	Yes	No
966	39	36	54	52	55	-	50	-	No	Yes	2	Yes	Yes	No
974	36	33	54	52	55	-	50	-	No	Yes	2	Yes	Yes	No
982	43	41	50	48	55	-	50	-	No	No	-	No	No	No
984	32	28	50	48	55	-	50	-	No	No	-	No	No	No
1007	45	42	53	51	55	-	50	-	No	Yes	1	Yes	Yes	No
1107	40	37	54	52	55	-	50	-	No	Yes	2	Yes	Yes	No
1564	52	53	50	48	60	-	55	55	No	No	-	No	Yes	No

Receiver ID	Future existing Predicted 2018	Future existing Predicted 2018	Post Construction Predicted Year 10	Post Construction Predicted Year 10	L _{Aeq(15hr)} Day Criteria		L _{Aeq(9hr)} Night Criteria		Acute? (Yes/No)	Exceed base / allowance criteria? (Yes/No)	Level of exceedance over Base criteria	Eligible for at house treatment? (Yes/No)	At house treatment received? (Yes/No)	Additional Treatment Required? (Yes/No)
	L _{Aeq(15hr)} Day Noise Level	L _{Aeq(9hr)} Night Noise Level	L _{Aeq(15hr)} Day Noise Level	L _{Aeq(9hr)} Night Noise Level	Base criteria	Allowance criteria	Base criteria	Allowance criteria						
1570	53	54	50	48	60	-	55	56	No	No	-	No	No	No
1572	60	57	48	47	60	62	55	59	No	No	-	No	No	No
1578	62	59	49	48	60	64	55	61	No	No	-	No	No	No
1579	62	59	48	47	60	64	55	61	No	No	-	No	No	No
1580	61	59	49	48	60	63	55	61	No	No	-	No	No	No
1581	63	60	49	49	60	65	55	62	No	No	-	No	No	No
1582	65	63	52	51	60	67	55	65	No	No	-	No	No	No
1585	61	58	47	46	60	63	55	60	No	No	-	No	No	No
1595	58	56	48	47	60	60	55	58	No	No	-	No	No	No
1598	53	53	47	45	60	-	55	55	No	No	-	No	No	No
1599	63	61	52	51	60	65	55	63	No	No	-	No	No	No
1600	62	59	49	48	60	64	55	61	No	No	-	No	No	No
1603	57	54	47	46	60	-	55	56	No	No	-	No	No	No
1605	53	52	47	45	60	-	55	-	No	No	-	No	No	No
1607	55	52	47	45	60	-	55	-	No	No	-	No	No	No
1608	52	53	48	47	60	-	55	55	No	No	-	No	No	No
1613	52	53	48	47	60	-	55	55	No	No	-	No	No	No
1616	53	48	48	47	60	-	55	-	No	No	-	No	No	No
1619	53	52	49	48	60	-	55	-	No	No	-	No	No	No
1621	54	51	49	48	60	-	55	-	No	No	-	No	No	No
1622	52	49	47	46	60	-	55	-	No	No	-	No	No	No
3002	44	41	51	49	55	-	50	-	No	No	-	No	Yes	No
3004	54	53	62	59	55	-	50	54	No	Yes	9	Yes	No ²	No ²
3005	63	62	56	53	60	65	55	64	No	No	-	No	Yes	No
5001	53	54	51	51	60	-	55	56	No	No	-	No	Yes	No

Notes:

1. Offer of at-property treatment declined by owner
2. Dwelling has been demolished
3. Originally assessed as a non-sensitive receiver during EA. Reassessed as a residence during construction.

APPENDIX D **As-Built Traffic Noise Contours**

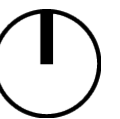


Legend

--- Road — Noise Wall Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65



Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

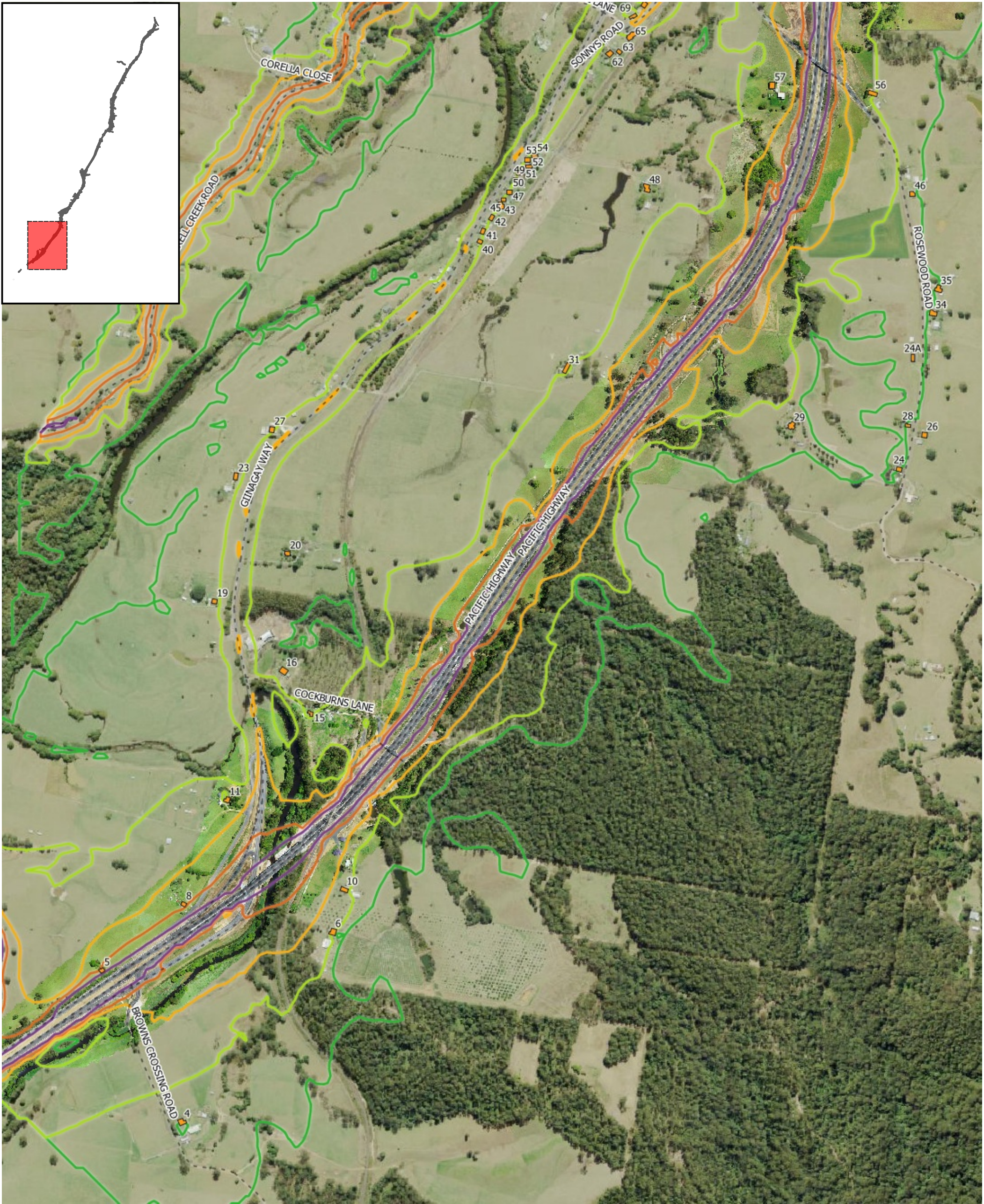
Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Day

Figure No: TK363-01.6.1.3.1 AppD (r6)-1
Date: 25-02-2020
Created by: DK

Rev: R6
Sheet: A3
Scale: 1:10000

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Legend

--- Road — Noise Wall Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65

250 0 250 500 m



Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

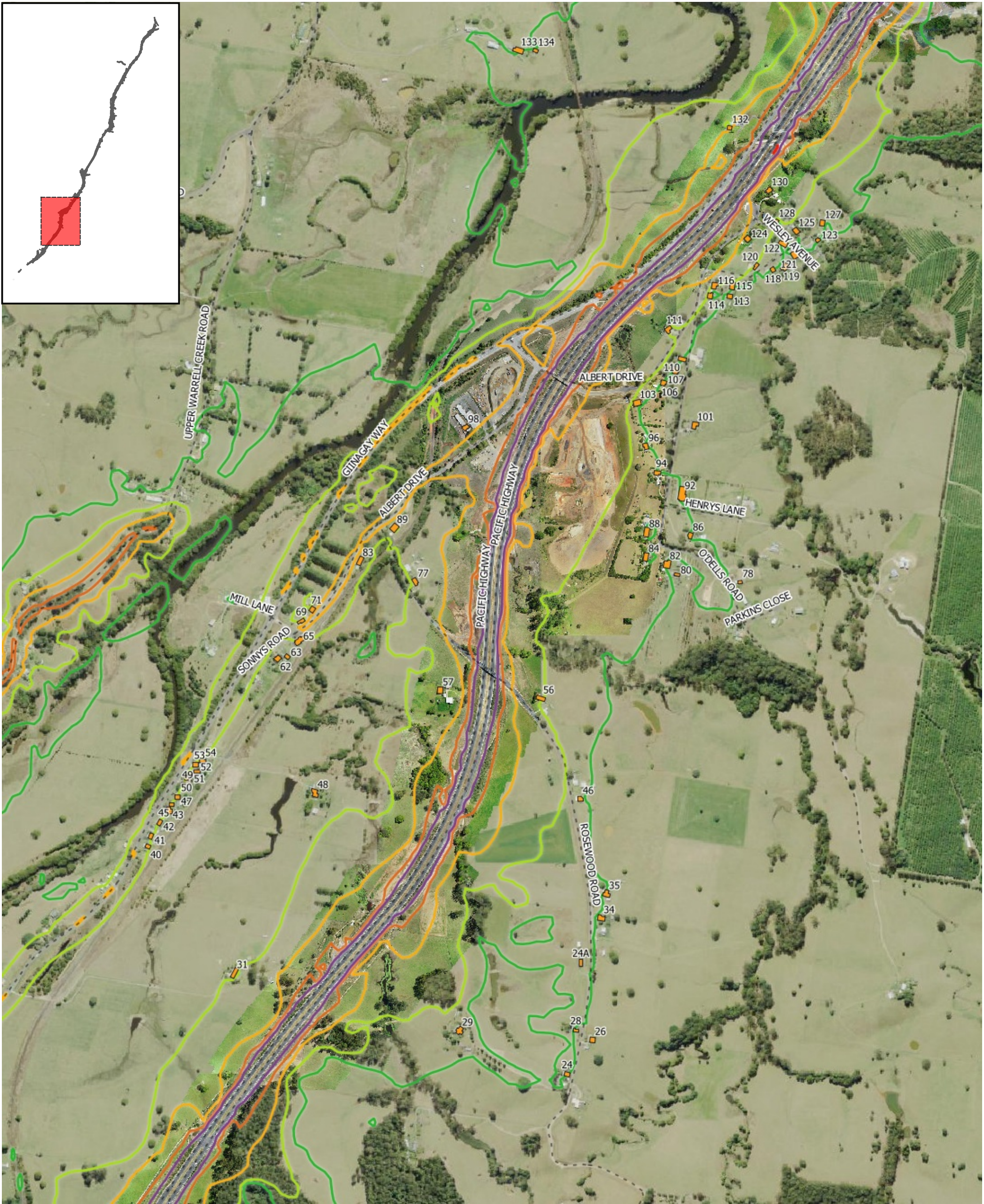
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Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Day

Figure No: TK363-01.6.1.3.1 AppD (r6)-2
Date: 25-02-2020
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Sheet: A3
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Legend

--- Road — Noise Wall Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65

250 0 250 500 m



Consultant:



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P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

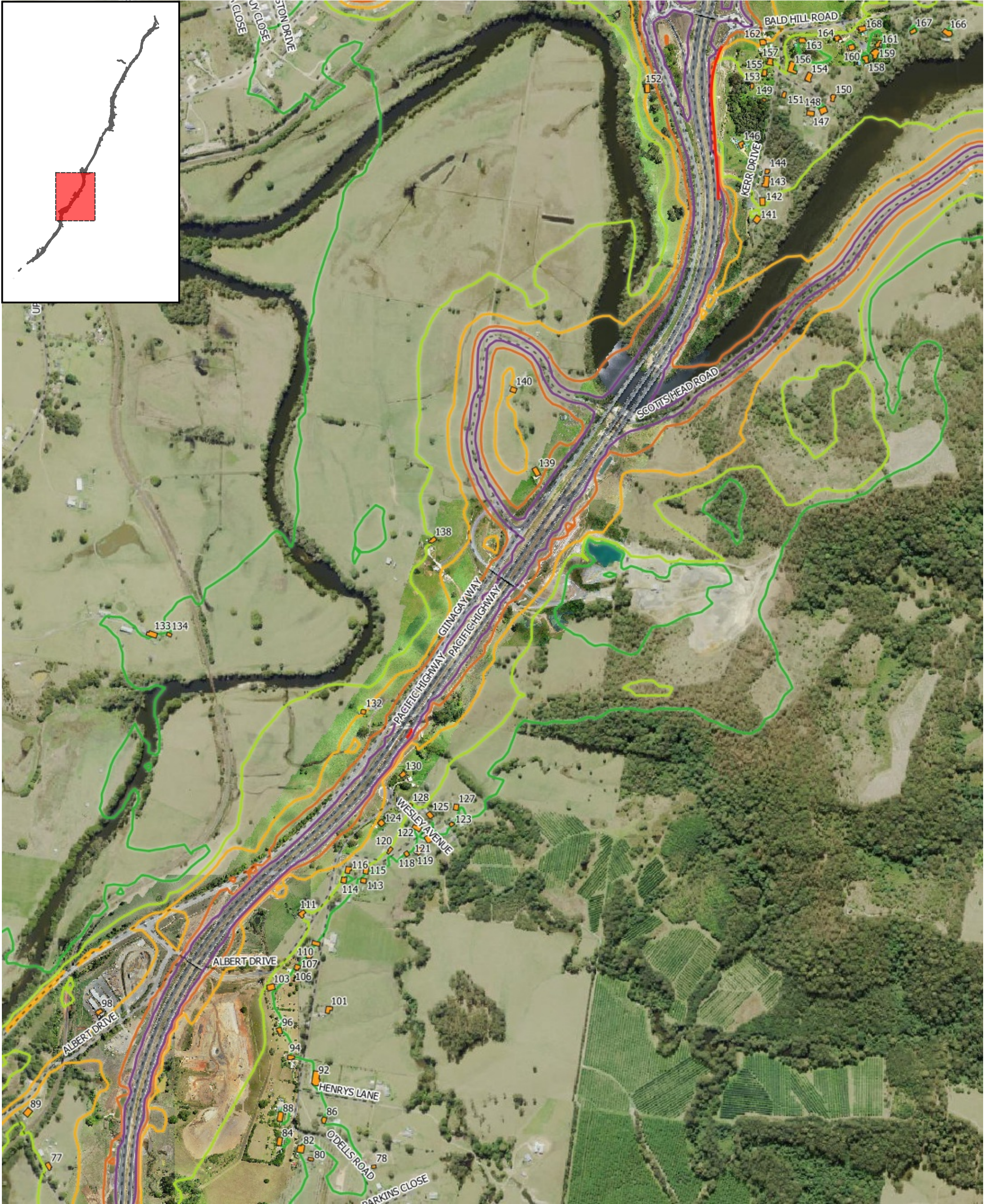
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Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Day

Figure No: TK363-01.6.1.3.1 AppD (r6)-3
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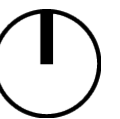


Legend

--- Road — Noise Wall Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65



Consultant:



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P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

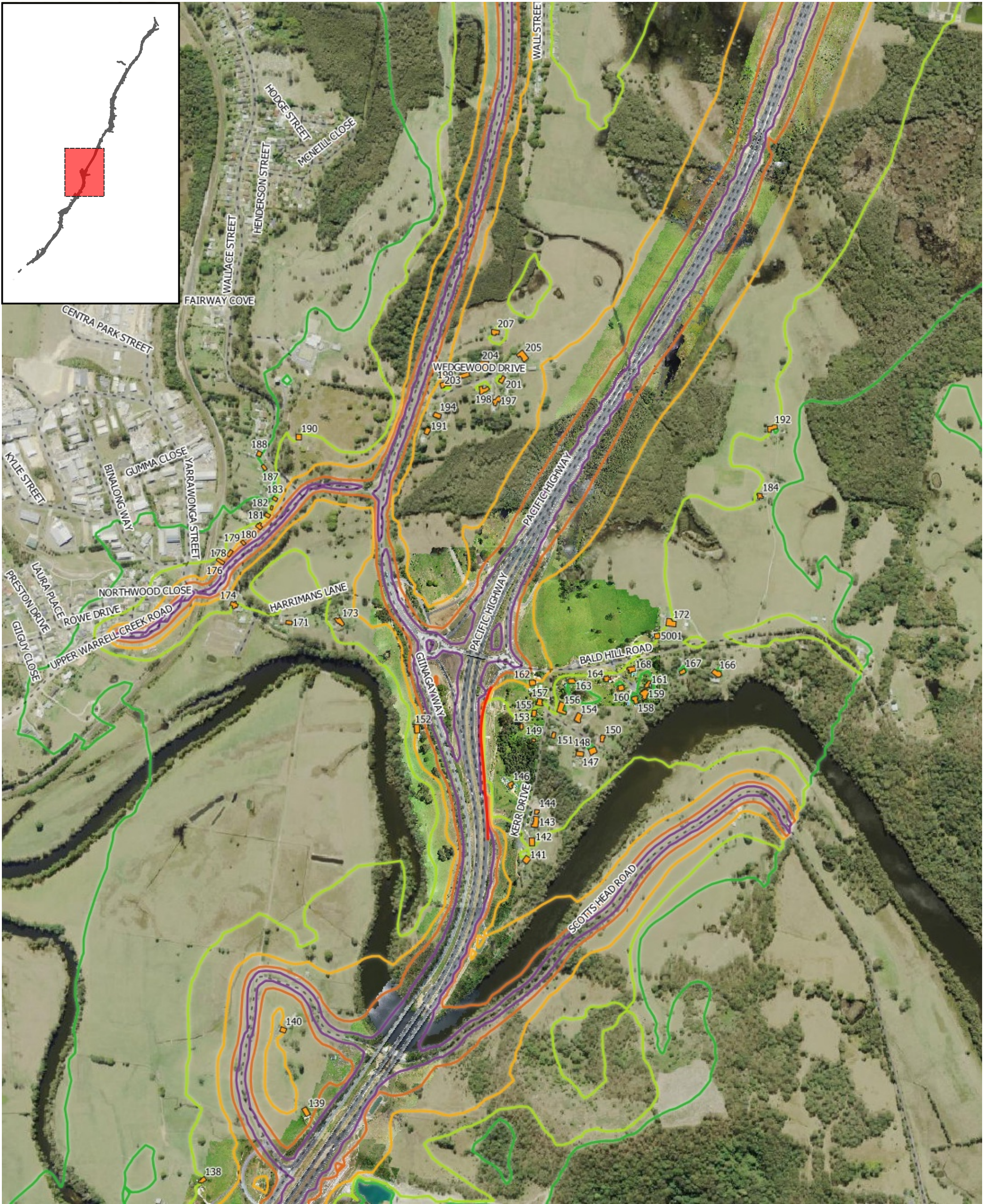
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Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Day

Figure No: TK363-01.6.1.3.1 AppD (r6)-4
Date: 25-02-2020
Created by: DK

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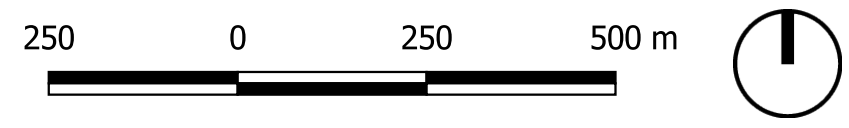


Legend

--- Road — Noise Wall Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65



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Project:
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Description:
Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Day

Figure No: TK363-01.6.1.3.1 AppD (r6)-5
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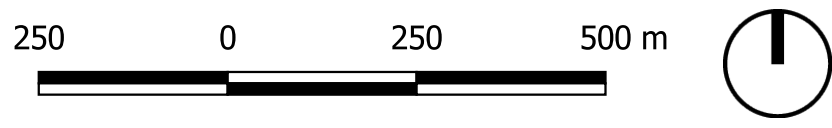


Legend

- Road
- Noise Wall
- Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65



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Project:

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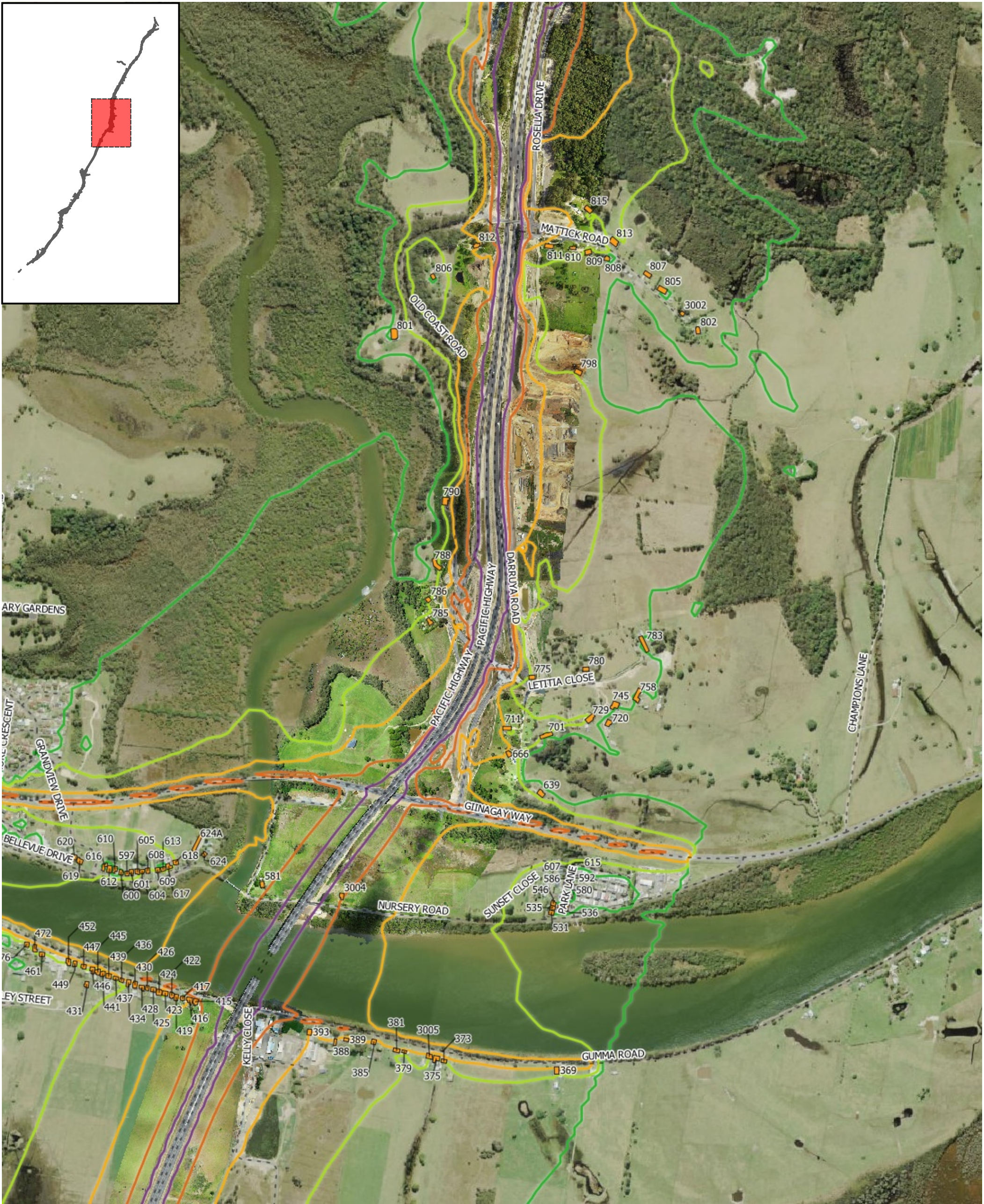
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Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Day

Figure No: TK363-01.6.1.3.1 AppD (r6)-6
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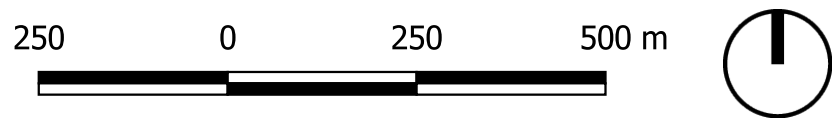


Legend

- Road
- Noise Wall
- Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65



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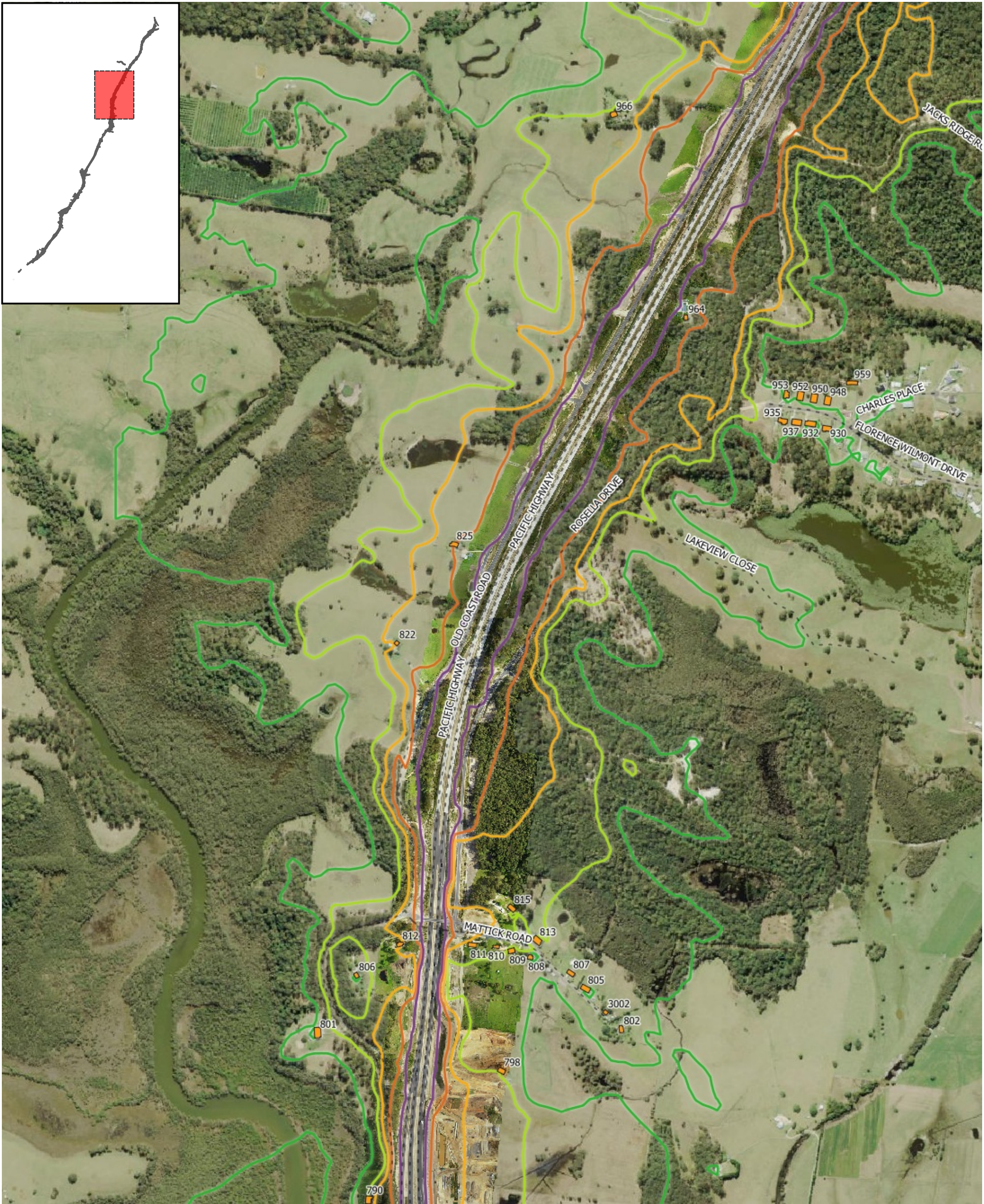
Client:
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Pacific Highway Upgrade

Description:
Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Day

Figure No: TK363-01.6.1.3.1 AppD (r6)-7
Date: 25-02-2020
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Legend

--- Road — Noise Wall Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65

250 0 250 500 m



Consultant:



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Project:

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Pacific Highway Upgrade

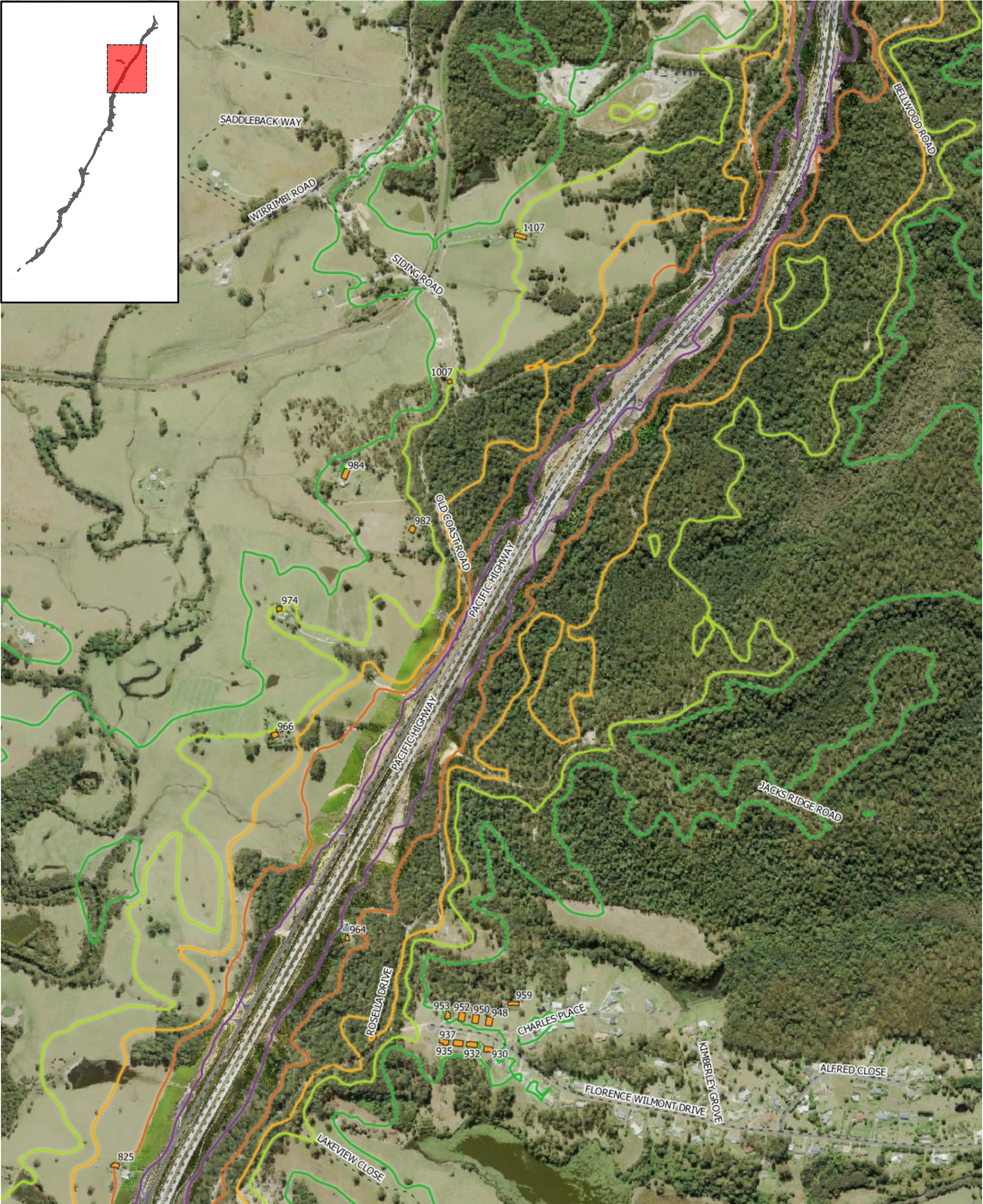
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Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Day

Figure No: TK363-01.6.1.3.1 AppD (r6)-8
Date: 25-02-2020
Created by: DK

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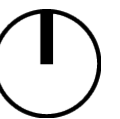


Legend

--- Road — Noise Wall Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65



Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

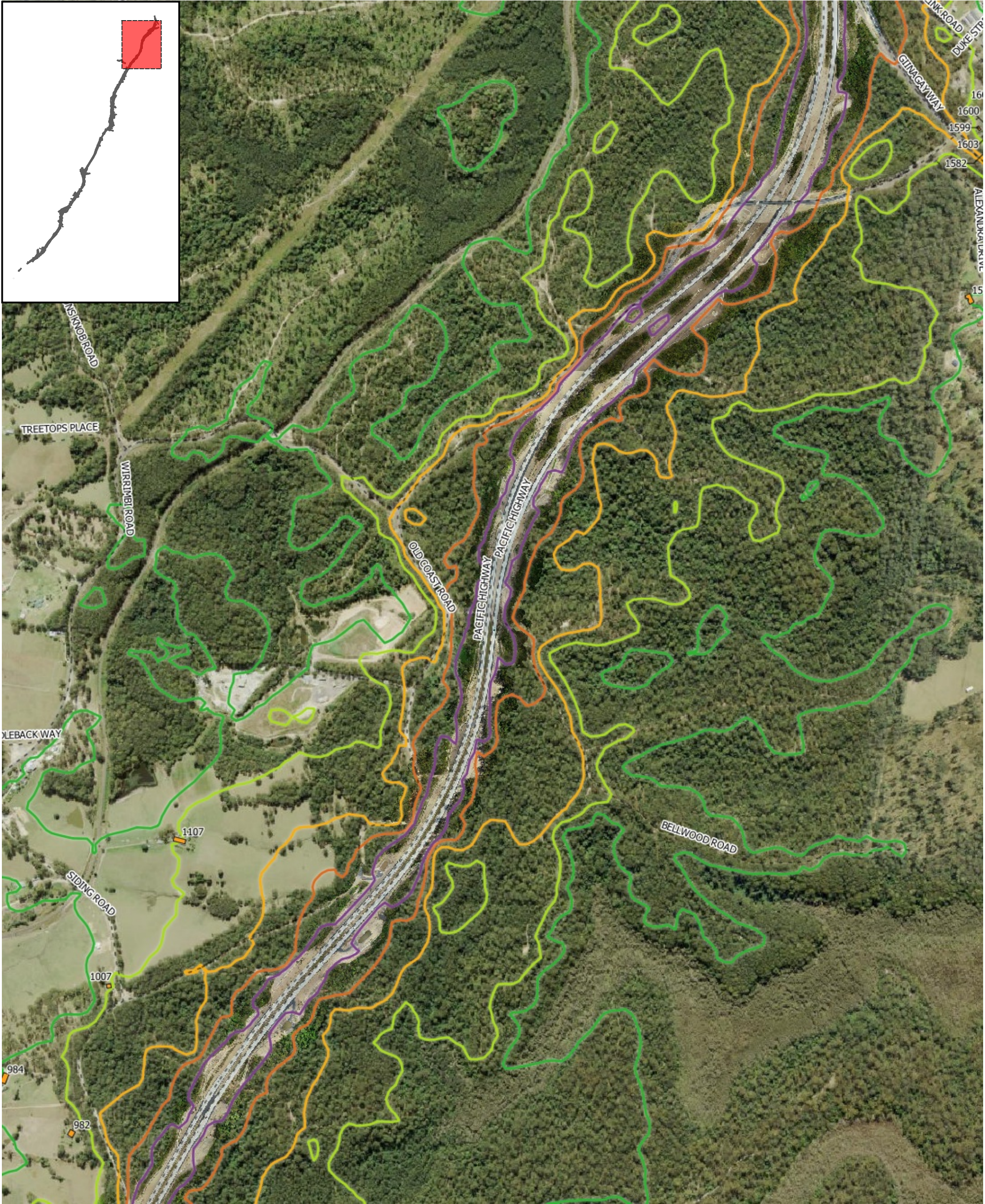
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Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Day

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Date: 25-02-2020
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Legend

--- Road — Noise Wall Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65



Consultant:



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P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

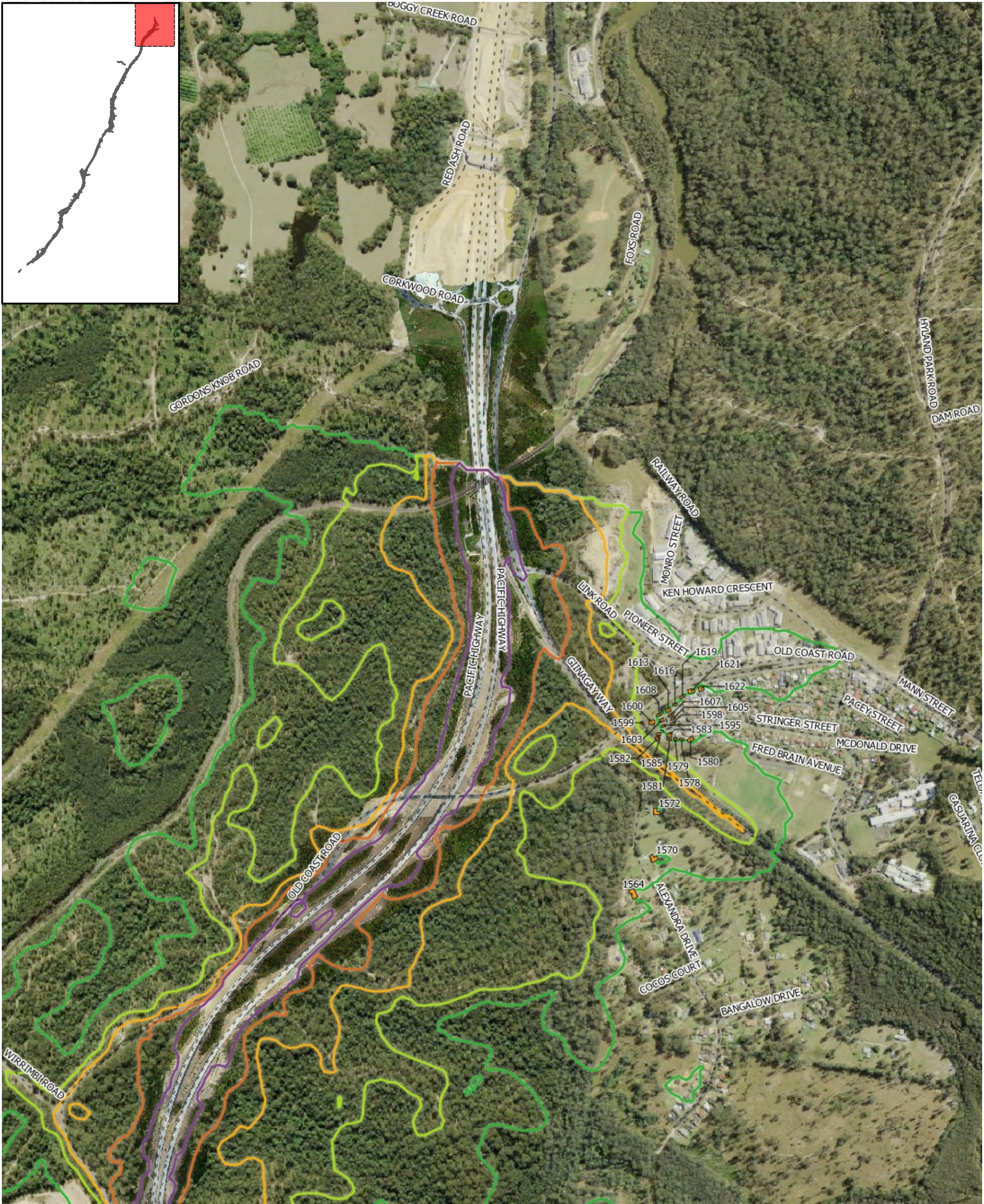
Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Day

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Figure No: TK363-01.6.1.3.1 AppD (r6)-10 Rev: R6
Date: 25-02-2020 Sheet: A3
Created by: DK Scale: 1:10000



Legend

- Road
- Noise Wall
- Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65

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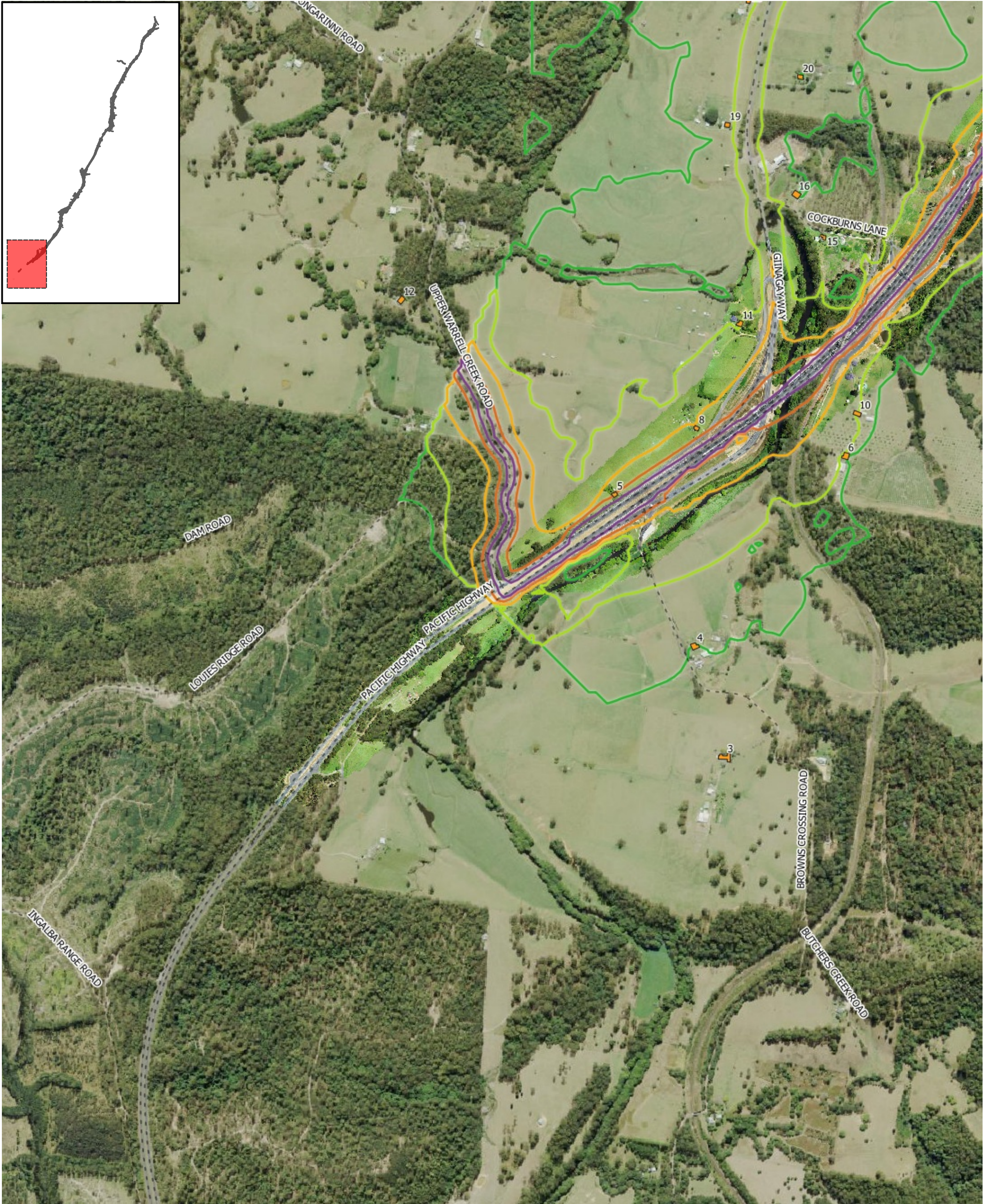
Client:
Roads & Maritime

Project:
Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

Description:
Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Day

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Date: 25-02-2020
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Rev: R6
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Legend

- - - Road — Noise Wall Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65

250 0 250 500 m

Consultant:

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P: 02 8218 0500 F: 02 8218 0501

Client:

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Project:

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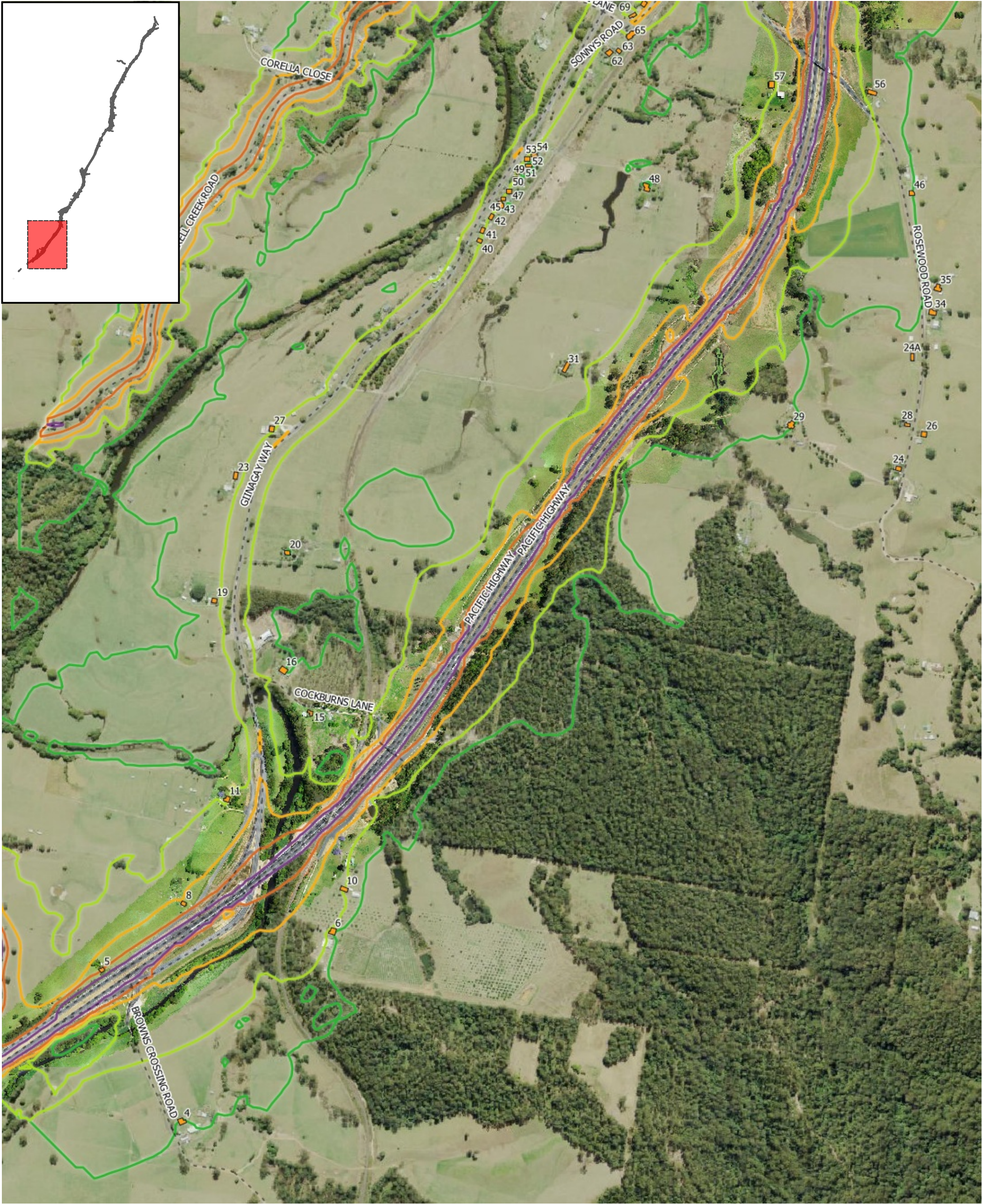
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Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Night

Figure No: TK363-01.6.1.3.1 AppD (r6)-1
Date: 25-02-2020
Created by: DK

Rev: R6
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Legend

Road

Noise Wall

Receiver

Noise Contours, dB(A)

45

50

55

60

65

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Client:

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Project:

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Pacific Highway Upgrade

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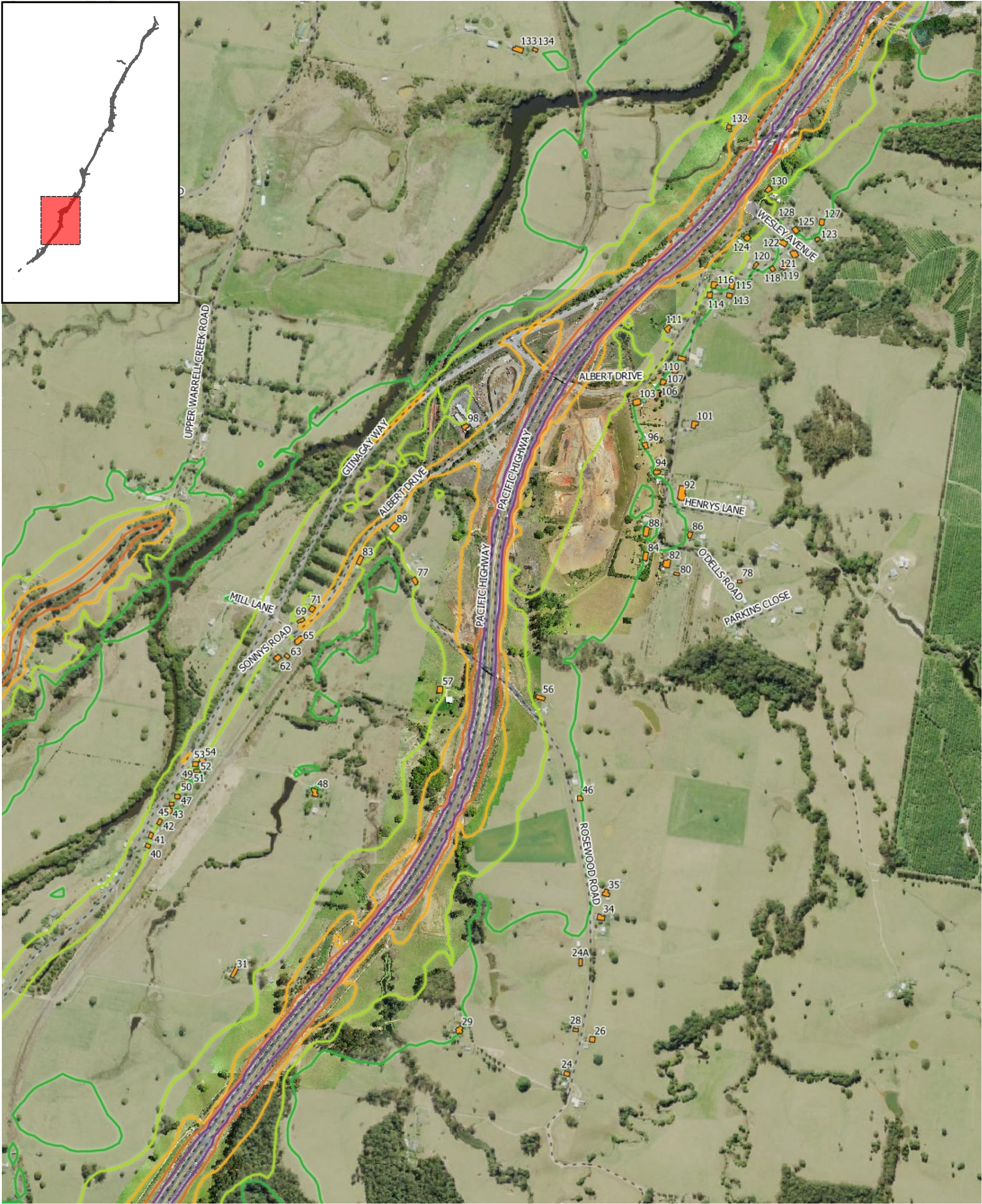
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Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Night

Figure No: TK363-01.6.1.3.1 AppD (r6)-2
Date: 25-02-2020
Created by: DK

Rev: R6
Sheet: A3
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2500250500 m



Legend

- - - Road — Noise Wall Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65

250 0 250 500 m

Consultant:

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P: 02 8218 0500 F: 02 8218 0501

Client:

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Project:

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Pacific Highway Upgrade

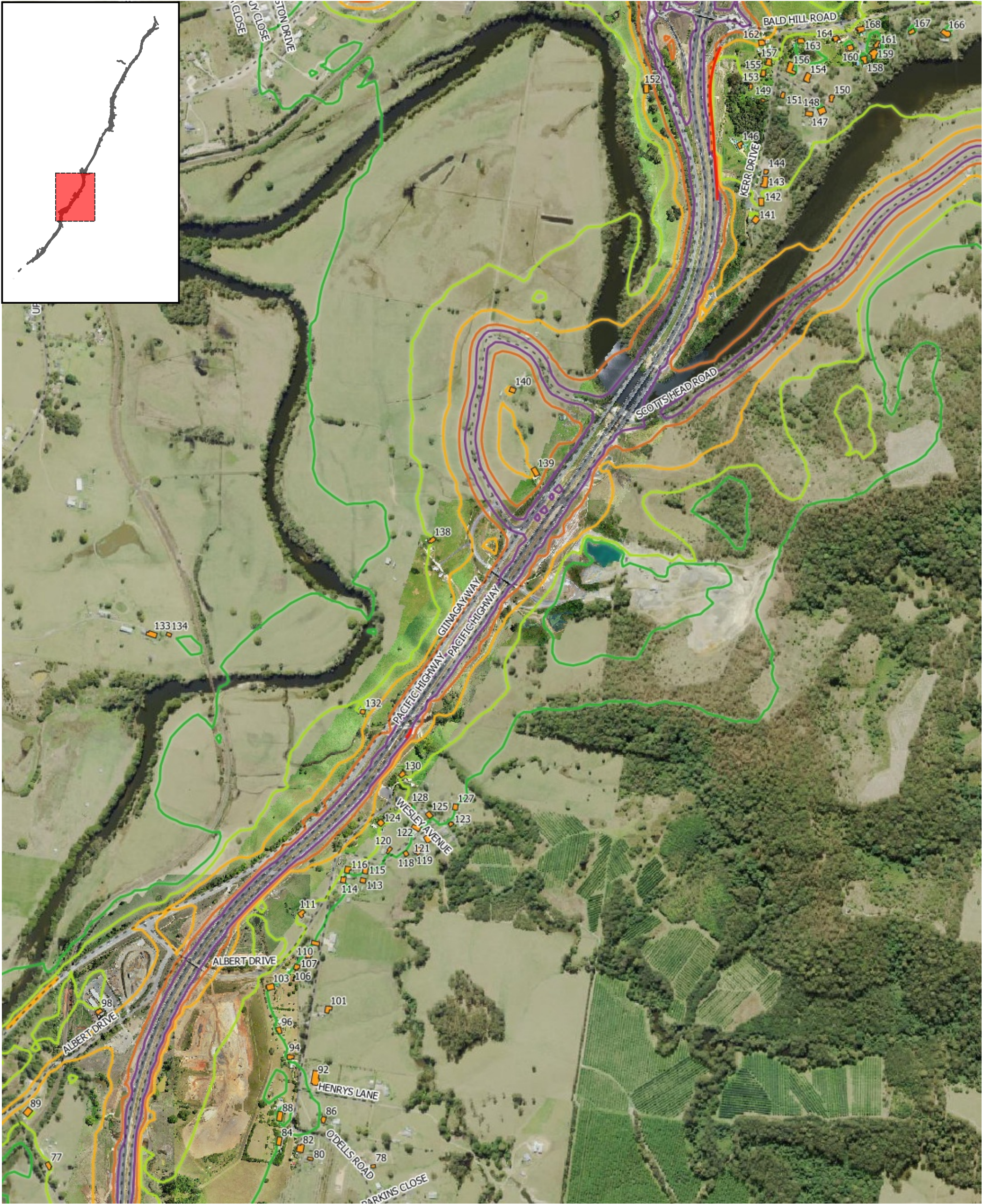
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Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Night

Figure No: TK363-01.6.1.3.1 AppD (r6)-3
Date: 25-02-2020
Created by: DK

Rev: R6
Sheet: A3
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Legend

Road

Noise Wall

Receiver

Noise Contours, dB(A)

45

50

55

60

65

250

0

250

500 m

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Client:

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Pacific Highway Upgrade

Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Night

Figure No:

TK363-01.6.1.3.1 AppD (r6)-4

Date:

25-02-2020

Created by:

DK

Rev:

R6

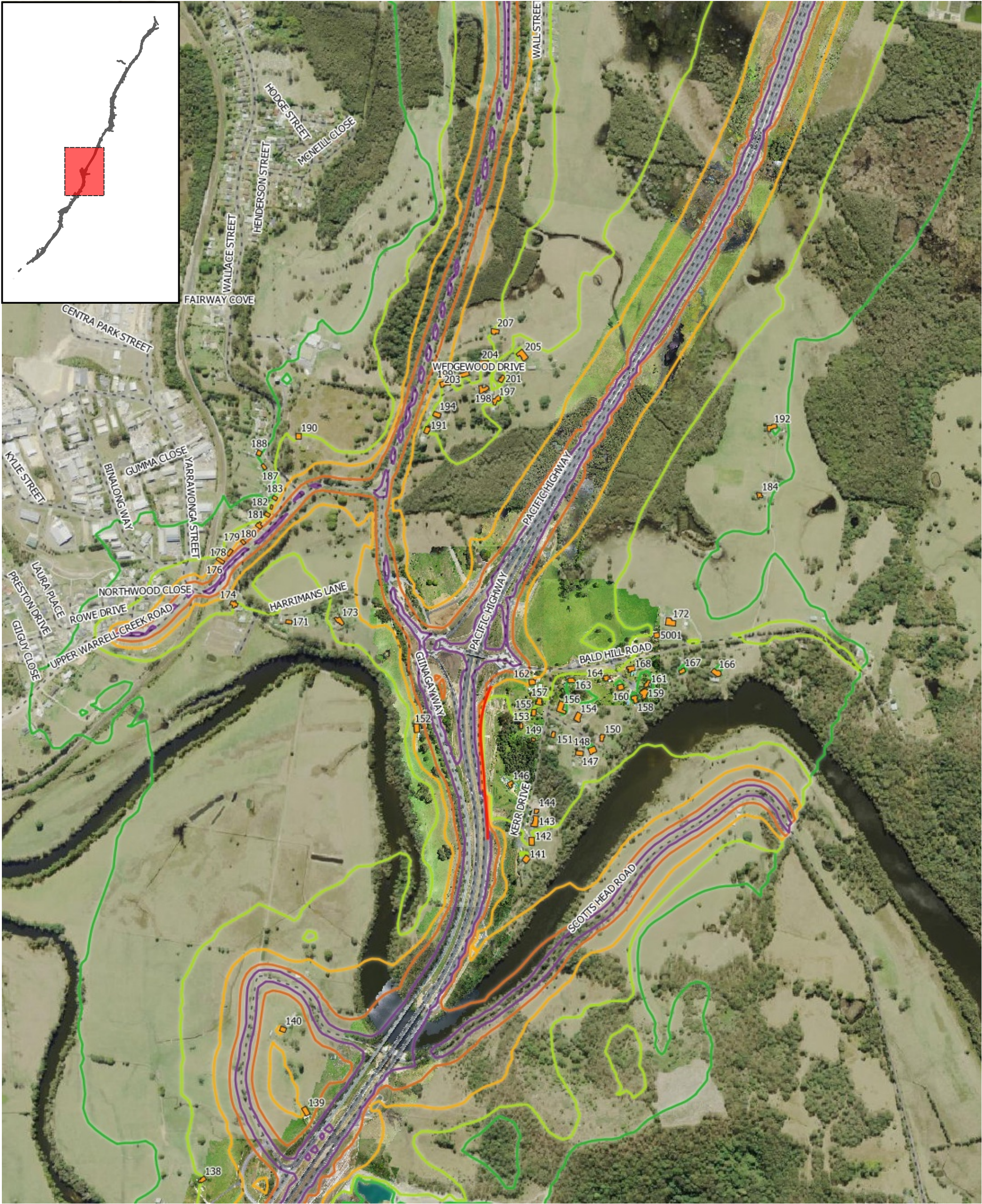
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Legend

- - - Road — Noise Wall Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65

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P: 02 8218 0500 F: 02 8218 0501

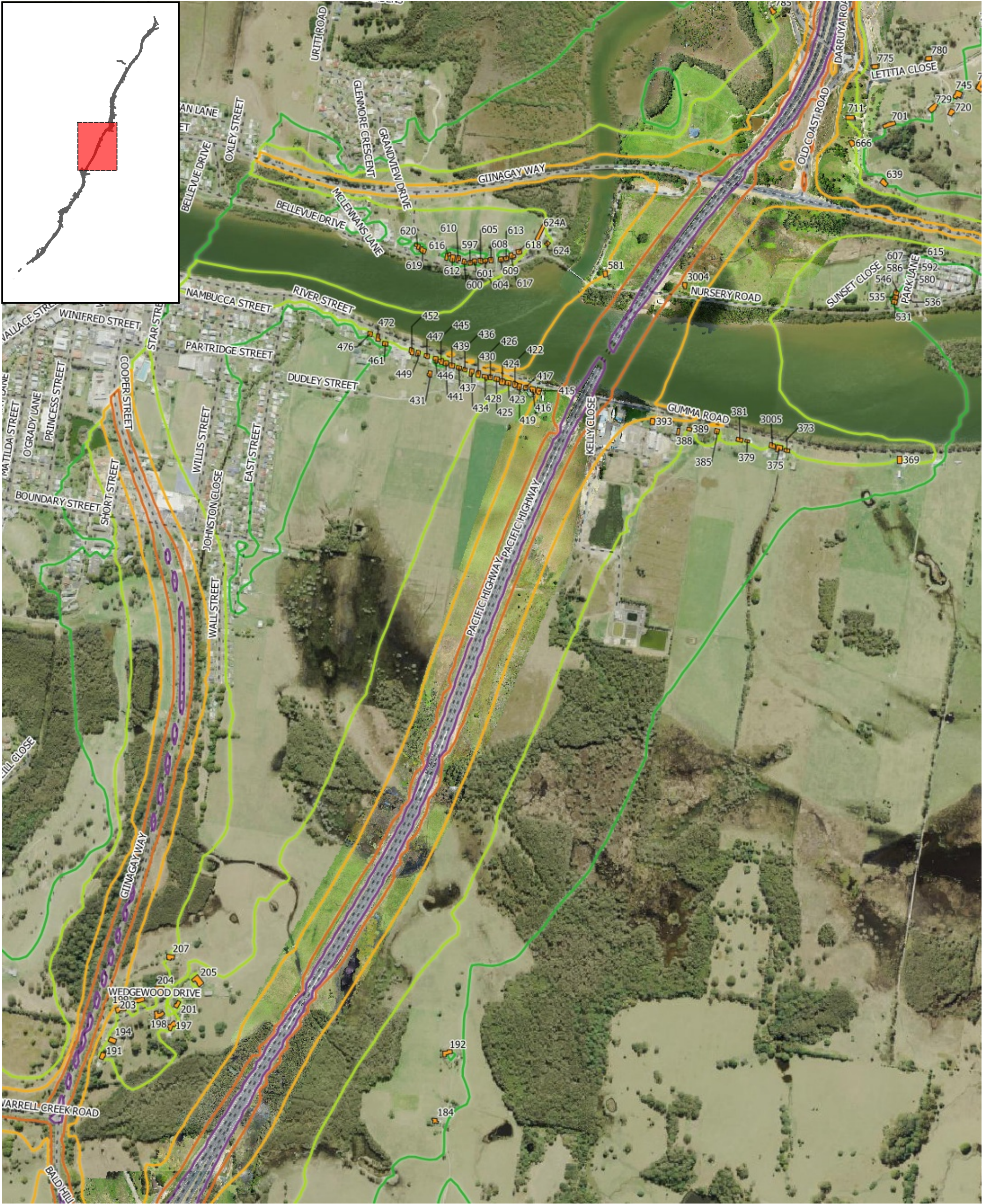
Client:
Roads & Maritime

Project:
Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

Description:
Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Night

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Figure No: TK363-01.6.1.3.1 AppD (r6)-5
Date: 25-02-2020
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Rev: R6
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Scale: 1:10000



Legend

- - - Road — Noise Wall ■ Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65

250 0 250 500 m

Consultant:

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P: 02 8218 0500 F: 02 8218 0501

Client:

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Project:

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Pacific Highway Upgrade

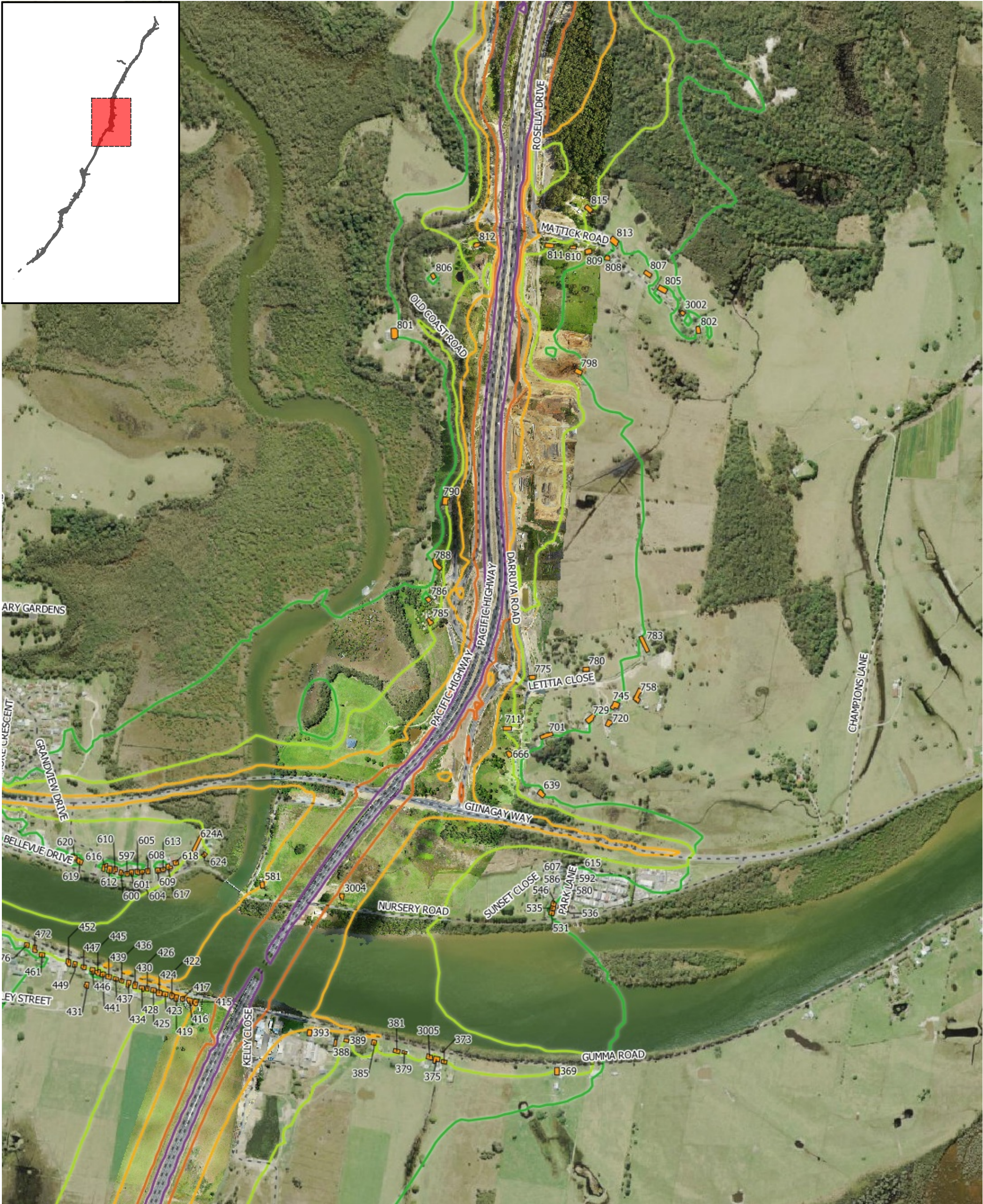
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Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Night

Figure No: TK363-01.6.1.3.1 AppD (r6)-6
Date: 25-02-2020
Created by: DK

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Scale: 1:10000



Legend

Road

Noise Wall

Receiver

Noise Contours, dB(A)

45

50

55

60

65

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Client:

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Project:

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Pacific Highway Upgrade

Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Night

Figure No:

TK363-01.6.1.3.1 AppD (r6)-7

Date:

25-02-2020

Created by:

DK

Rev:

R6

Sheet:

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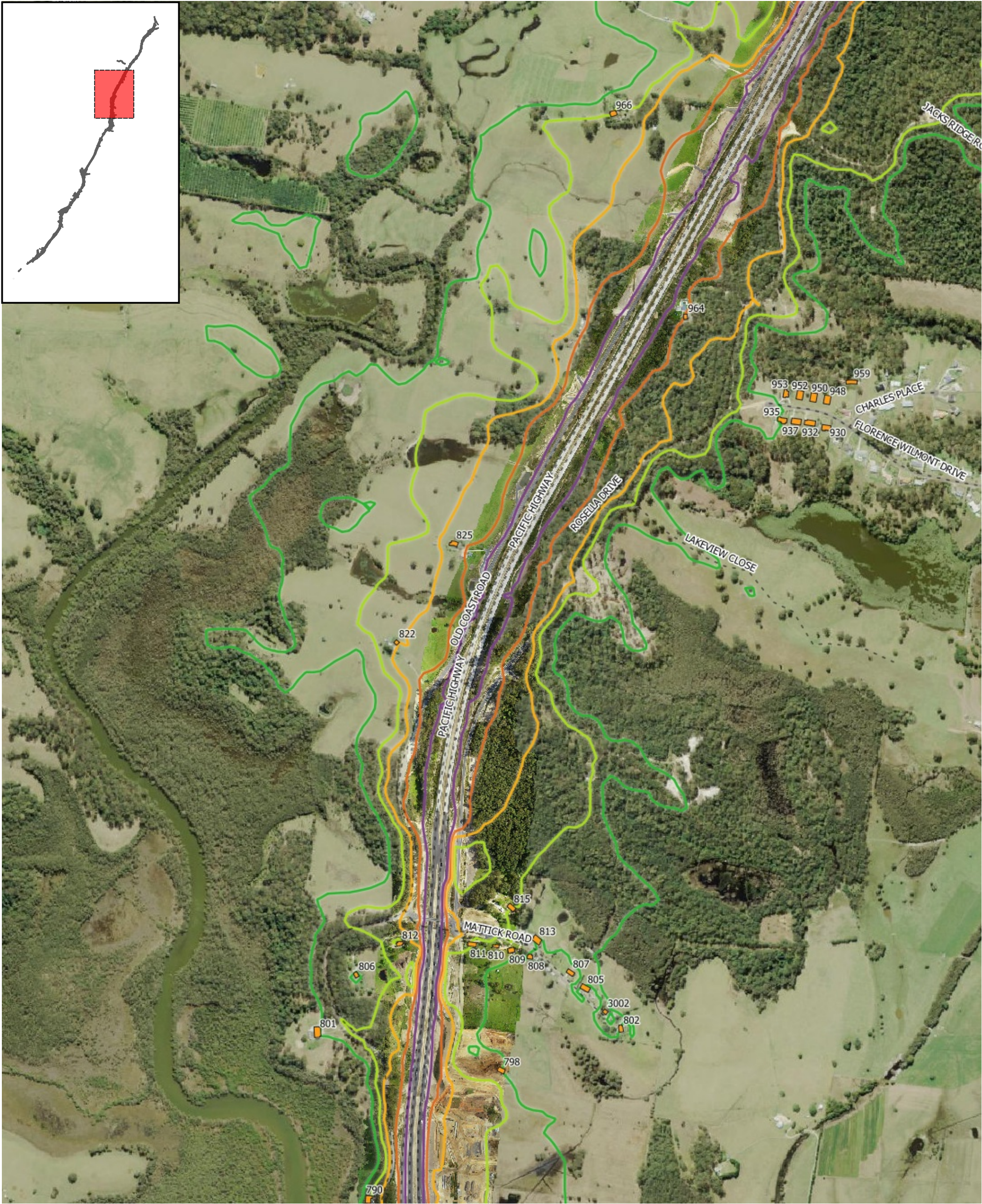
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250

0

250

500 m



Legend

Road

—

Noise Wall

■

Receiver

Noise Contours, dB(A)

45

50

55

60

65

2500250500 m

Consultant:

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Client:

Roads & Maritime

Project:

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Pacific Highway Upgrade

Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Night

Figure No:

TK363-01.6.1.3.1 AppD (r6)-8

Date:

25-02-2020

Created by:

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Rev:

R6

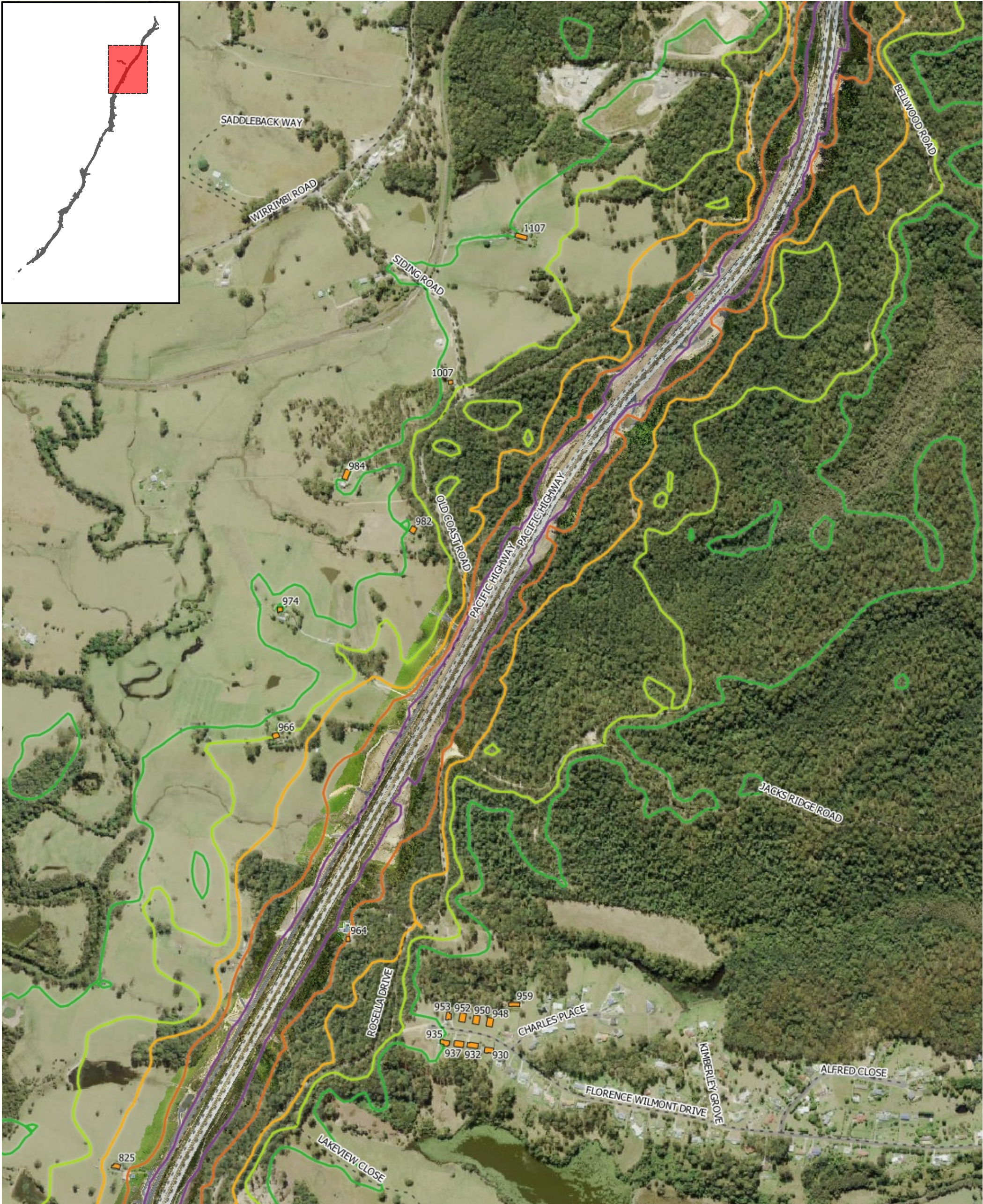
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Legend

- - - Road — Noise Wall Receiver

Noise Contours, dB(A)

- 45
- 50
- 55
- 60
- 65

250 0 250 500 m

Consultant:

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P: 02 8218 0500 F: 02 8218 0501

Client:

Roads & Maritime

Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

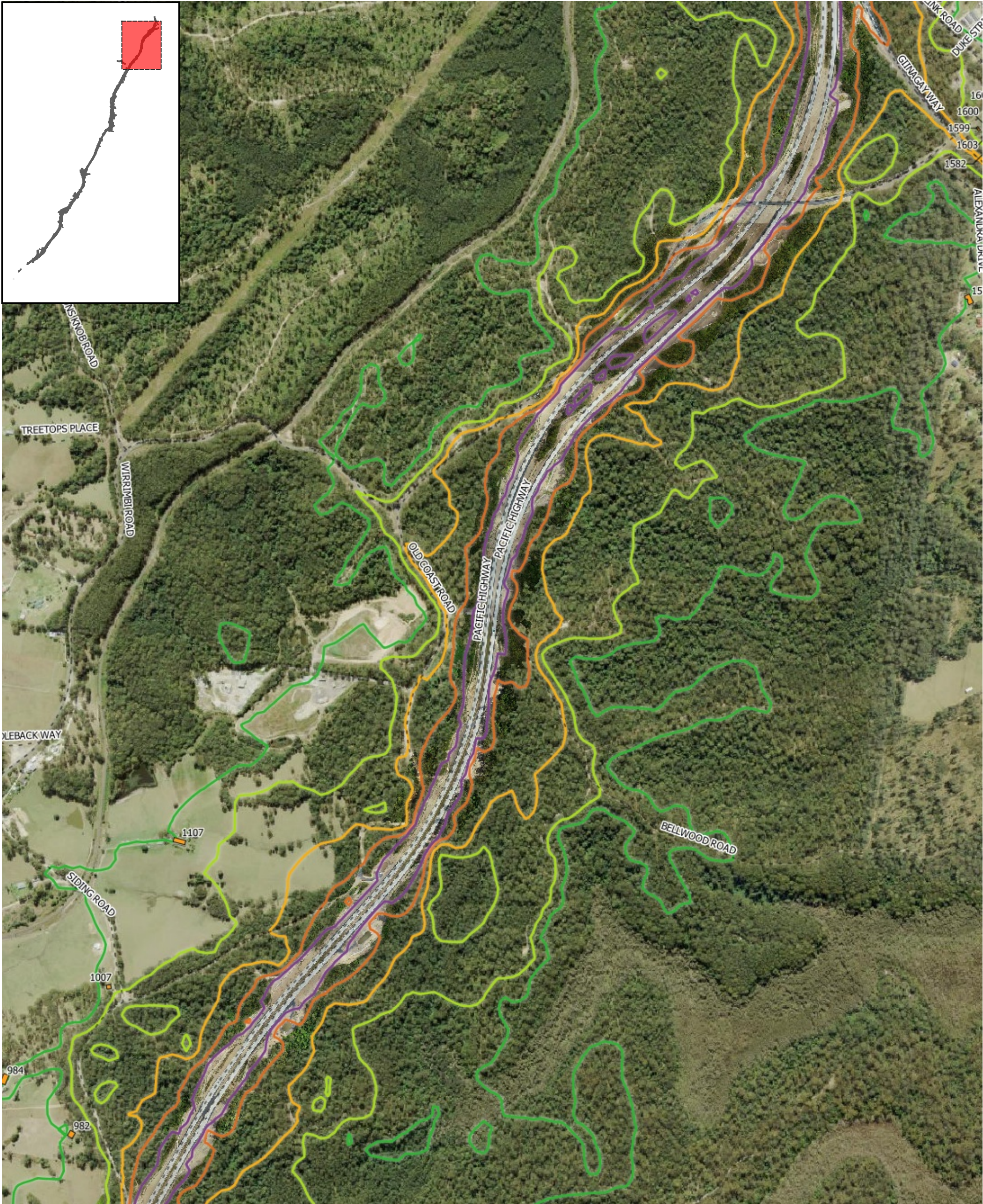
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Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Night

Figure No: TK363-01.6.1.3.1 AppD (r6)-9
Date: 25-02-2020
Created by: DK

Rev: R6
Sheet: A3
Scale: 1:10000



Legend

 Road

—

 Noise Wall

■

 Receiver

Noise Contours, dB(A)

45

50

55

60

65

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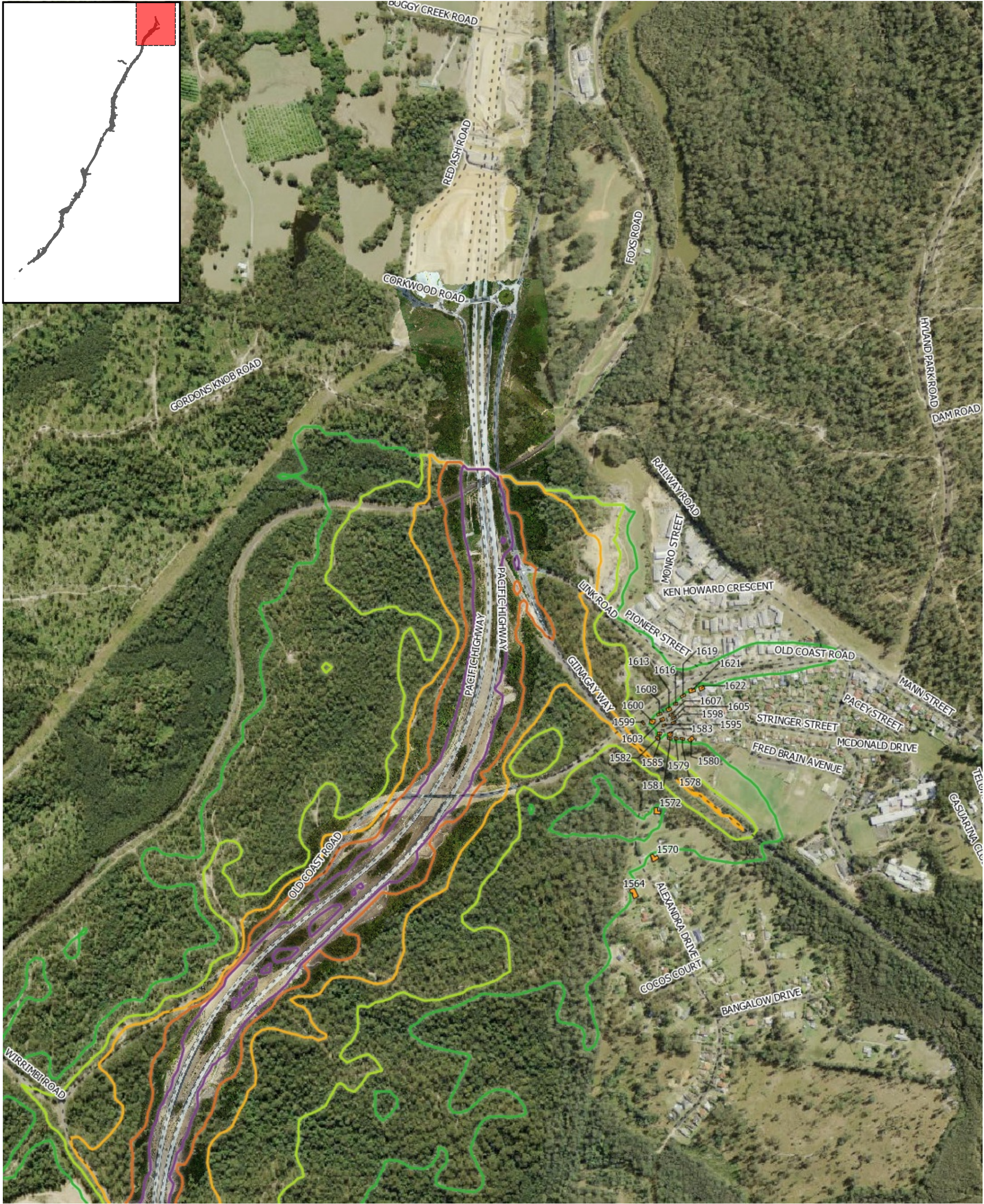
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Warrell Creek to Nambucca Heads Post Construction Operational Noise Assessment 2028 Noise Contours at 1.5m - Night

Figure No: TK363-01.6.1.3.1 AppD (r6)-10
Date: 25-02-2020
Created by: DK

Rev: R6
Sheet: A3
Scale: 1:10000

2500250500 m



Legend

- - - Road — Noise Wall Receiver

Noise Contours, dB(A)

	45
	50
	55
	60
	65

250 0 250 500 m

Consultant:

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Project:

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Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
2028 Noise Contours at 1.5m - Night

Figure No: TK363-01.6.1.3.1 AppD (r6)-11
Date: 25-02-2020
Created by: DK

Rev: R6
Sheet: A3
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APPENDIX E **Details of Complaints Received**

Location	Complaint	Response
Rosella Drive North Macksville	19/12/17 - Resident raised concerns about the high temperatures inside their house due to having windows closed as a result of road noise. Property has no air-conditioning installed. Resident commented that it is noisier inside the house than outside.	RMS supplied a mobile air conditioner for each occupied bedroom (5) and will provide more information about operational noise assessment as it becomes available
Kerr Drive Macksville	19/12/17 - Resident raised concerns about their property not being assessed as a 2 story building. Resident advised Minister Pavey's office informed them that their house is not eligible for treatment.	Contacted the resident to explain post construction operational noise assessment process (see Note).
River Street Macksville	19/12/17 - Complaint received from resident about trucks using their exhaust brakes, particularly at night. As a result of the noise impacts, resident has to close all windows and use air conditioning to keep the noise out.	Project representative met with resident and explained noise monitoring will be undertaken. Stakeholder requested a logger at their house and was advised this request would be forwarded to the noise assessment consultants. Stakeholder has also requested a "limit compression breaking" signs be installed.
Ainsworth Drive Macksville	19/12/17 - Resident complaint about truck noise and requested contact details for RMS.	RMS contact details forwarded
Scotts Head Road Way Way	20/12/17 - Resident called advising that they are hearing noise from the new highway as a consistent hum. Resident said it is not overly intrusive and that they could not see the highway.	Project team acknowledged the complaint
Letitia Close Macksville	20/12/17 - Resident emailed advising that they have noticed extra noise with the highway opening. Requested information about operational noise assessment process.	E-mail response describing the process of operational noise review and assessment.
River Street Macksville	20/12/17 - During stakeholder meeting, resident requested a noise monitor placed at their property during operational noise monitoring and installation of "limit compression breaking" signs.	Advised stakeholder about the operational noise review and assessment process. Request for noise monitoring equipment to be situated at the property forwarded to noise consultants for consideration.
Letitia Close Macksville	21/12/17 - Resident raised concerns about operational noise, especially the trucks using the roundabout. Noise impacts at night are higher.	E-mail response and attached further information emailed the operational noise Frequently Asked Questions (FAQ) fact sheet

Location	Complaint	Response
Letitia Close Macksville	10/1/18 - Resident called and said the highway is very noisy as the trucks pass a gap between two noise mounds near her house.	Returned call and arranged meeting to discuss
Mattick Road North Macksville	10/1/18 - Email complaint regarding excessive noise generated by the trucks particularly at night. Concerned that the earth wall is too short and that the truck exhausts are above the earth wall. Resident commented that the noise levels at other properties in the street are much lower than their property because their earth wall is adequate height.	E-mail response describing the process of operational noise review and assessment.
Mattick Road North Macksville	15/1/18 - During stakeholder meeting, resident raised concerns about highway noise, mainly truck exhaust and engine brakes and tyre whine. Advised that the front of their house had double glazing treatment and they hear the noise from around the back. Stakeholder believes the noise is coming from Rosella Drive area.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Champions Lane North Macksville	16/1/18- Stakeholder says that they hear the highway noise loudly at night, mostly the trucks. Their property is behind the old girder plant site. Pacifico was there to discuss other matters when this was raised. Resident acknowledged that the wind direction was a factor. They moved in in October 2017.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Connors Crescent Macksville	17/1/18 - Resident raised concerns about highway noise at night in the front bedroom of their property. Resident requested information about when operational noise monitoring would be carried out, and requested double glazing in the front bedroom.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Wedgewood Drive Macksville	17/1/18 - Resident raised concerns about highway noise, especially truck exhaust brakes and tyre whine at night.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Mattick Road North Macksville	17/1/18 - Resident is concerned that the night time traffic noise is more than they thought it would be. Doesn't bother them during the day. Resident has had air-conditioning provided but at night they don't use the air-con and sleep with the windows open.	Contacted the resident to explain post construction operational noise assessment process (see Note).

Location	Complaint	Response
Letitia Close Macksville	1/2/18 - During stakeholder meeting, resident raised concerns about the poor installation of blinds by the contractor. Resident advised they are getting light spill from the street lights and cars coming up the ramps. Also being impacted by highway noise from a gap in the earth mound. Resident complained about entrenched dirt on windows and horse trailer.	Met with resident and advised cleaning would be organised. Advised of the process of operational noise review and assessment.
Pacific Highway Congaringi	6/2/18 - Email from Nambucca Shire Council on behalf of resident lack of consultation regarding management of highway noise with increased traffic volumes.	RMS discussed with Council and advised of the process of operational noise review and assessment
River Street Macksville	19/2/18 - Resident called complaining of highway noise.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Kerr Drive Macksville	22/2/18 - Resident called complaining about highway noise being intrusive at night, despite sound wall. Resident said they cannot open the south facing windows in bedroom or bathroom because of highway noise at night. Resident says they have raised this before and been told that they are in a hollow but advised they have a 2 storey house which raises it above the hollow.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Wall Street Macksville	5/3/18 - Email received advising that since the bypass of Macksville has been introduced that the noise of the traffic going on to the Phillip Hughes bridge is very loud especially at night.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Bald Hill Road Macksville	8/3/18 - Resident raised concerns about highway noise, especially at night and is not able to open their windows.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Marshall Drive Macksville	13/3/18 - Resident has concerns about noise from the Pacific Highway upgrade near their home. The truck noise is waking them at night and they cannot be outside for too long as the resident gets headaches.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Glenmore Crescent Macksville	29/3/18 - Resident can hear trucks at night up and down the bridge, says they can't open the windows at night.	Contacted the resident to explain post construction operational noise assessment process (see Note).

Location	Complaint	Response
River Street Macksville	23/4/18 - Email from property owner advising their tenant has complained about an increase of traffic noise at the rear of the house and an increase of train noise at the front of the house which they believe is rebounding off the new bridge.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Old Coast Drive North Macksville	15/5/18 - Resident raised concerns about noise from the new highway.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Old Coast Drive North Macksville	25/5/18 - Email received from resident requesting noise report. Resident also noted traffic noise is very distinct with the constant compression/exhaust braking of heavy vehicles using the highway.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Alexandra Drive Nambucca Heads	28/5/18 - Email received from resident advising that the new upgraded highway is much noisier despite being further away.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Mattick Road North Macksville	15/6/19 - Email to Ms Melinda Pavey and copy to RMS. Resident raised concerns regarding road noise in and around North Macksville.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Bald Hill Road Macksville	27/6/18 - Email received from resident raising concerns about noise from the highway, especially trucks using engine brakes. Resident noted the noise levels have risen continuously and seem to be getting louder as it gets colder.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Rosewood Drive Warrell Creek	6/7/18 - Resident called to say that it is very noisy, especially the trucks at night. Resident asked whether there will be sound walls erected.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Rosewood Drive Warrell Creek	6/7/18 - Resident raised concerns about highway noise and advised they have had air-conditioning installed.	Contacted the resident to explain post construction operational noise assessment process (see Note).
O'Dells Drive Donnellyville	6/7/18 - Resident raised concerns about highway noise and said they are due to have window treatments fitted and are able to hear the truck exhaust noise from the new highway.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Giinagay Way Warrell Creek	27/7/18 - Email received from resident regarding noise monitoring and treatment. Resident has requested noise monitoring during the night for a period of time as the noise levels vary.	Contacted the resident to explain post construction operational noise assessment process (see Note).

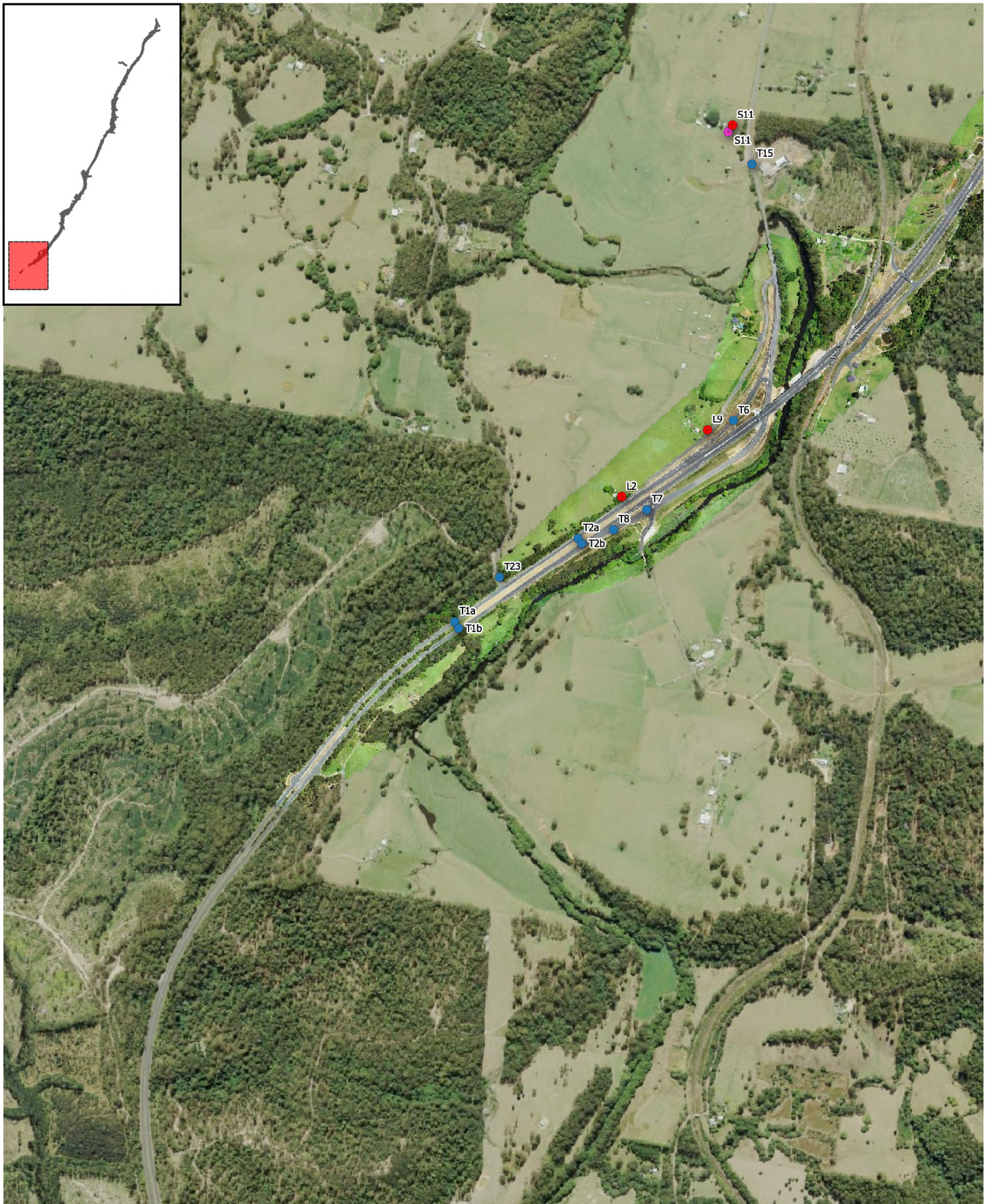
Location	Complaint	Response
Siding Road North Macksville	18/8/18 - Resident email received enquiring about noise assessment process and timing.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Taylors Arm Road Macksville	22/8/18 - Discussion with stakeholder about operational noise monitoring process, in relation to tenanted property in River St. Property owner stated the tenants have moved out due to the noise and increased cost of running the air-conditioning that was installed as at-house noise treatment.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Mattick Road North Macksville	27/8/18 - Resident contacted Roads and Maritime with concerns about the highway noise, especially truck exhaust brakes at night. Resident has received window glazing and ventilation at-house noise treatment, but says the noise comes up through the valley.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Scotts Head Road Way Way	19/9/18 - Email received from resident regarding noise levels following the opening of the Warrell Creek to Nambucca Heads section of the Pacific Highway.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Mattick Road North Macksville	2/11/18 - Resident contacted Roads and Maritime regarding road noise and enquired about the potential to add more earth to the top of the noise wall.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Harrimans Lane Macksville	5/11/18 - Complaint received regarding operational noise.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Kerr Drive Macksville	5/11/18 - Resident complained about lack of response to operational noise concerns and advised they are still suffering from highway noise, especially truck exhaust. The property has not received any at-house noise treatment.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Letitia Close Macksville	26/11/18 - Resident emailed to complain about operational noise during day.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Bellevue Drive Macksville	28/11/18 - Resident requested additional at-house noise treatment for front windows, as this is where the noise comes from.	Contacted the resident to explain post construction operational noise assessment process (see Note).

Location	Complaint	Response
Mattick Road North Macksville	14/1/19 - Email from resident raising concerns about operational noise and light spill which is very distracting and affecting sleep patterns.	Called and discussed issues and advised of the process of operational noise review and assessment. Raised the option of increasing the height of the mound adjacent to their property by constructing a fence/barrier on top.
Bellevue Drive Macksville	25/2/19 - Resident discussion on site reporting quality issues with at-house noise treatment carried out on the property.	Confirmed defects would be rectified prior to finalising the at-house noise treatment at the property.
East Street Macksville	11/3/19 - Resident contact Roads and Maritime to raise concerns about highway noise and no noise treatment being provided at the property.	Contacted the resident to explain post construction operational noise assessment process (see Note).
East Street Macksville	13/3/19 - Resident raised concerns about highway noise. They have air-conditioning but would like to know if something more can be done. Property has not received at-house noise treatment.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Giinagay Way Warrell Creek	29/4/19 - Resident called to report issues with traffic noise from highway and asked when the operational noise monitoring would be carried out.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Wedgewood Drive Macksville	22/5/19 - Resident contacted Roads and Maritime regarding excessive truck and vehicle noise, particularly at night.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Kerr Drive Macksville	25/6/19 - Letter received from resident regarding traffic noise, especially after speed limit was increased to 110kp/h and noting noise levels worse during cold weather and early mornings. Resident requested new windows in two bedrooms.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Wedgewood Drive Macksville	26/6/19 - Resident raised concerns regarding excessive truck and vehicle noise, particularly at night.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Wedgewood Drive Macksville	2/7/19 - Email received from resident about traffic noise from the new highway and status of the operational noise assessment.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Bellevue Drive Macksville	4/7/19 - Email received from resident requesting further at-house noise treatment.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Scotts Head Road Way Way	8/7/19 - Email received from resident regarding trucks audible at night with windows closed and requesting results of noise assessment.	Contacted the resident to explain post construction operational noise assessment process (see Note).

Location	Complaint	Response
Wedgewood Drive Macksville	12/8/19 - Resident email complaining about the traffic noise from the new highway.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Wedgewood Drive Macksville	20/8/19 - Resident called requesting noise treatments.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Wedgewood Drive Macksville	26/8/19 - Resident called advising the noise levels were higher than expected.	Contacted the resident to explain post construction operational noise assessment process (see Note).
East Street Macksville	28/8/19 - Resident called regarding motorway noise.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Bellevue Drive Macksville	28/8/19 - Resident called regarding additional facades of property to be treated.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Letitia Close Macksville	19/9/19 - Resident raised concerns about operational traffic noise, particularly impacts to two front bedrooms at night. Resident enquired about eligibility for further at-house noise treatment.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Wedgewood Drive MACKSVILLE	25/9/19 - Email received from resident regarding the constant traffic noise, particularly from trucks. Raised concerns about effect on sleep and daytime productivity.	Contacted the resident to explain post construction operational noise assessment process (see Note).
Siding Rd MACKSVILLE	30/9/19 - Resident called regarding truck noise, especially at night.	Contacted the resident to explain post construction operational noise assessment process (see Note).

Note: The response to the complaint was to contact the stakeholder and discuss their concerns. A project team member discussed the process for monitoring the operational traffic noise and how the results would be assessed and reported. Advised that TfNSW would be in contact again as soon as the report has been published following the review and approval by the EPA and the Department of Planning Industry and Environment. The stakeholder was offered to the opportunity meet with the project representative and discuss the report findings once the report is published. In these cases the stakeholder was satisfied with the process. No further actions were required to close out the complaint at this stage.

APPENDIX F **Noise and Traffic Monitoring Locations**



Legend

- Long Term Noise Monitoring Location
- Short Term Noise Monitoring Location
- Traffic Counting Location



Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

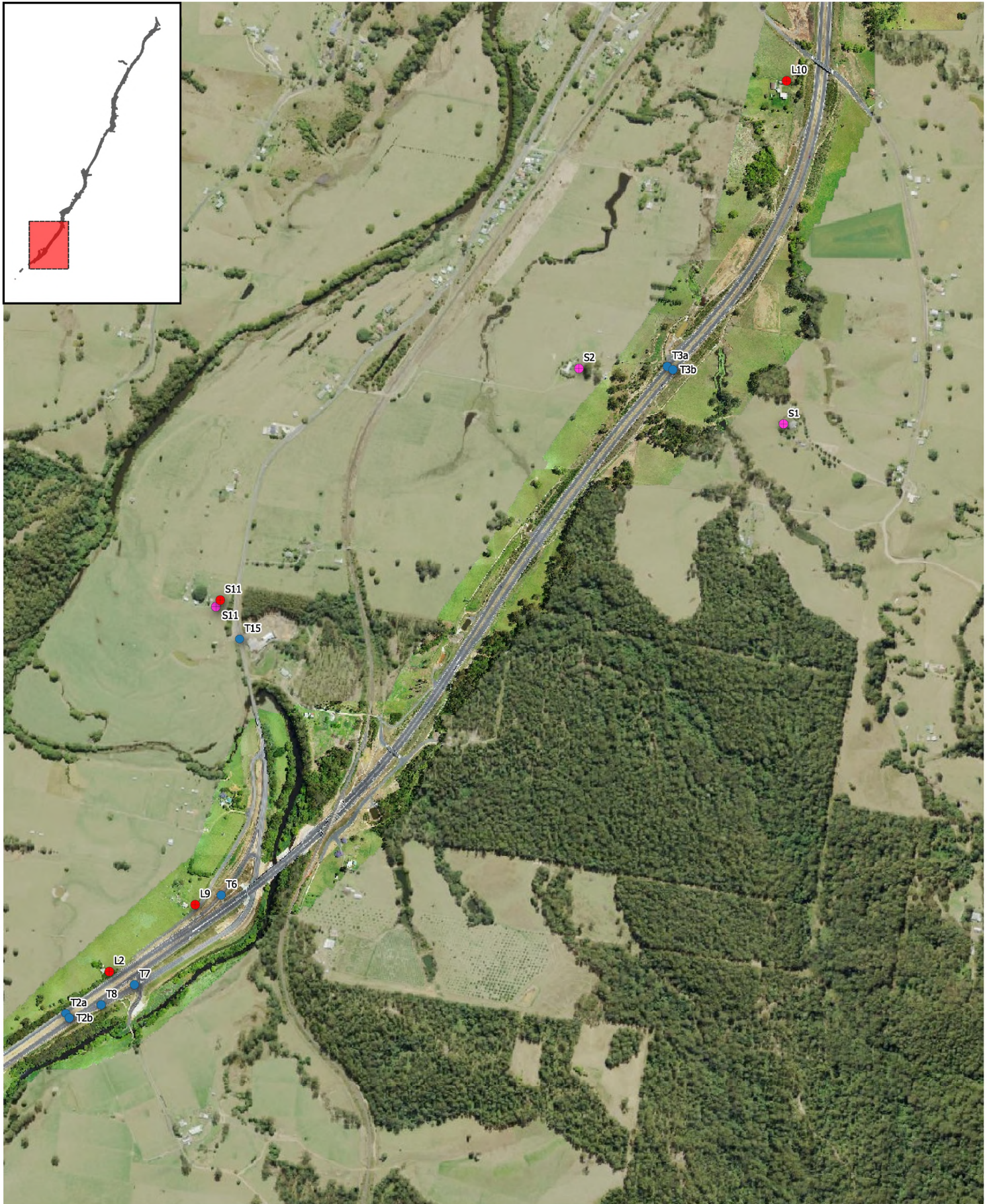
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Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Long Term and Short Term Noise Monitoring and
Traffic Counting Locations

Figure No: TK363-01.6.1.3.1 AppF (r1)-1
Date: 01-10-2019
Created by: DK

Rev: R1
Sheet: A3
Scale: 1:10000

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Legend

- Long Term Noise Monitoring Location
- Short Term Noise Monitoring Location
- Traffic Counting Location



Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

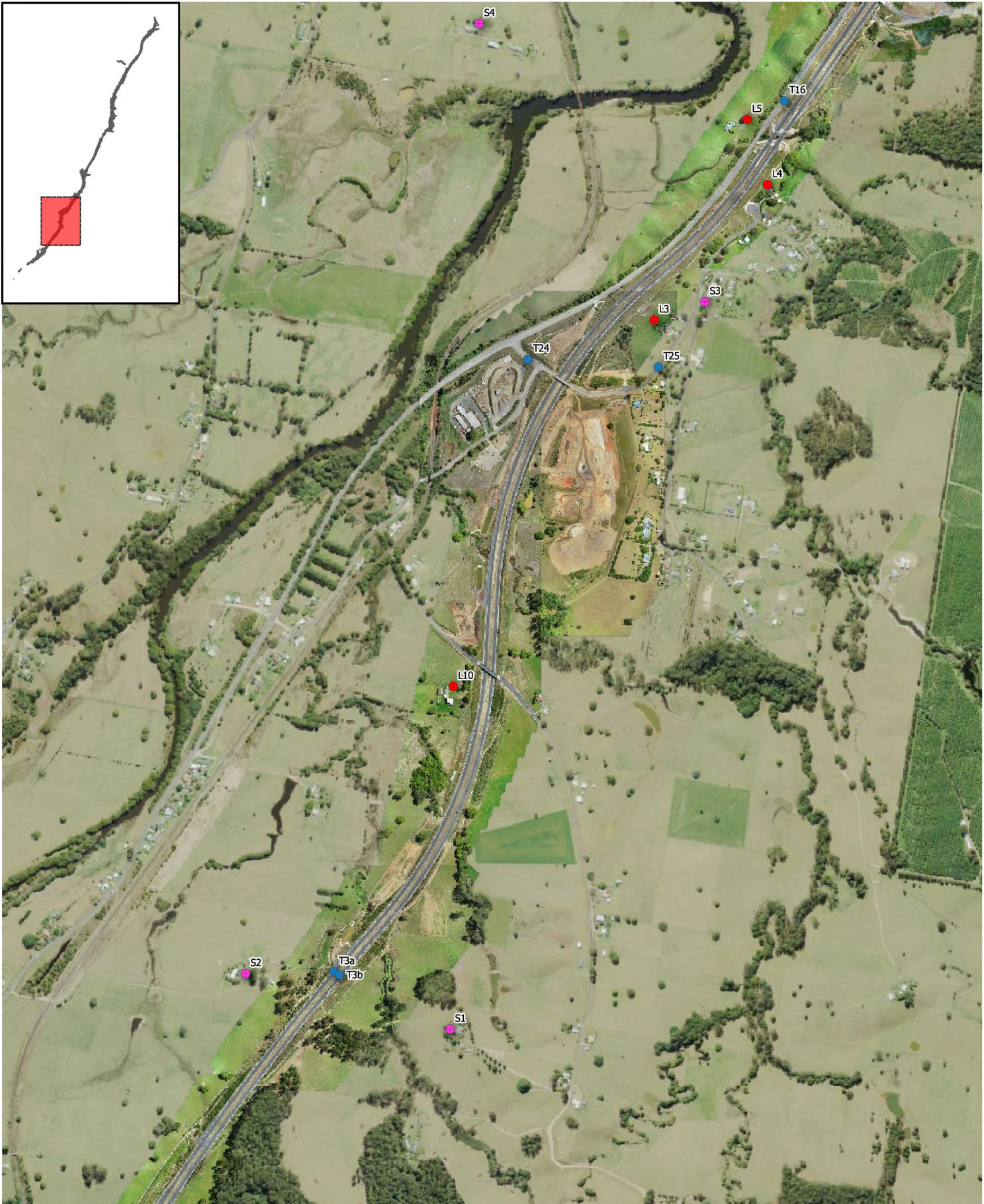
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Long Term and Short Term Noise Monitoring and
Traffic Counting Locations

Figure No: TK363-01.6.1.3.1 AppF (r1)-2
Date: 01-10-2019
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Legend

- Long Term Noise Monitoring Location
- Short Term Noise Monitoring Location
- Traffic Counting Location



Consultant:
RENZO TONIN & ASSOCIATES
inspired to achieve
 1/418A Elizabeth Street, SURRY HILLS NSW 2010
 P: 02 8218 0500 F: 02 8218 0501

Client:
 **Roads & Maritime**

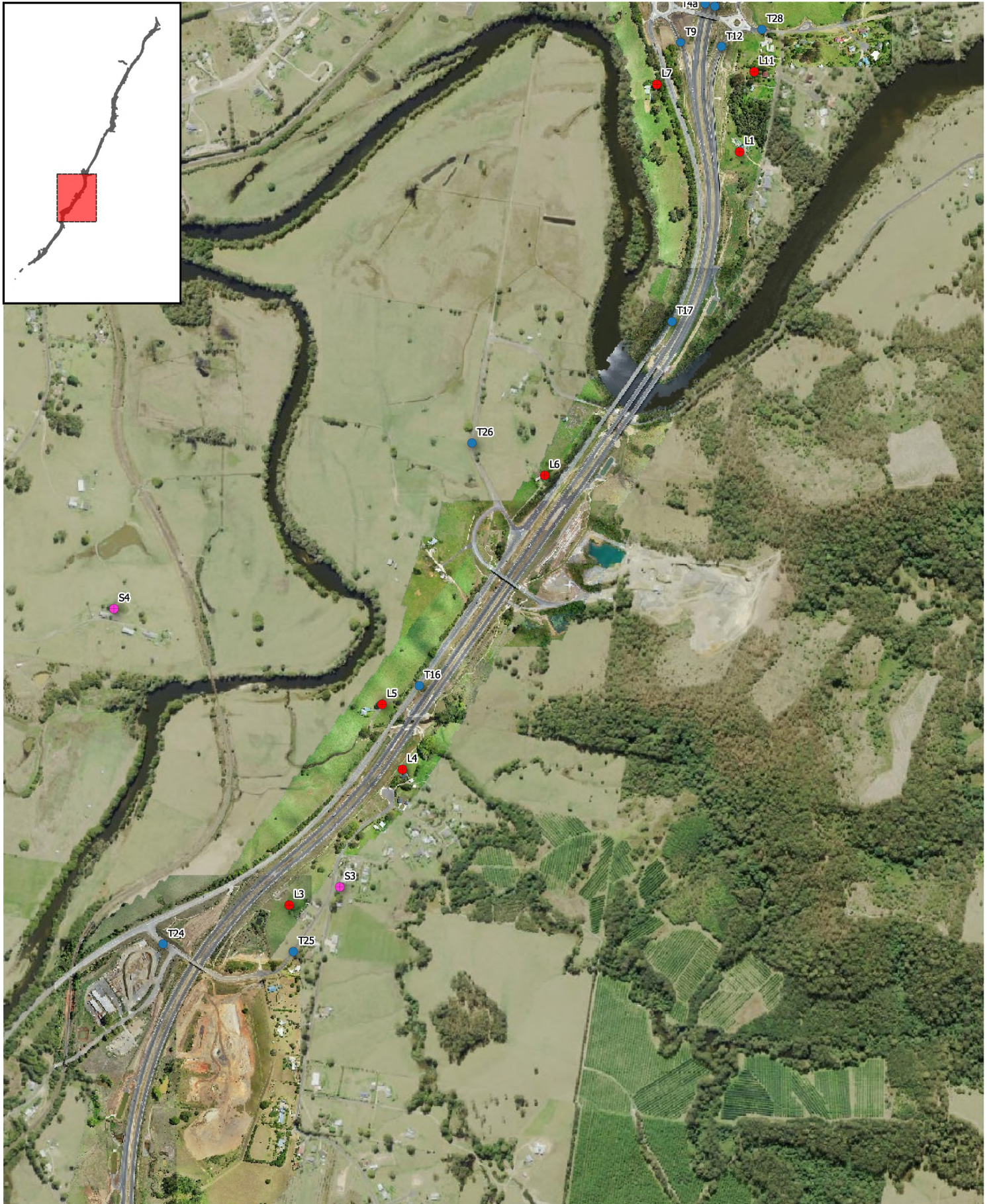
Project:
 Warrell Creek to Nambucca Heads
 Pacific Highway Upgrade

Description:
 Warrell Creek to Nambucca Heads
 Post Construction Operational Noise Assessment
 Long Term and Short Term Noise Monitoring and
 Traffic Counting Locations

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Figure No: TK363-01.6.1.3.1 AppF (r1)-3
 Date: 01-10-2019
 Created by: DK

Rev: R1
 Sheet: A3
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Legend

- Long Term Noise Monitoring Location
- Short Term Noise Monitoring Location
- Traffic Counting Location



Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

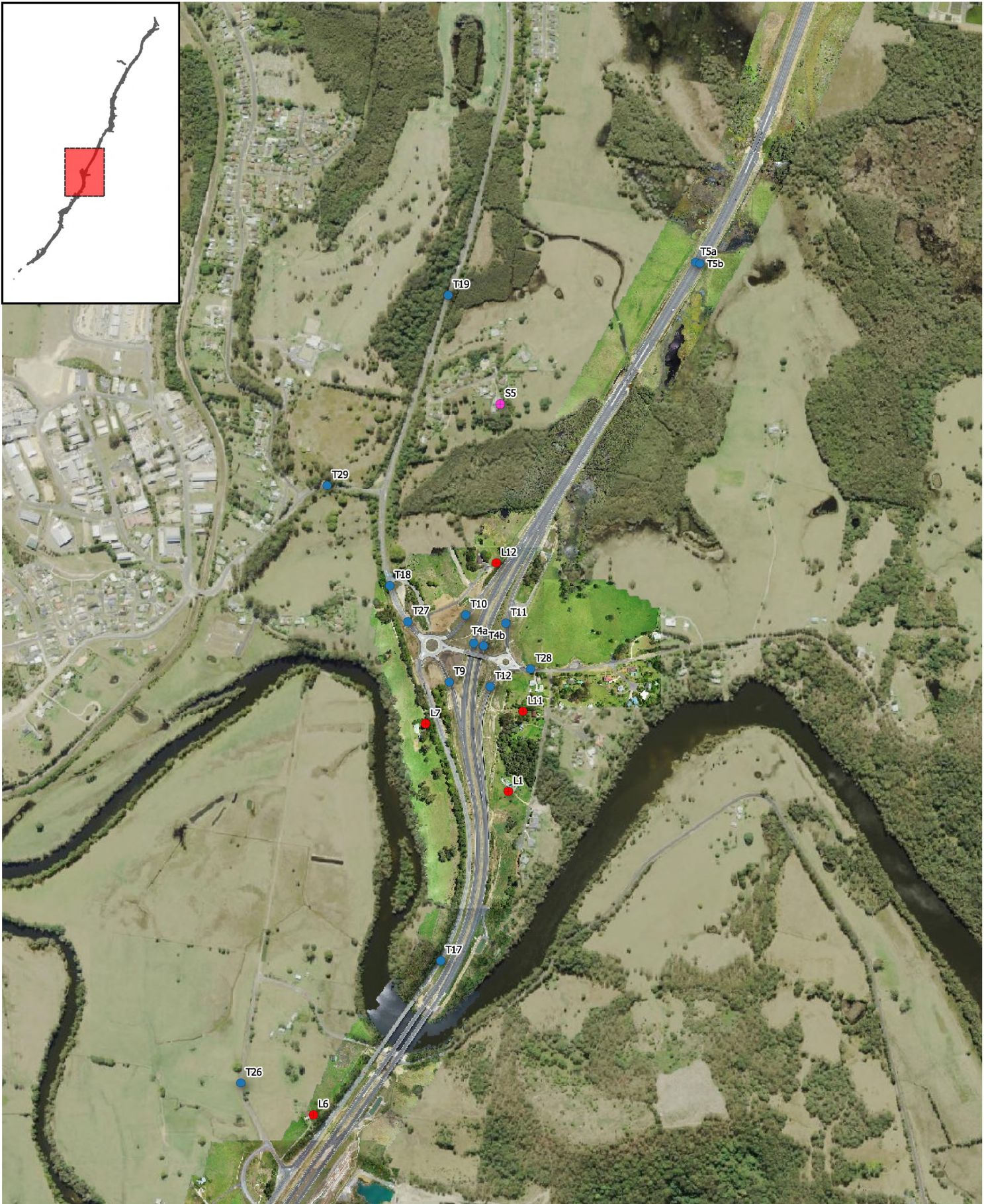
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Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Long Term and Short Term Noise Monitoring and
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- Long Term Noise Monitoring Location
- Short Term Noise Monitoring Location
- Traffic Counting Location



Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

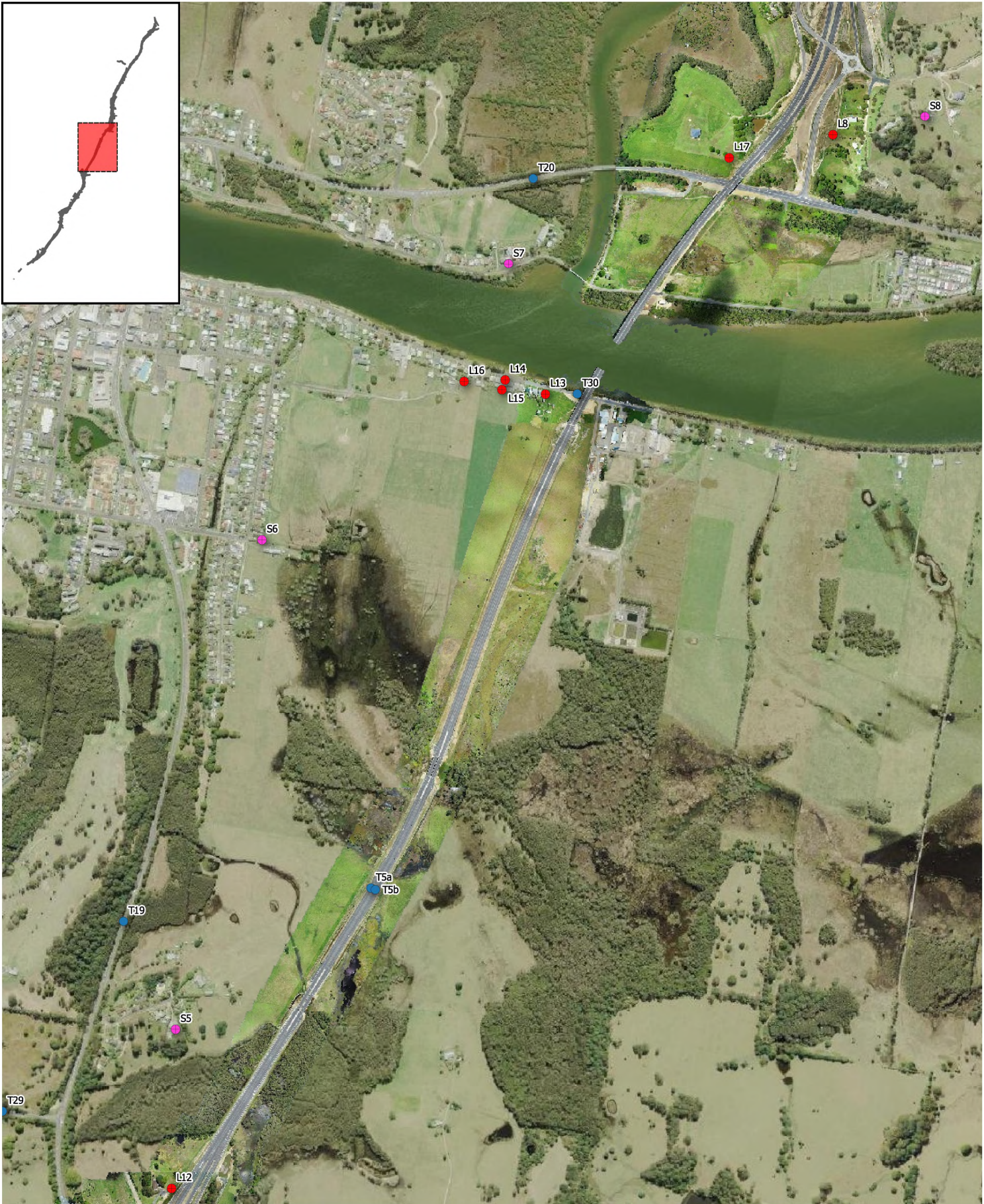
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Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Long Term and Short Term Noise Monitoring and
Traffic Counting Locations

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Figure No: TK363-01.6.1.3.1 AppF (r1)-5
Date: 01-10-2019
Created by: DK

Rev: R1
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Legend

- Long Term Noise Monitoring Location
- Short Term Noise Monitoring Location
- Traffic Counting Location



Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

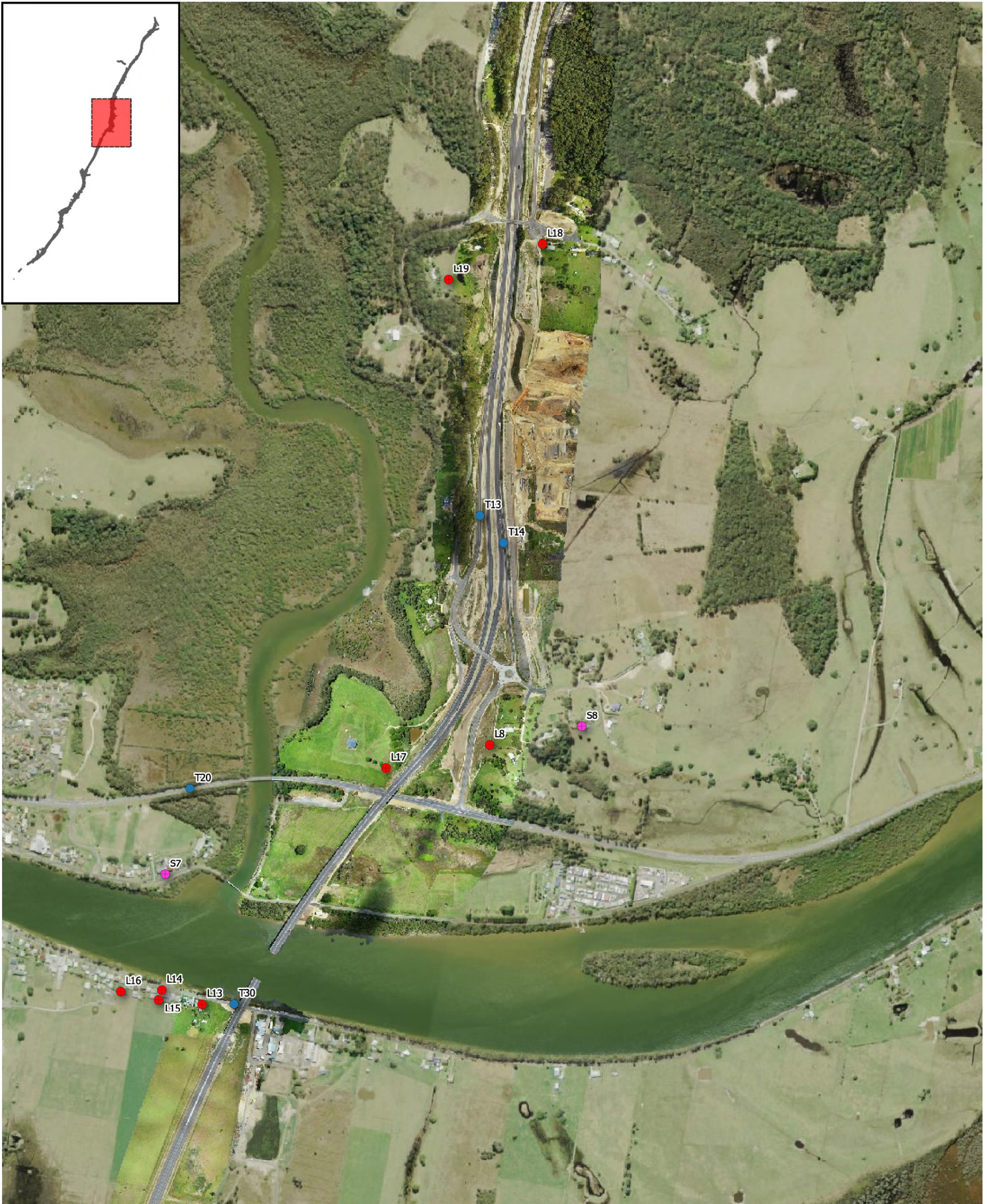
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Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Long Term and Short Term Noise Monitoring and
Traffic Counting Locations

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Date: 01-10-2019
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Rev: R1
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Legend

- Long Term Noise Monitoring Location
- Short Term Noise Monitoring Location
- Traffic Counting Location



Consultant:
RENZO TONIN & ASSOCIATES
inspired to achieve
 1/418A Elizabeth Street, SURRY HILLS NSW 2010
 P: 02 8218 0500 F: 02 8218 0501

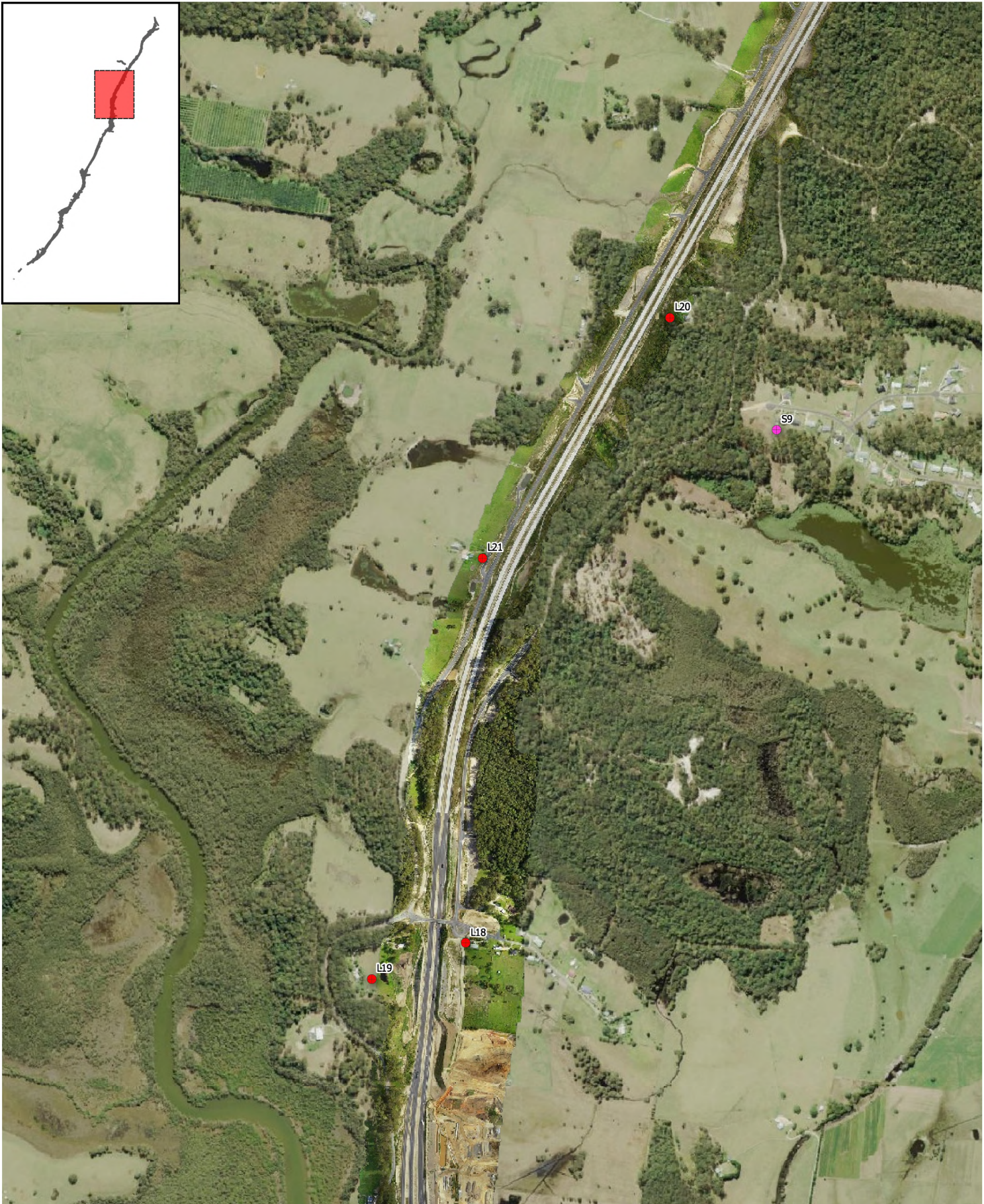
Client:
Roads & Maritime

Project:
 Warrell Creek to Nambucca Heads
 Pacific Highway Upgrade

Description:
 Warrell Creek to Nambucca Heads
 Post Construction Operational Noise Assessment
 Long Term and Short Term Noise Monitoring and
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 Rev: R1
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Legend

- Long Term Noise Monitoring Location
- Short Term Noise Monitoring Location
- Traffic Counting Location

Consultant:



1/418A Elizabeth Street, SURRY HILLS NSW 2010
P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Long Term and Short Term Noise Monitoring and
Traffic Counting Locations

Figure No: TK363-01.6.1.3.1 AppF (r1)-8

Date: 01-10-2019

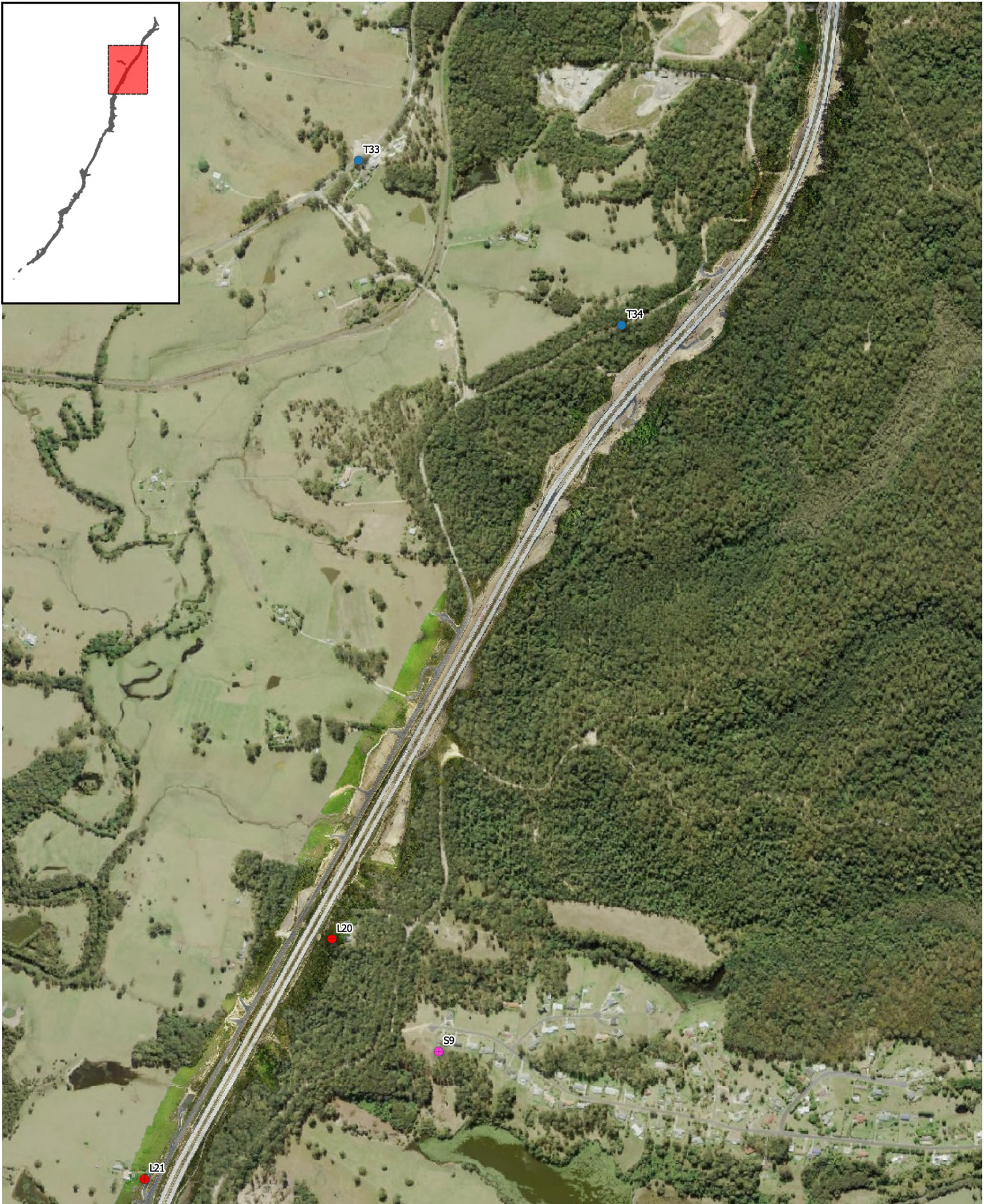
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Rev: R1

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Legend

- Long Term Noise Monitoring Location
- Short Term Noise Monitoring Location
- Traffic Counting Location



Consultant:

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 P: 02 8218 0500 F: 02 8218 0501

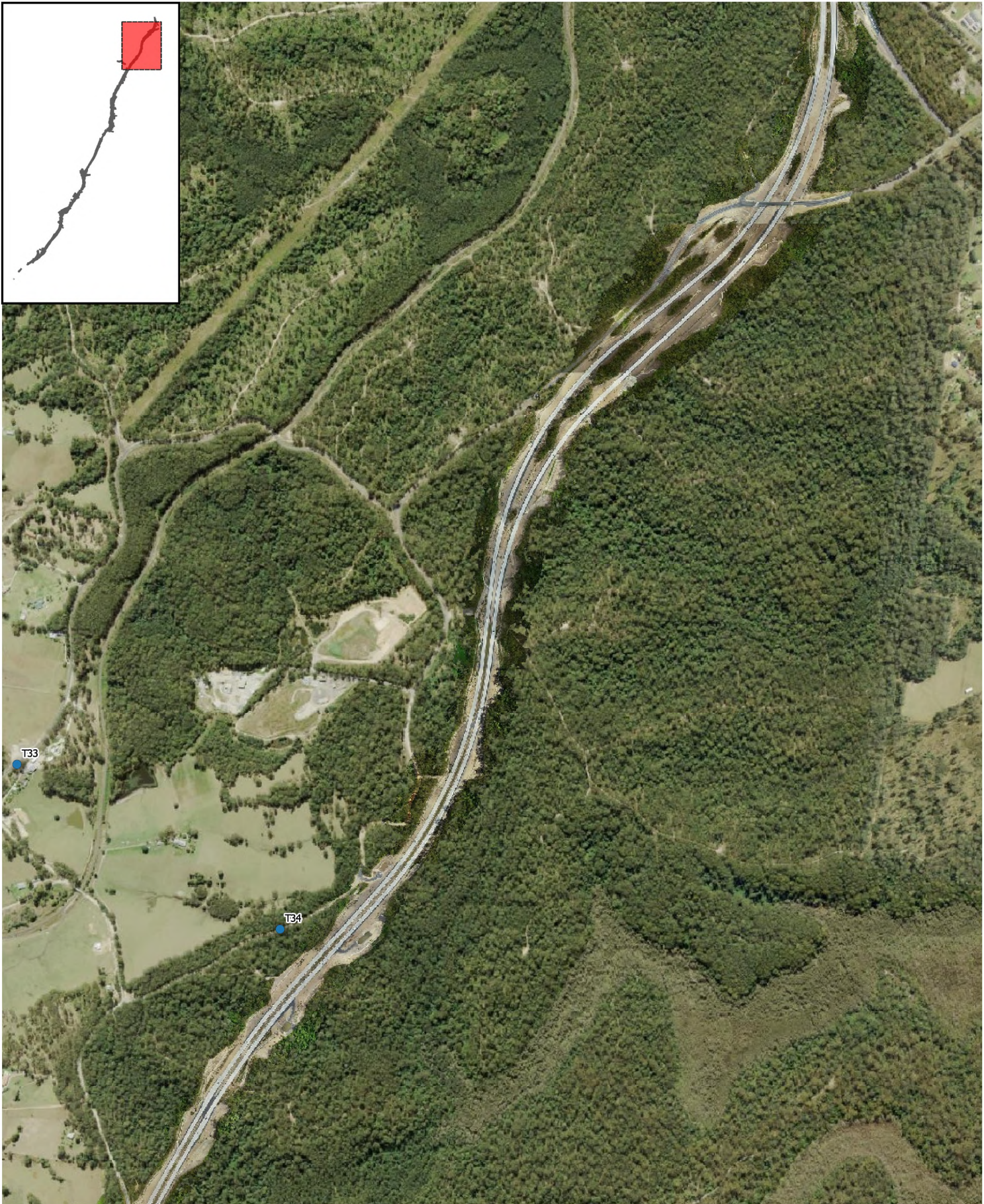
Client:


Project:
 Warrell Creek to Nambucca Heads
 Pacific Highway Upgrade

Description:
 Warrell Creek to Nambucca Heads
 Post Construction Operational Noise Assessment
 Long Term and Short Term Noise Monitoring and
 Traffic Counting Locations

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Figure No: TK363-01.6.1.3.1 AppF (r1)-9
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Legend

- Long Term Noise Monitoring Location
- Short Term Noise Monitoring Location
- Traffic Counting Location



Consultant:

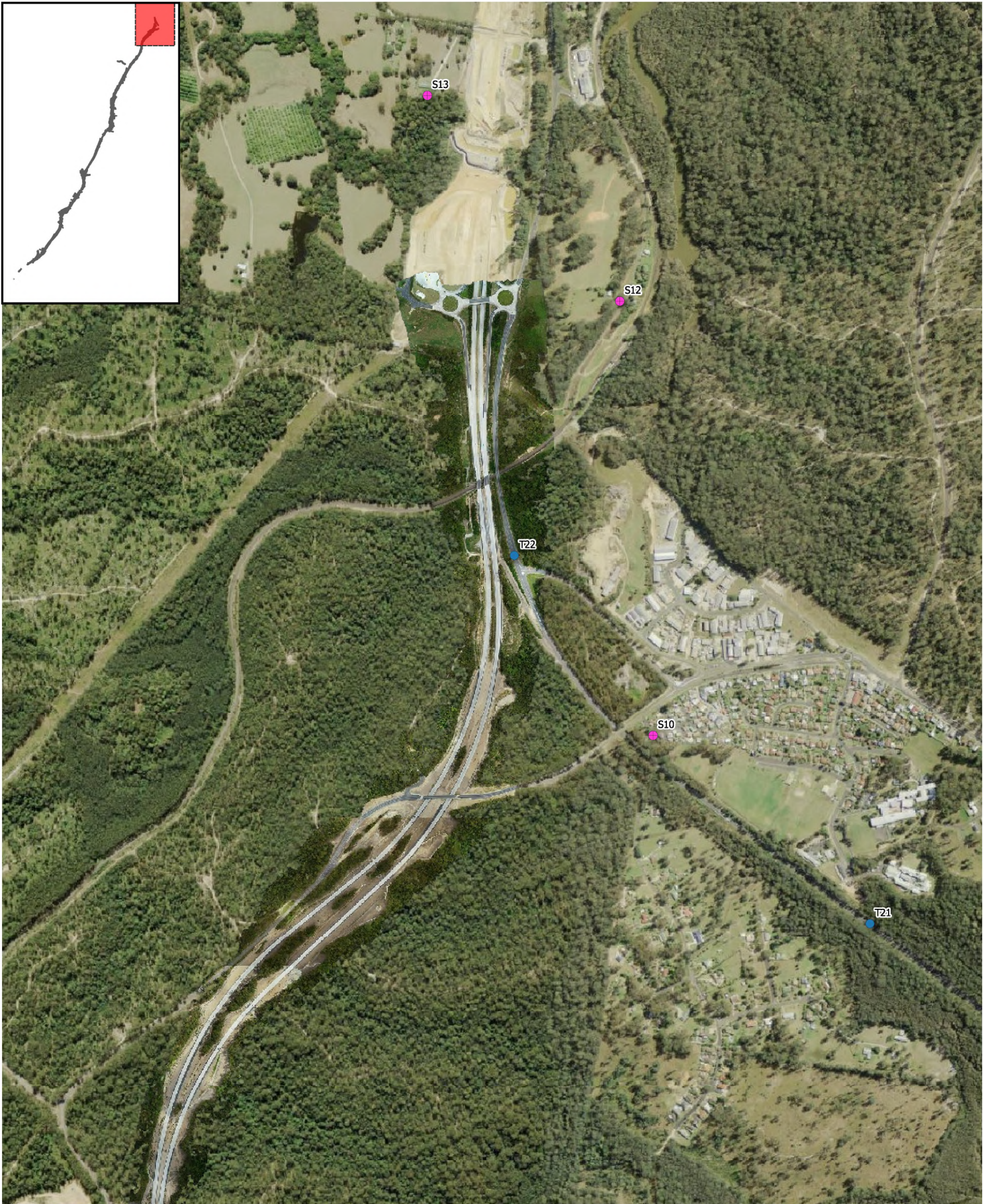
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Client:


Project:
 Warrell Creek to Nambucca Heads
 Pacific Highway Upgrade

Description:
 Warrell Creek to Nambucca Heads
 Post Construction Operational Noise Assessment
 Long Term and Short Term Noise Monitoring and
 Traffic Counting Locations
 Figure No: TK363-01.6.1.3.1 AppF (r1)-10
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 Rev: R1
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- Long Term Noise Monitoring Location
- Short Term Noise Monitoring Location
- Traffic Counting Location



Consultant:



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P: 02 8218 0500 F: 02 8218 0501

Client:



Project:

Warrell Creek to Nambucca Heads
Pacific Highway Upgrade

Description:

Warrell Creek to Nambucca Heads
Post Construction Operational Noise Assessment
Long Term and Short Term Noise Monitoring and
Traffic Counting Locations

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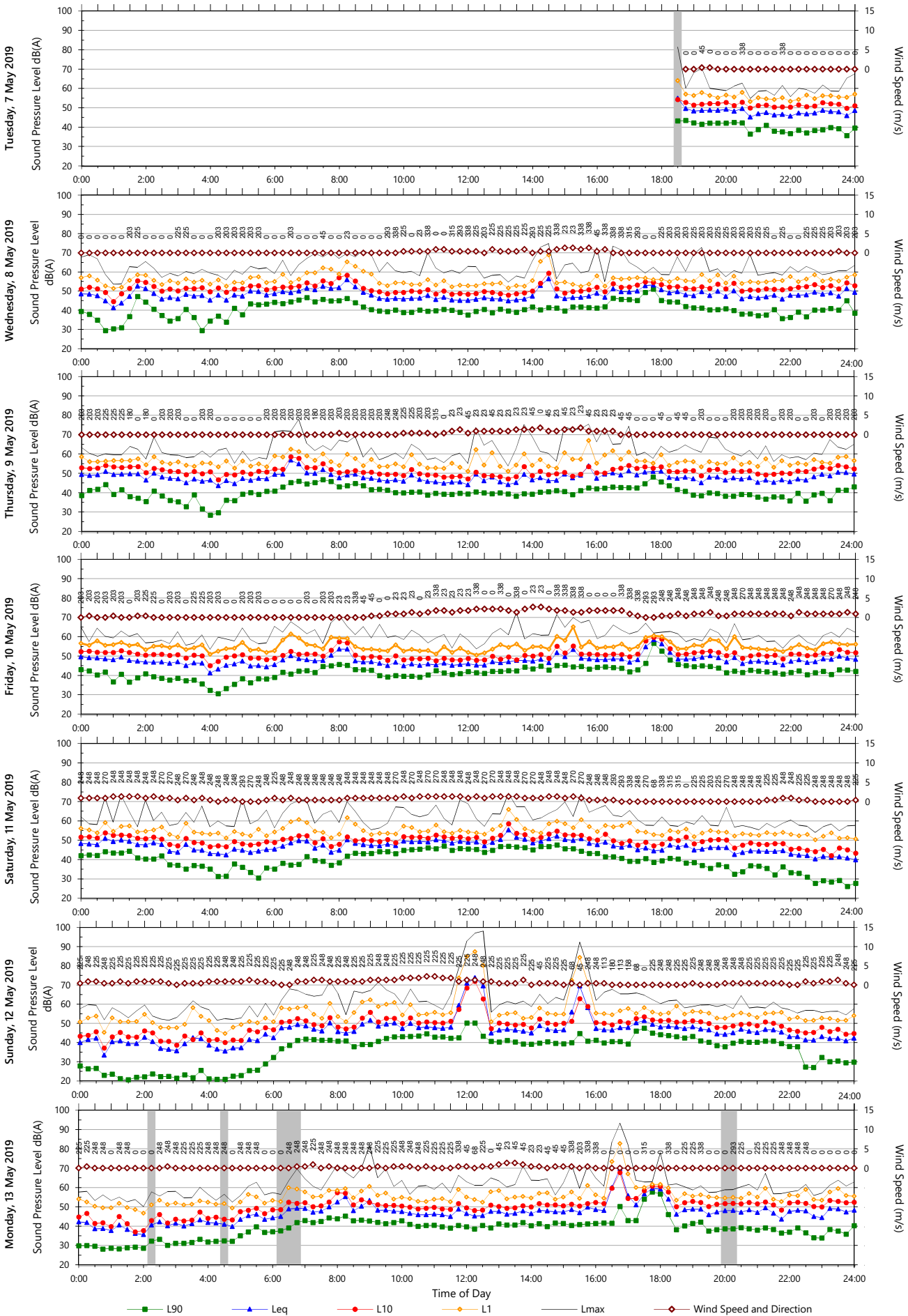
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APPENDIX G **Noise Monitoring Results**

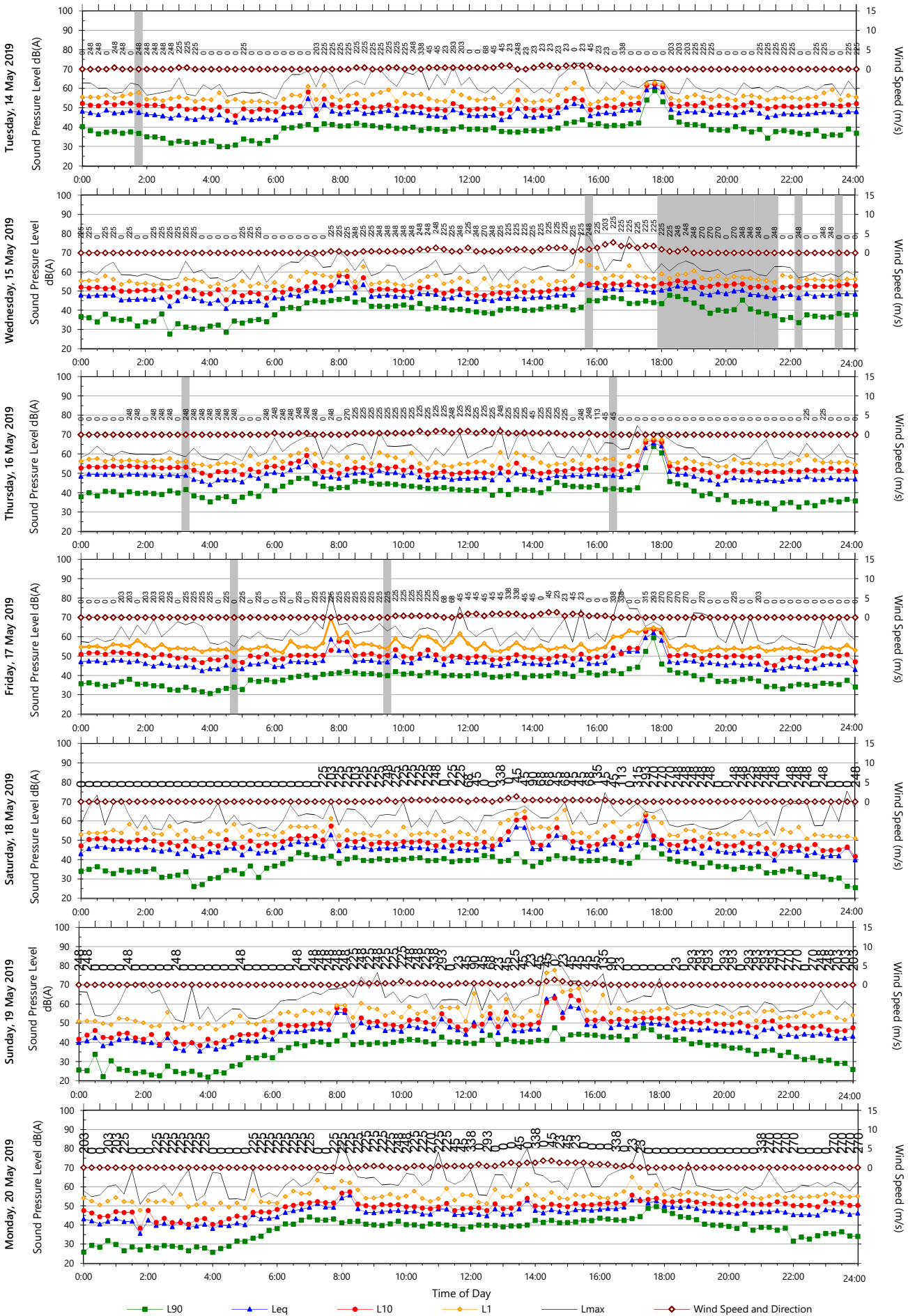
Unattended Monitoring Results

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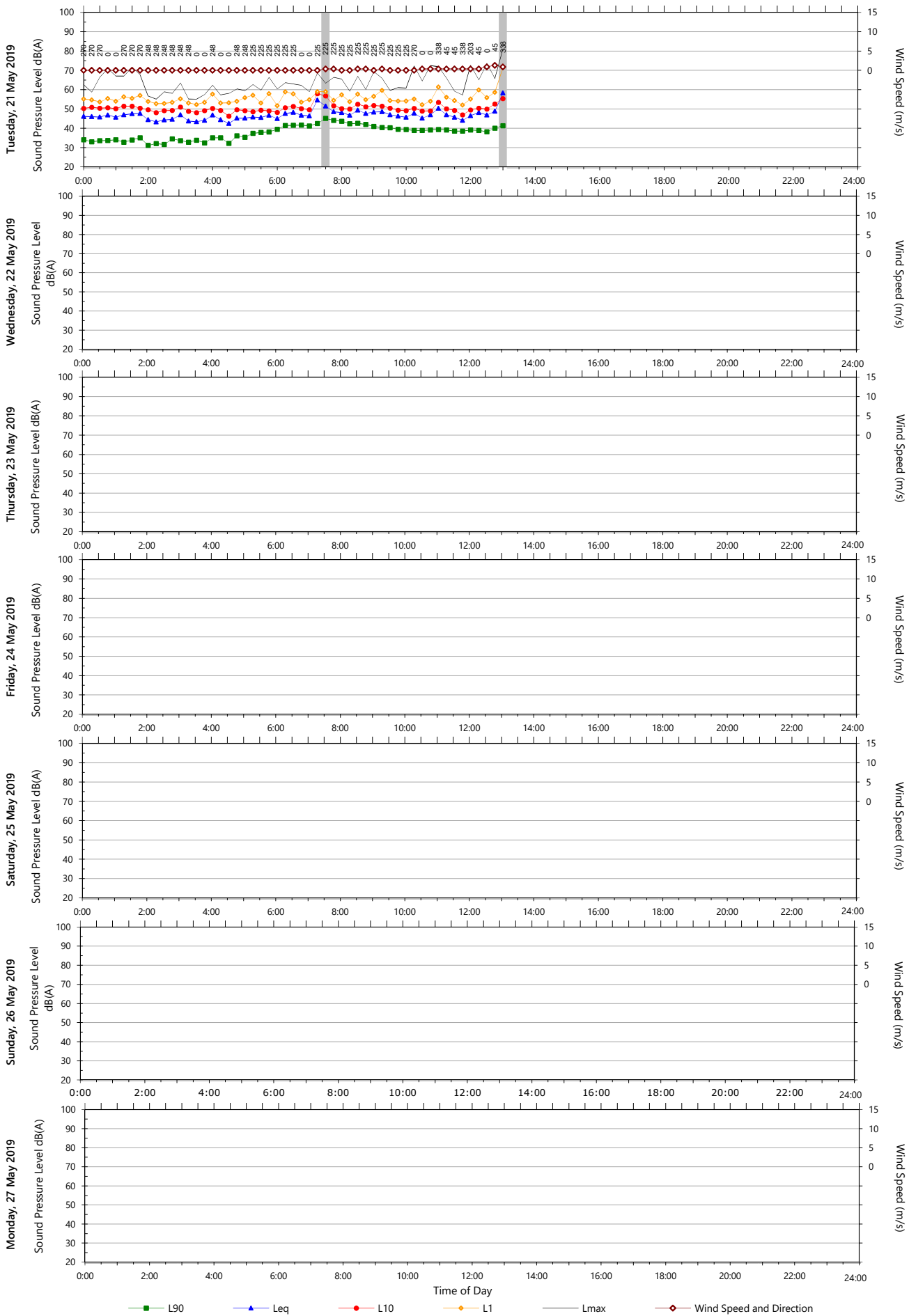
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Template: QTE-26 Logger Graphs Program (r29)



Unattended Monitoring Results

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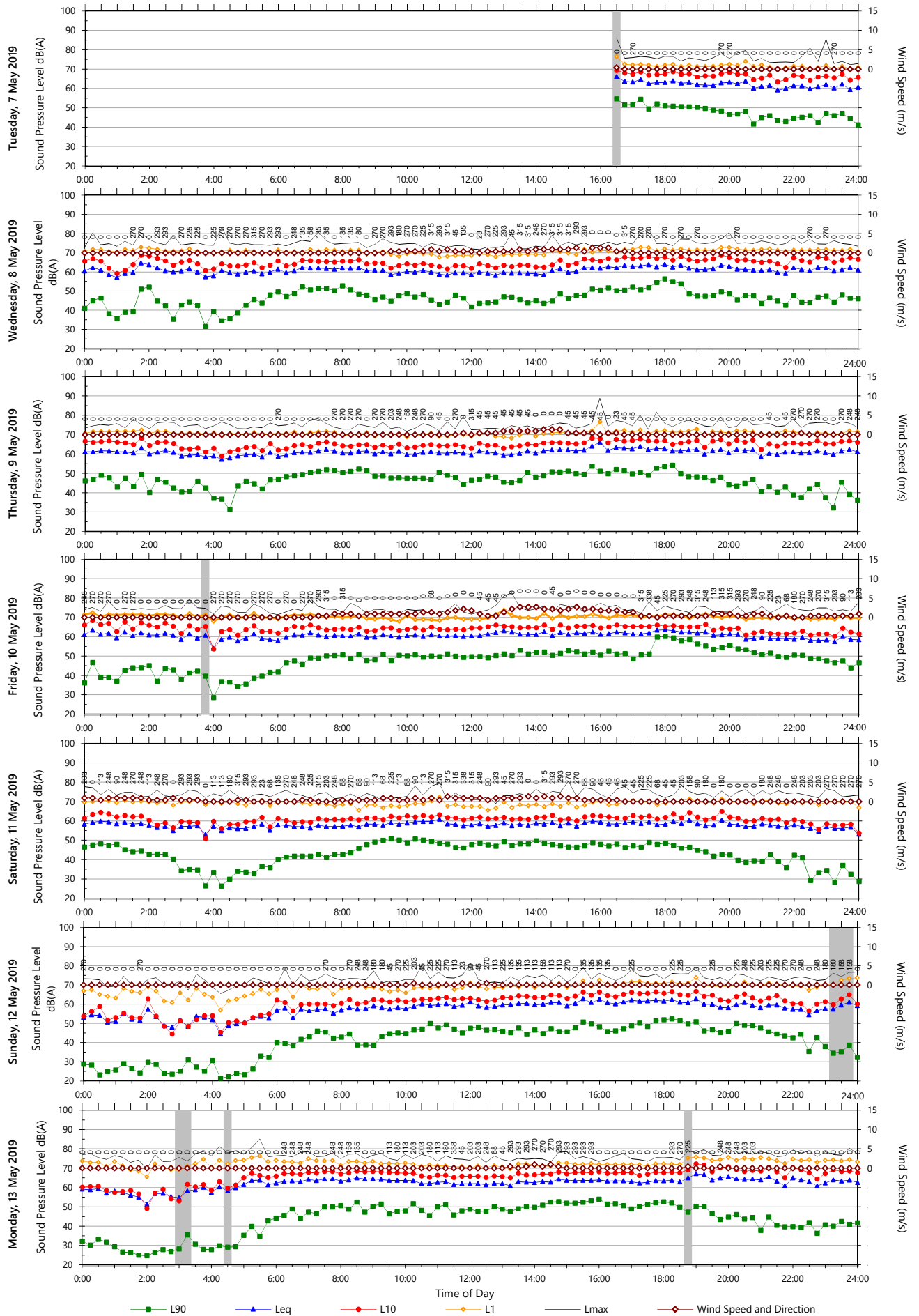


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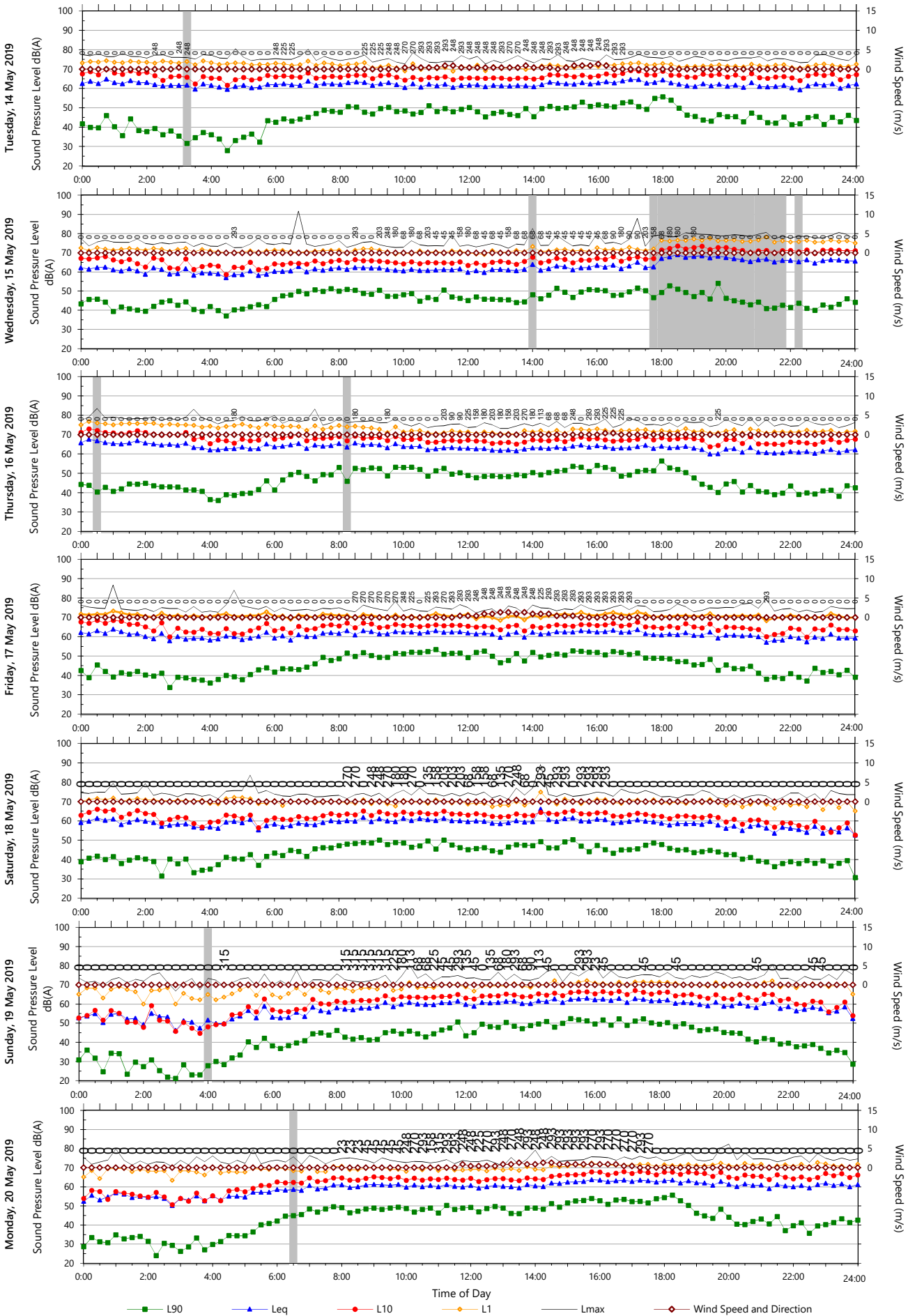
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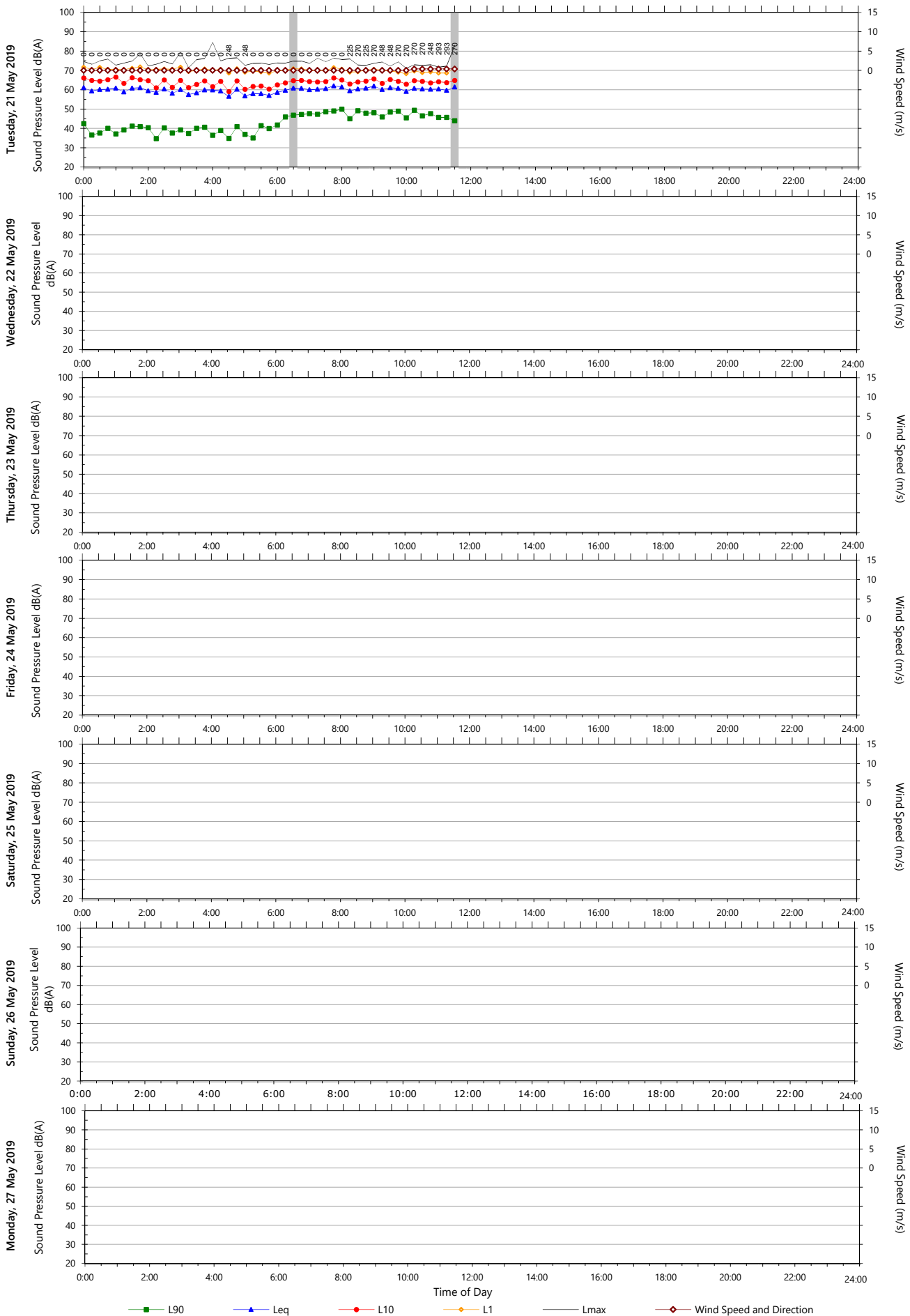
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Unattended Monitoring Results

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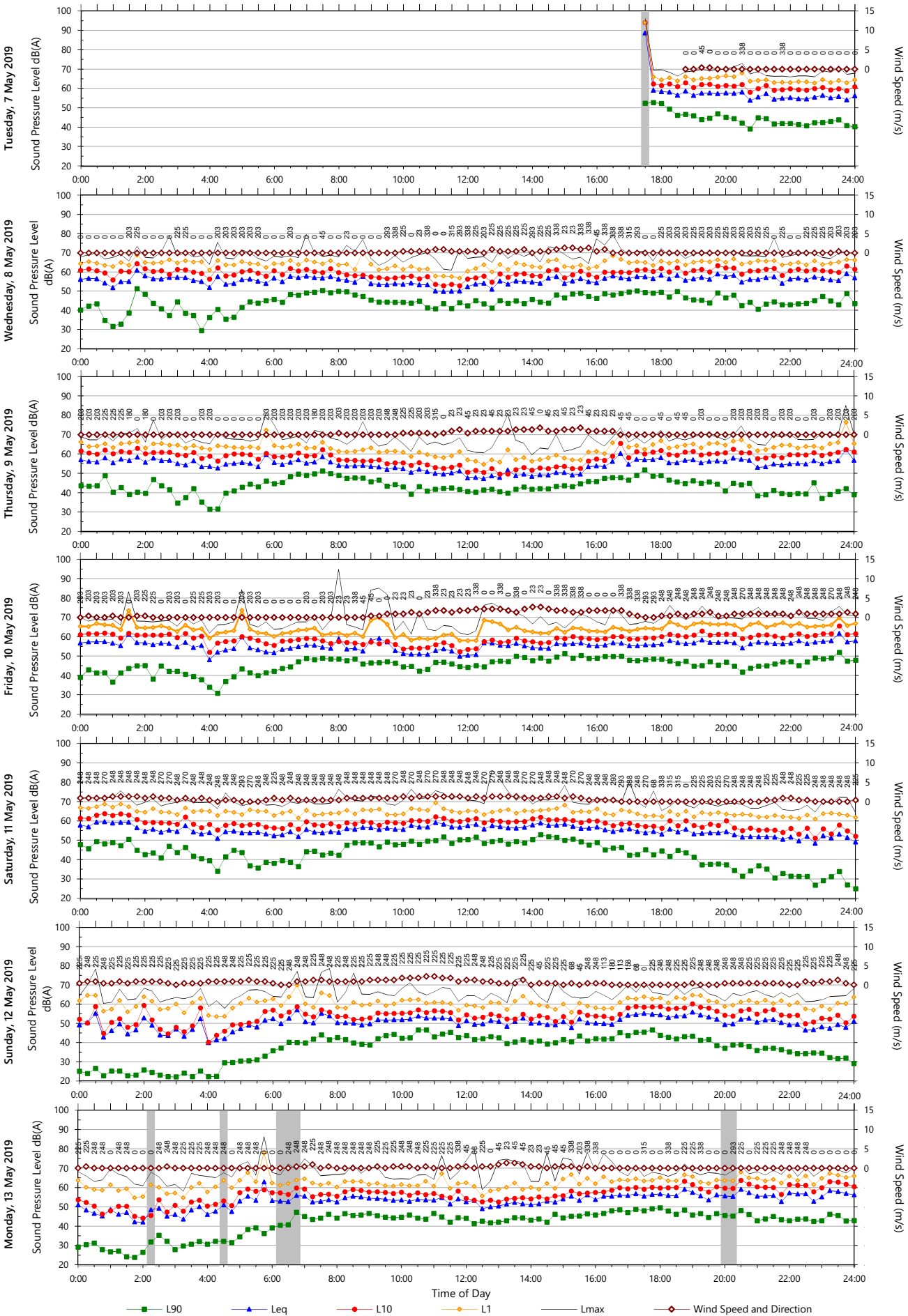


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Unattended Monitoring Results

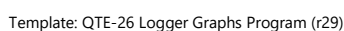
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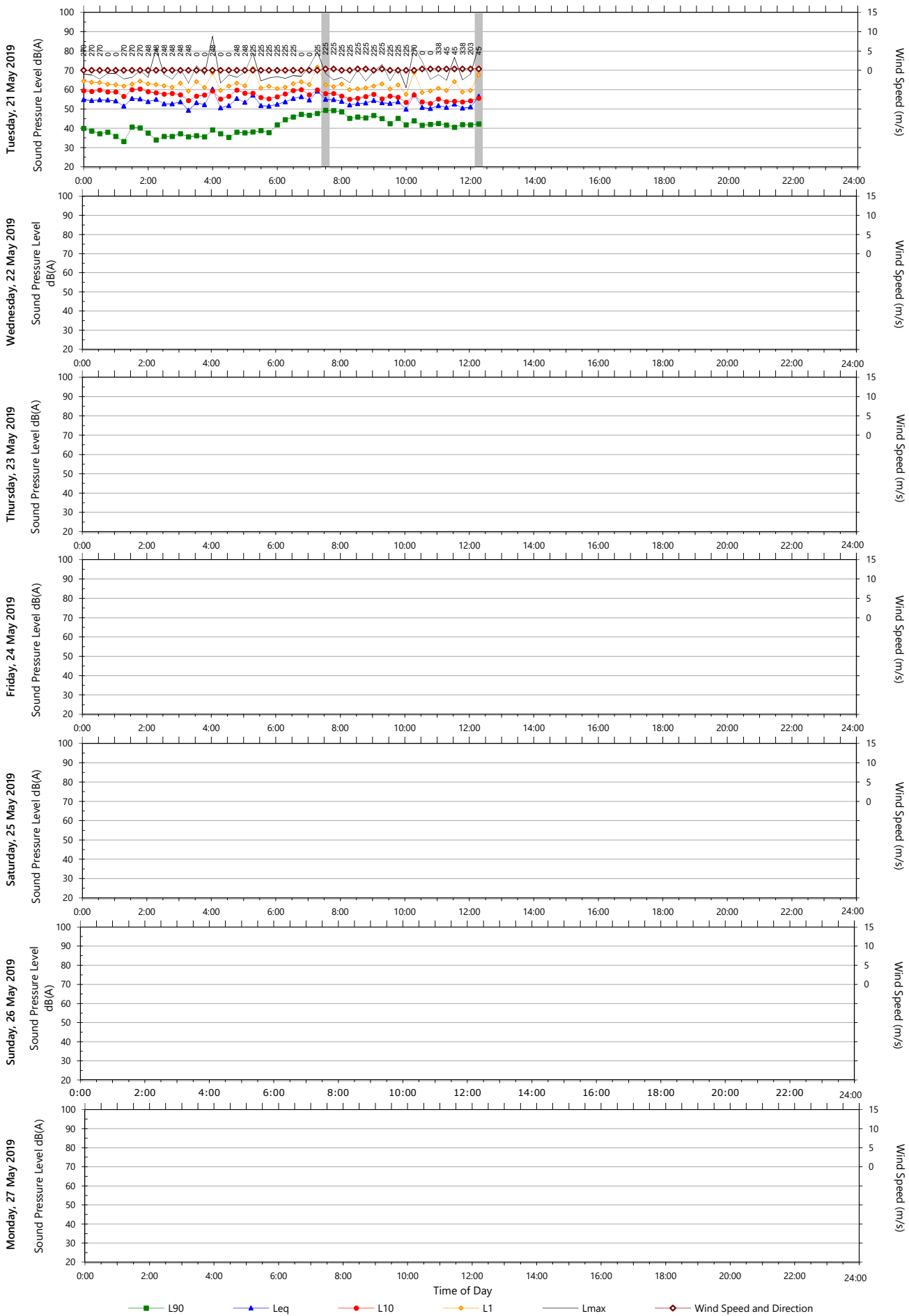
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Location: 40-56 Albert Drive



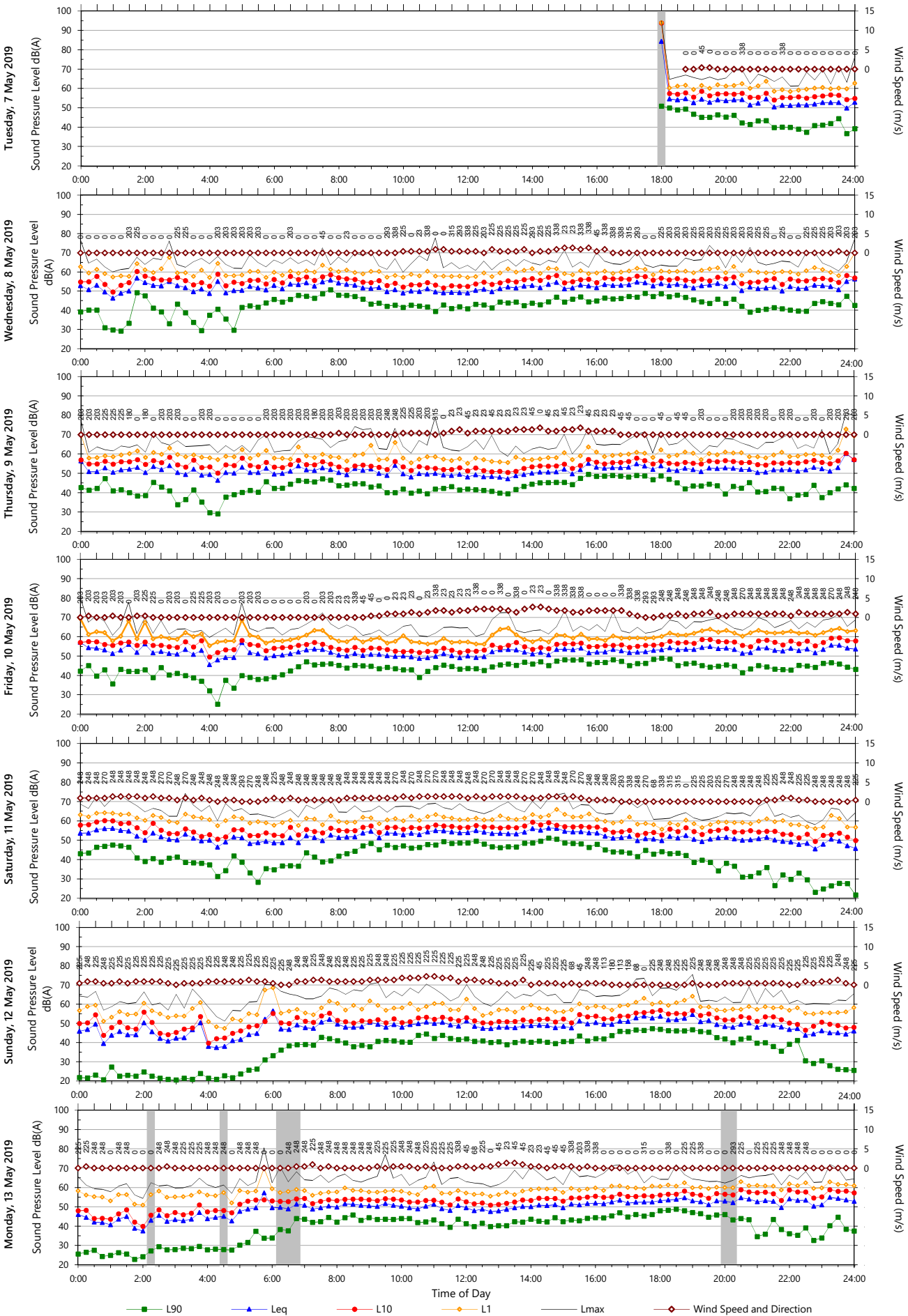
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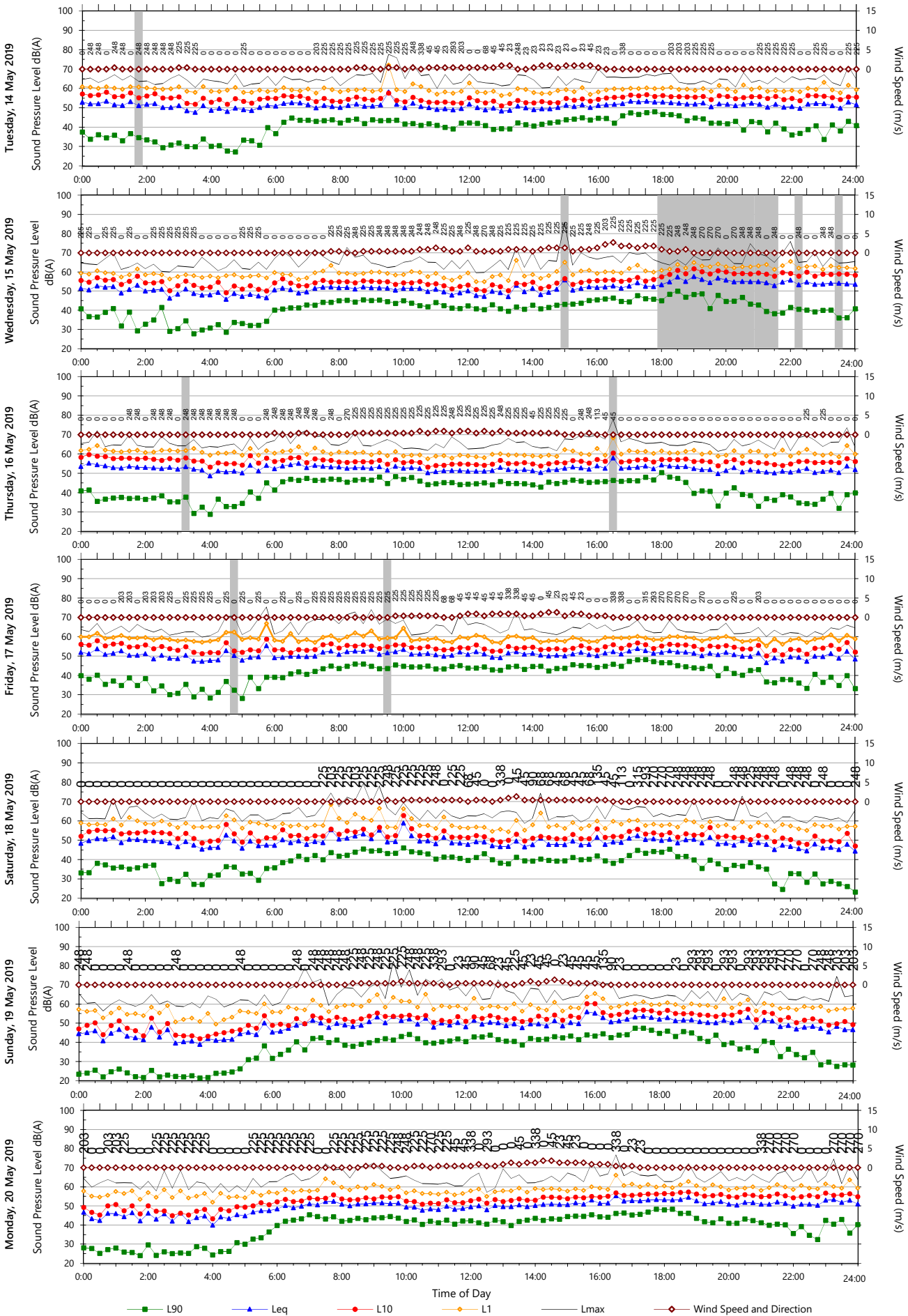
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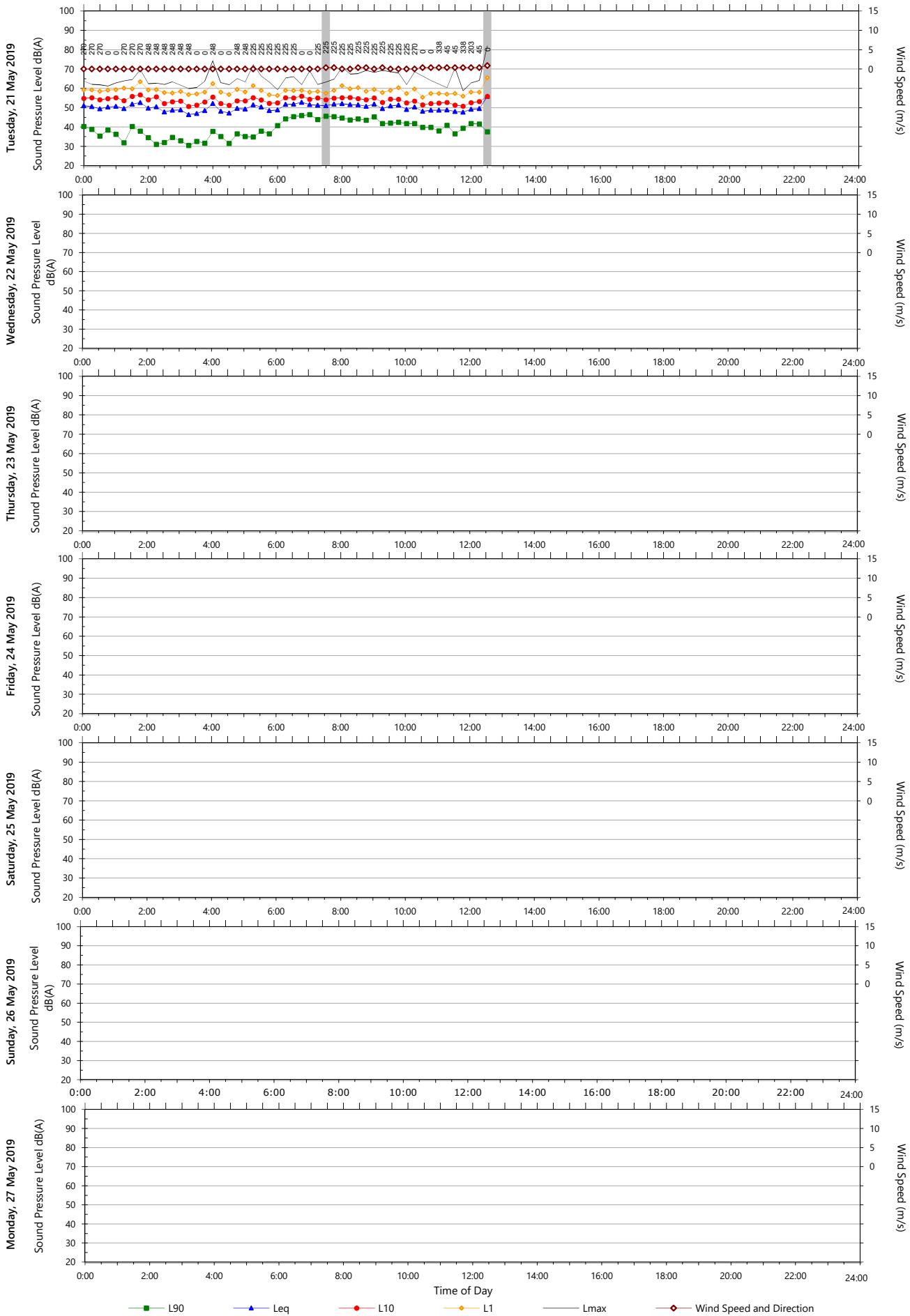


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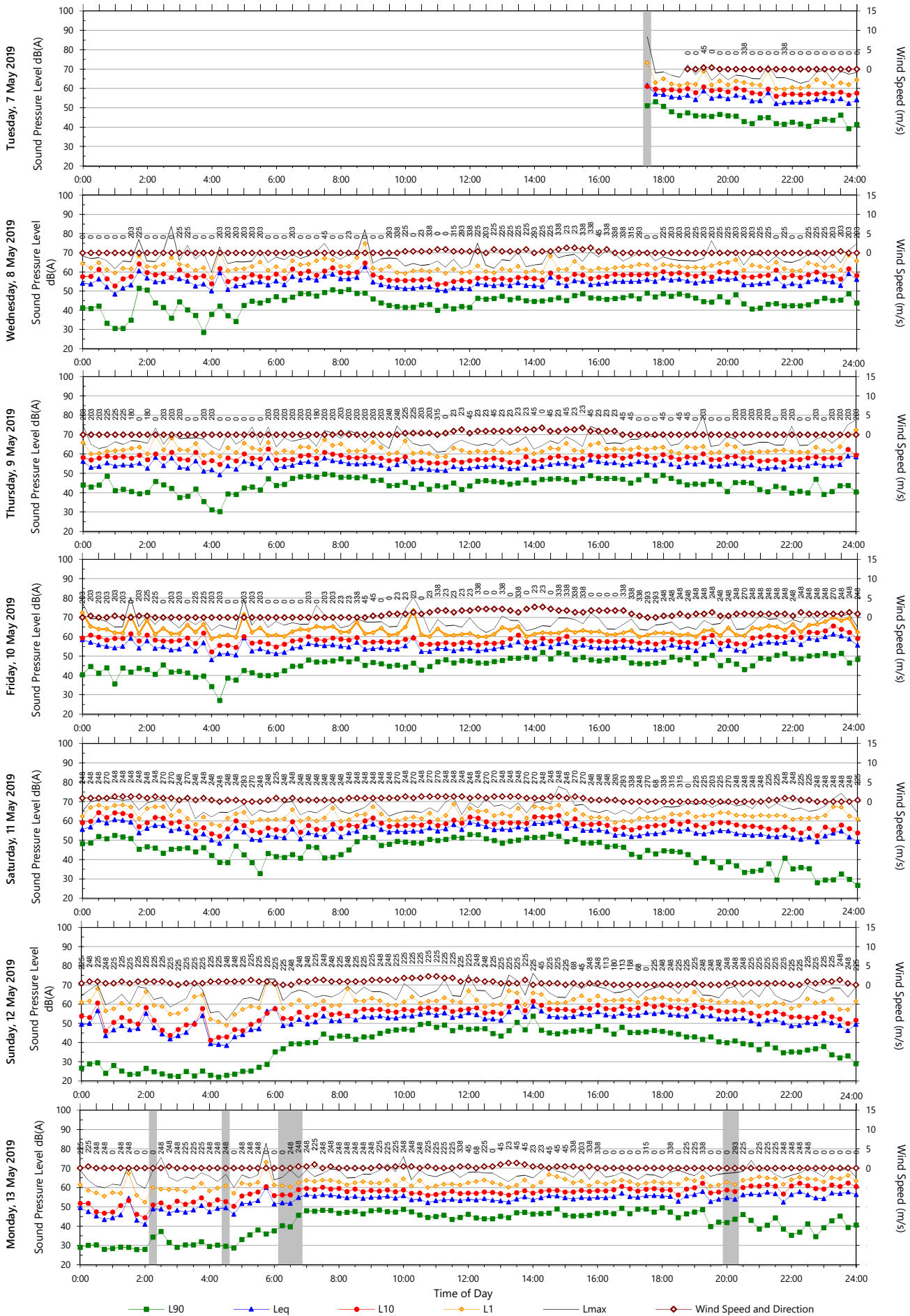






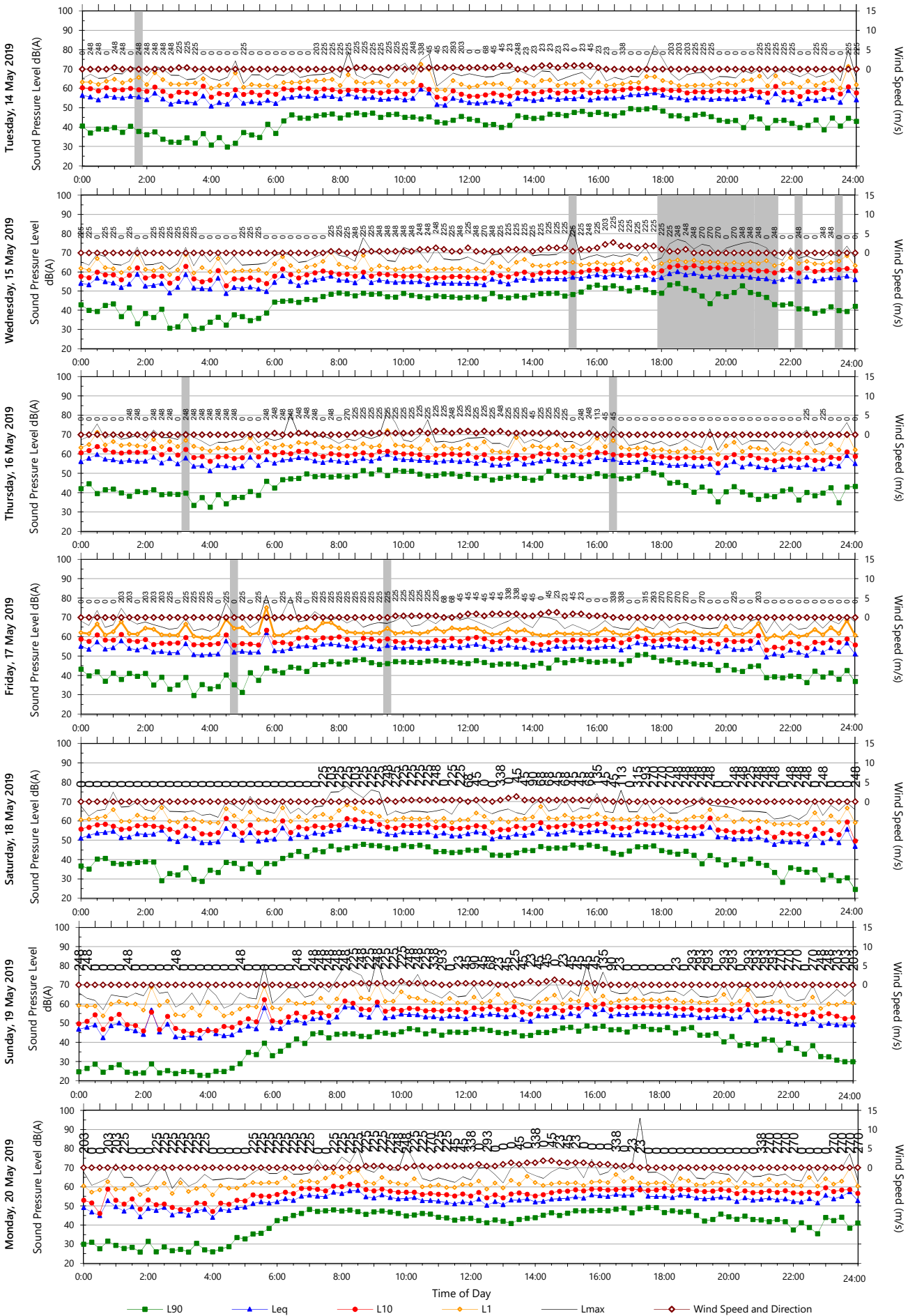
Unattended Monitoring Results

Location: 4723 Pacific Highway



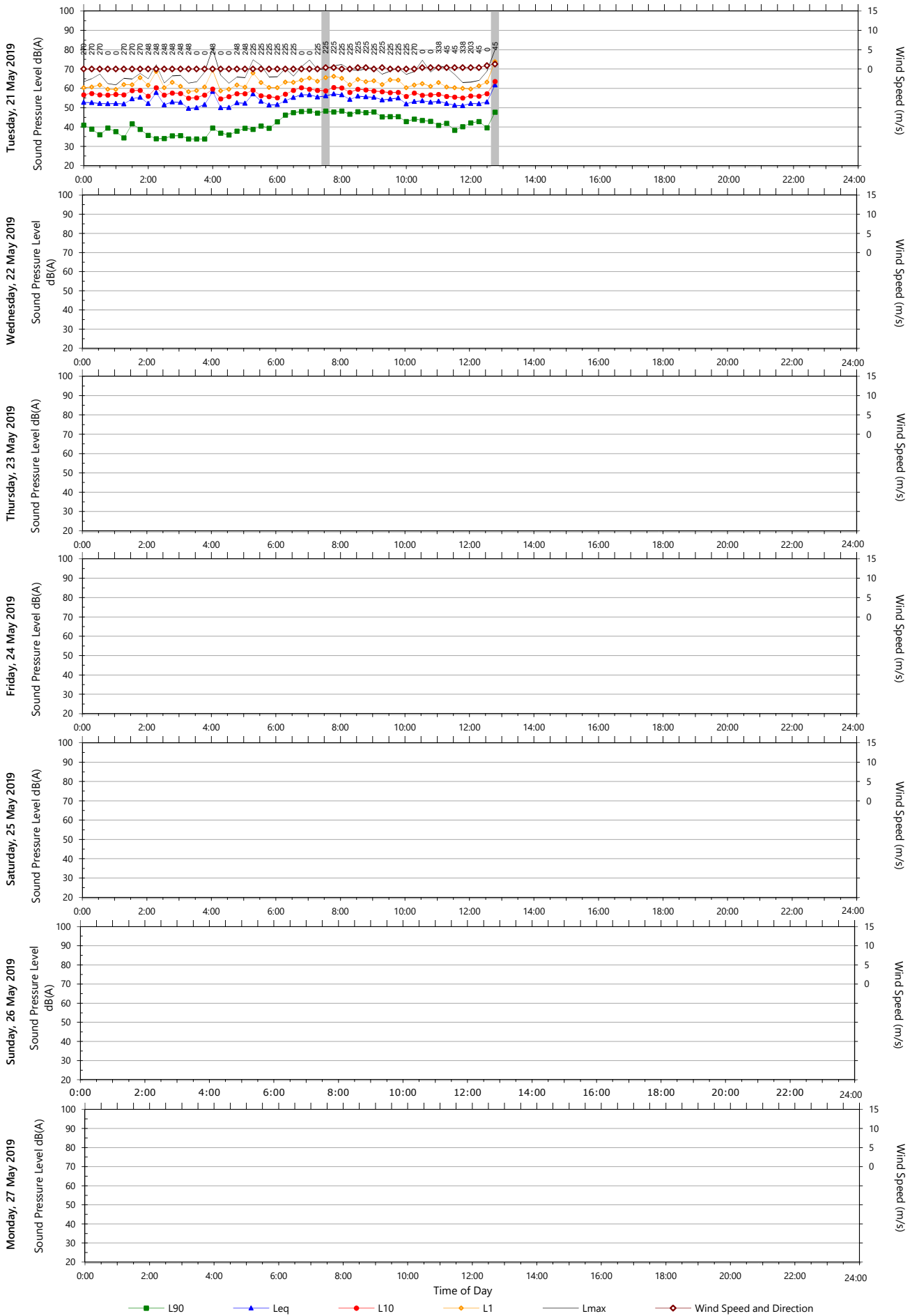
Data File: 2019-05-07_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)



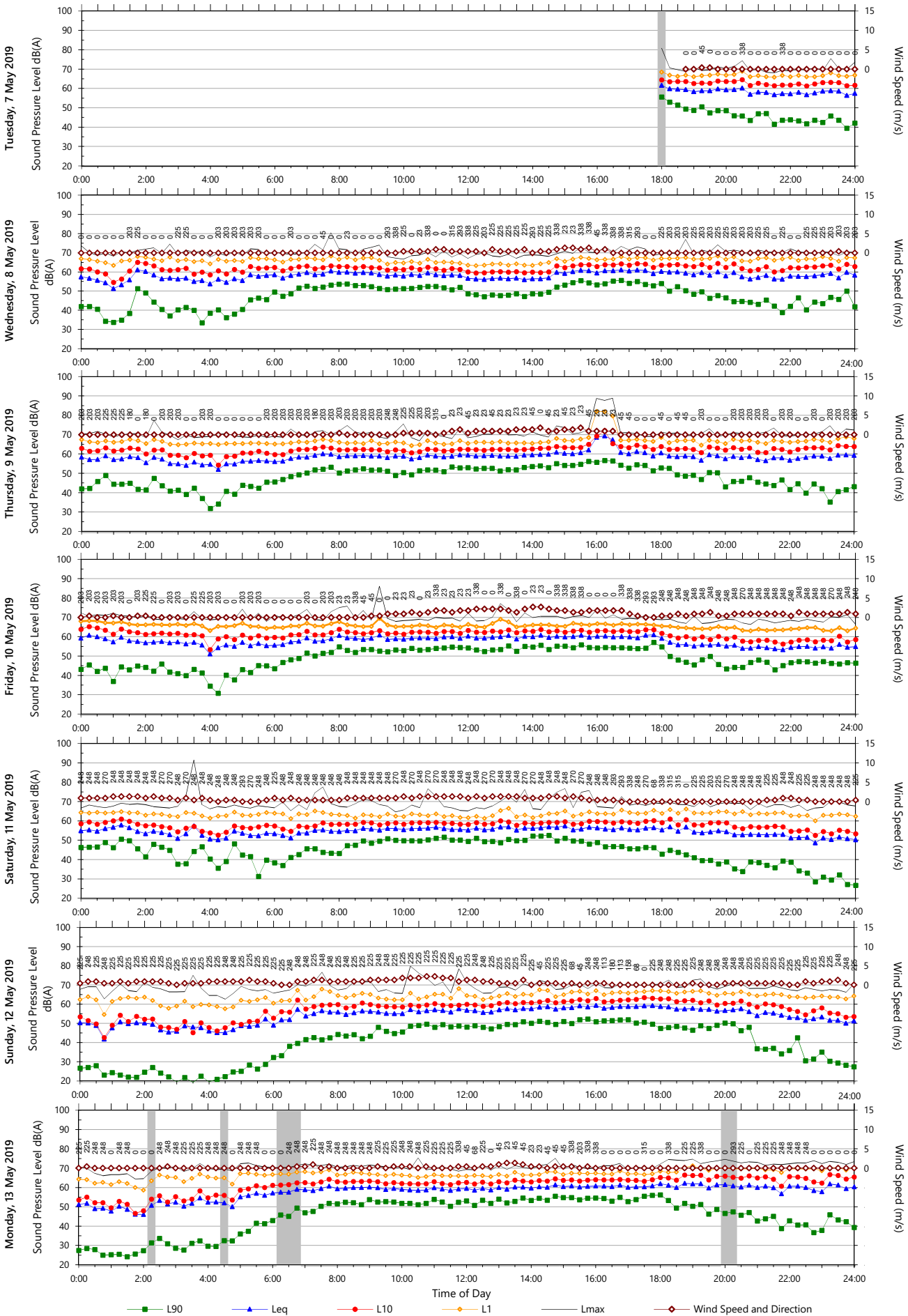
Unattended Monitoring Results

Location: 4723 Pacific Highway



Unattended Monitoring Results

Location: 4 Scotts Head Road

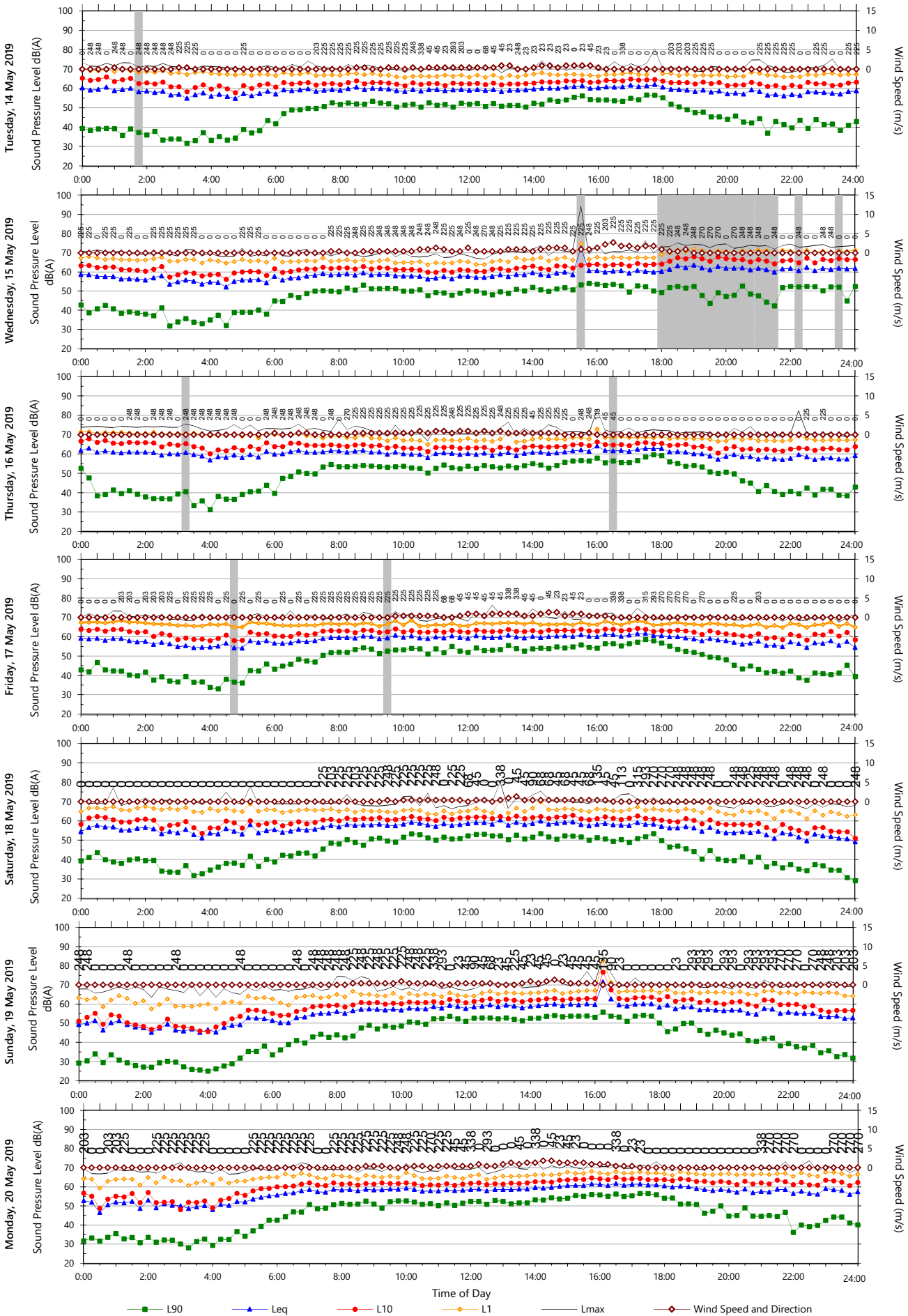


Data File: 2019-05-07_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

Unattended Monitoring Results

Location: 4 Scotts Head Road

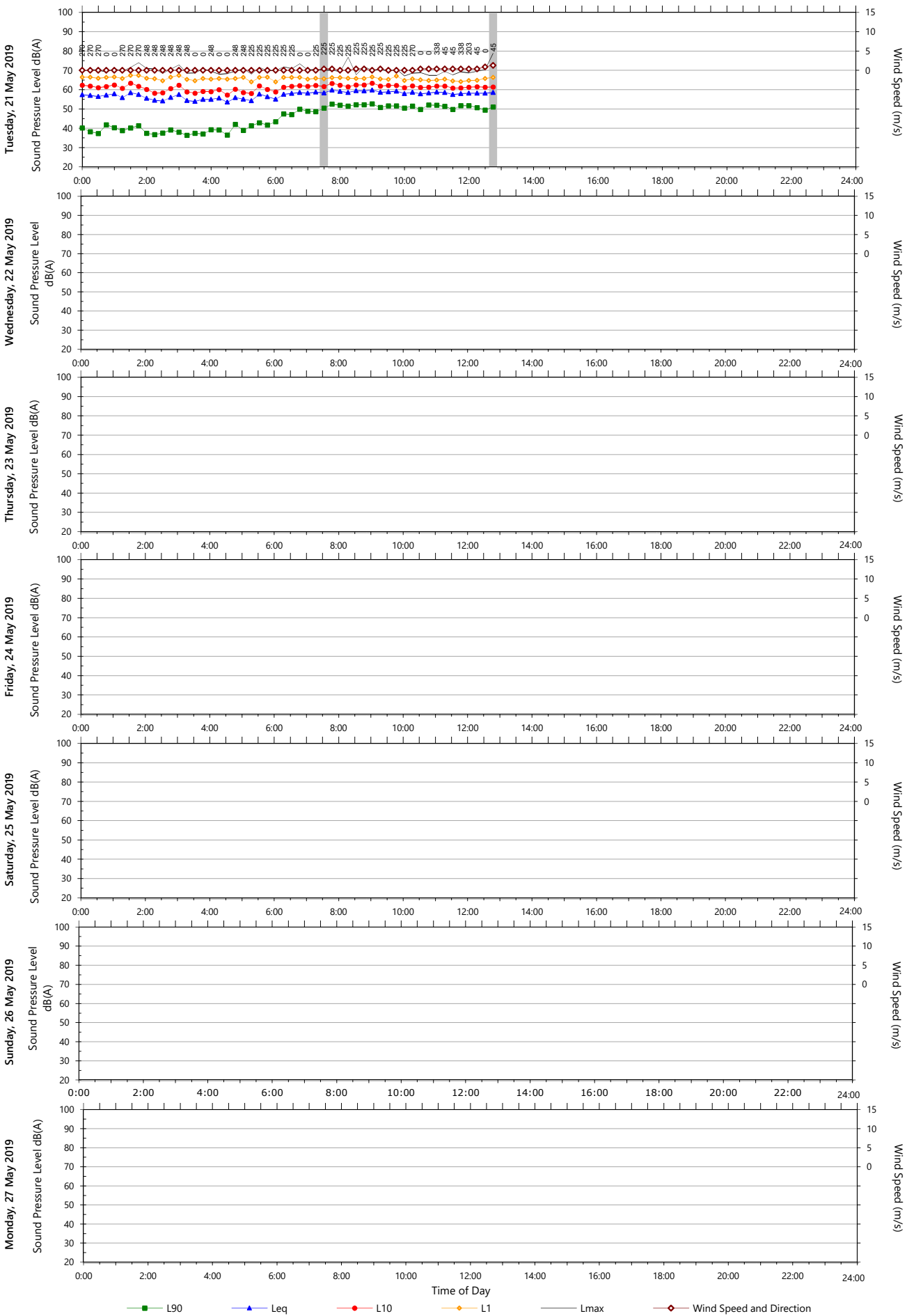


Data File: 2019-05-07_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

Unattended Monitoring Results

Location: 4 Scotts Head Road

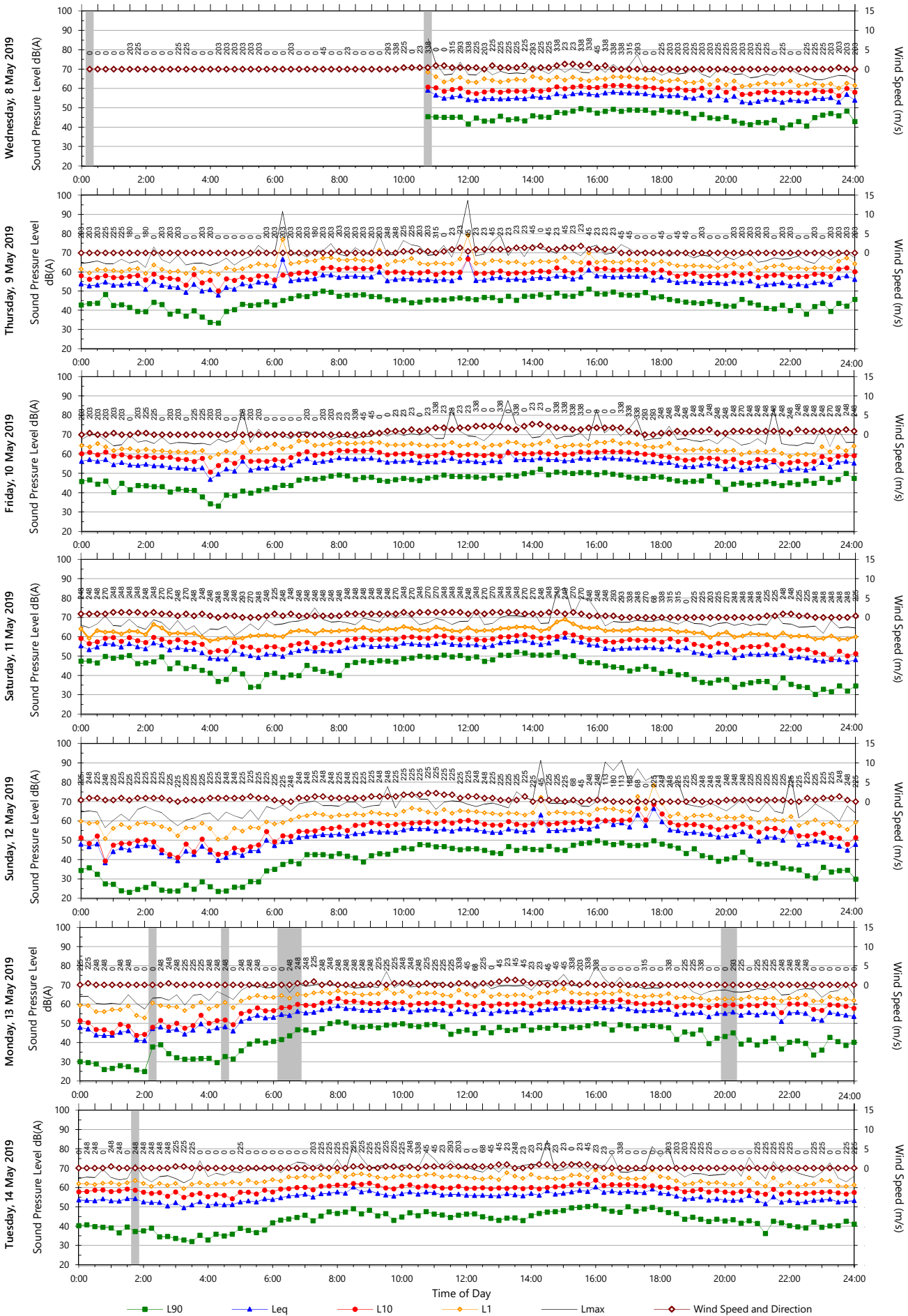


Data File: 2019-05-07_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

Unattended Monitoring Results

Location: 58 Harrimans Lane

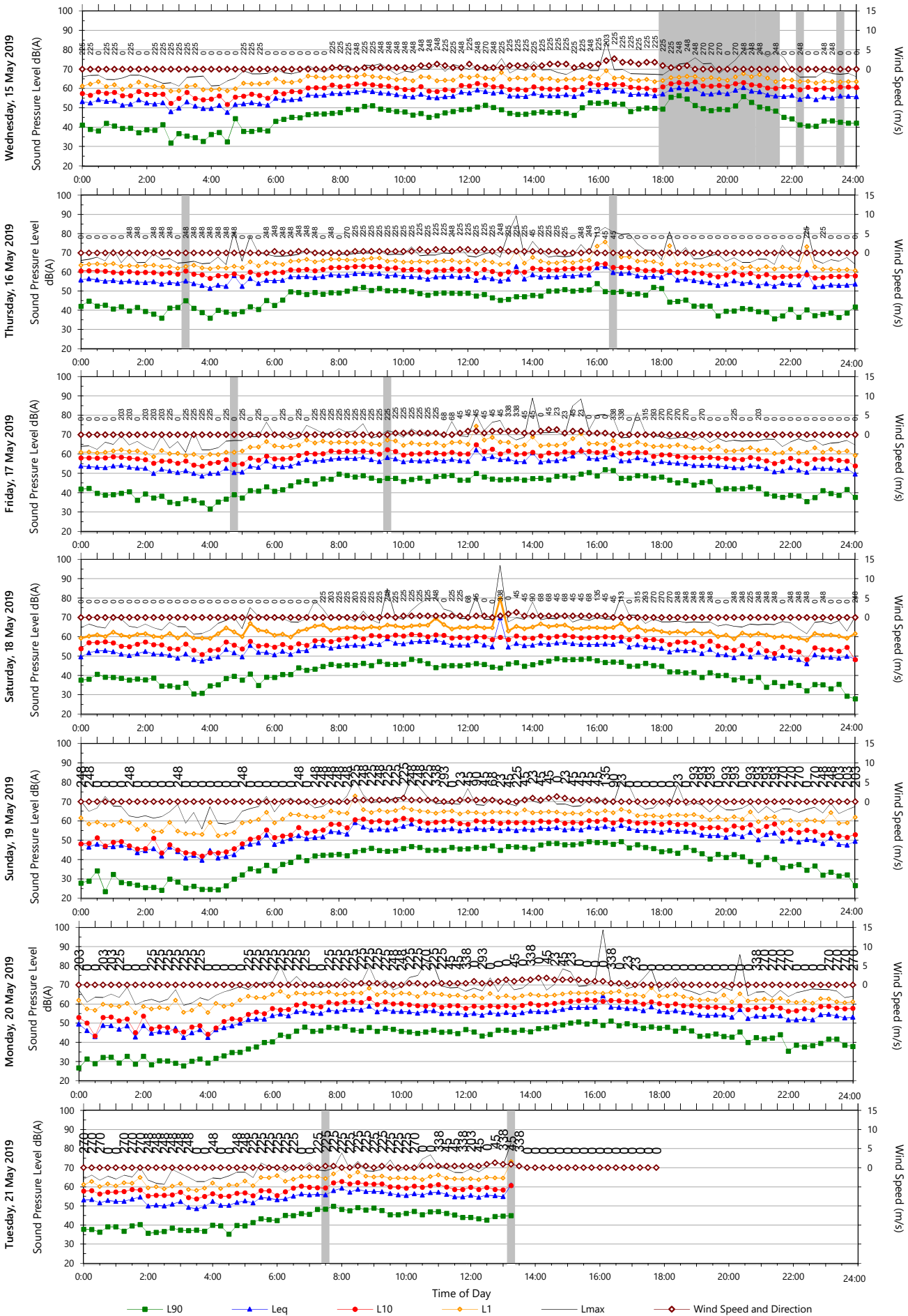


Data File: 2019-05-08_SLM_100_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

Unattended Monitoring Results

Location: 58 Harrimans Lane

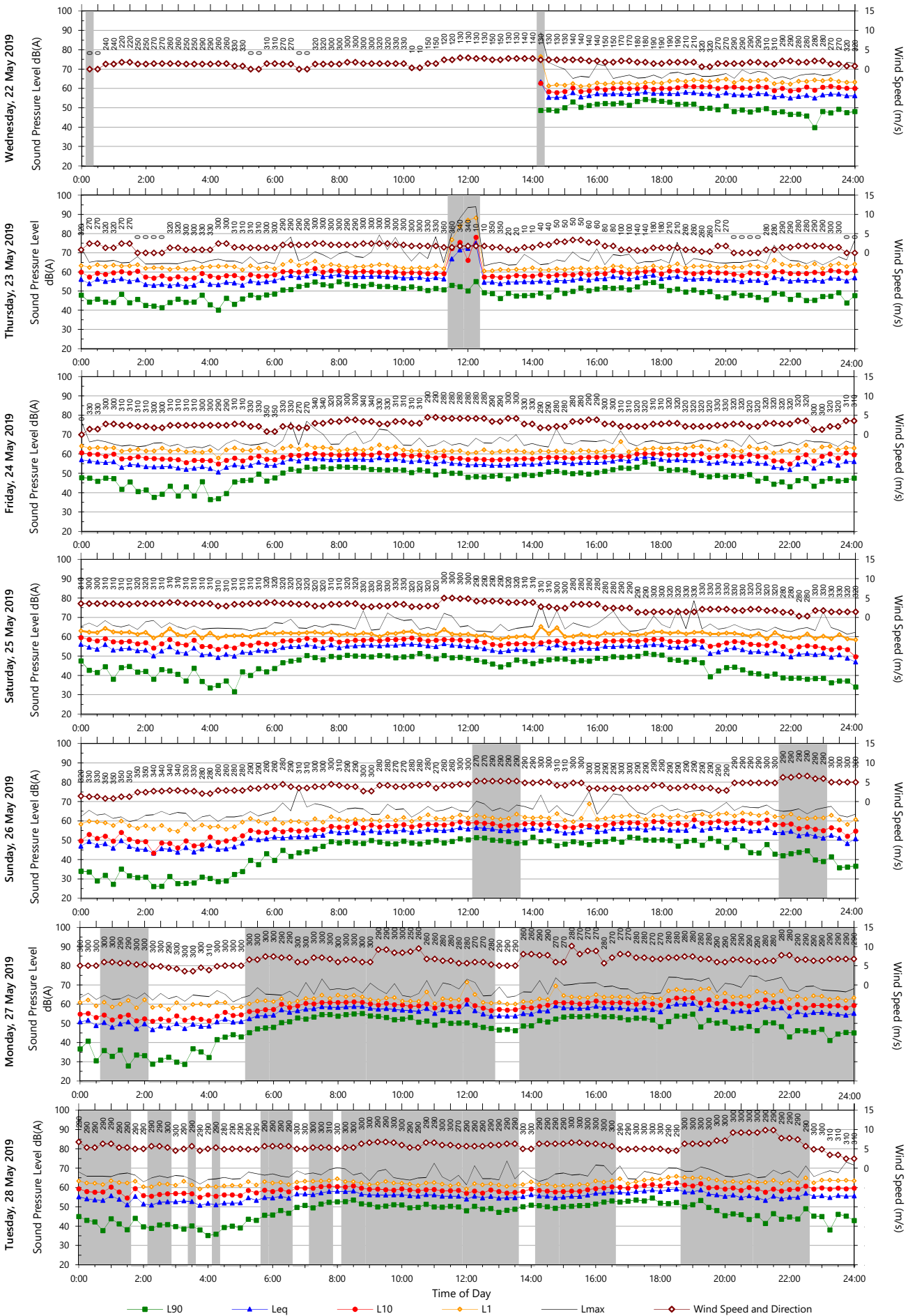


Data File: 2019-05-08_SLM_100_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

Unattended Monitoring Results

Location: 22 Letitia Close

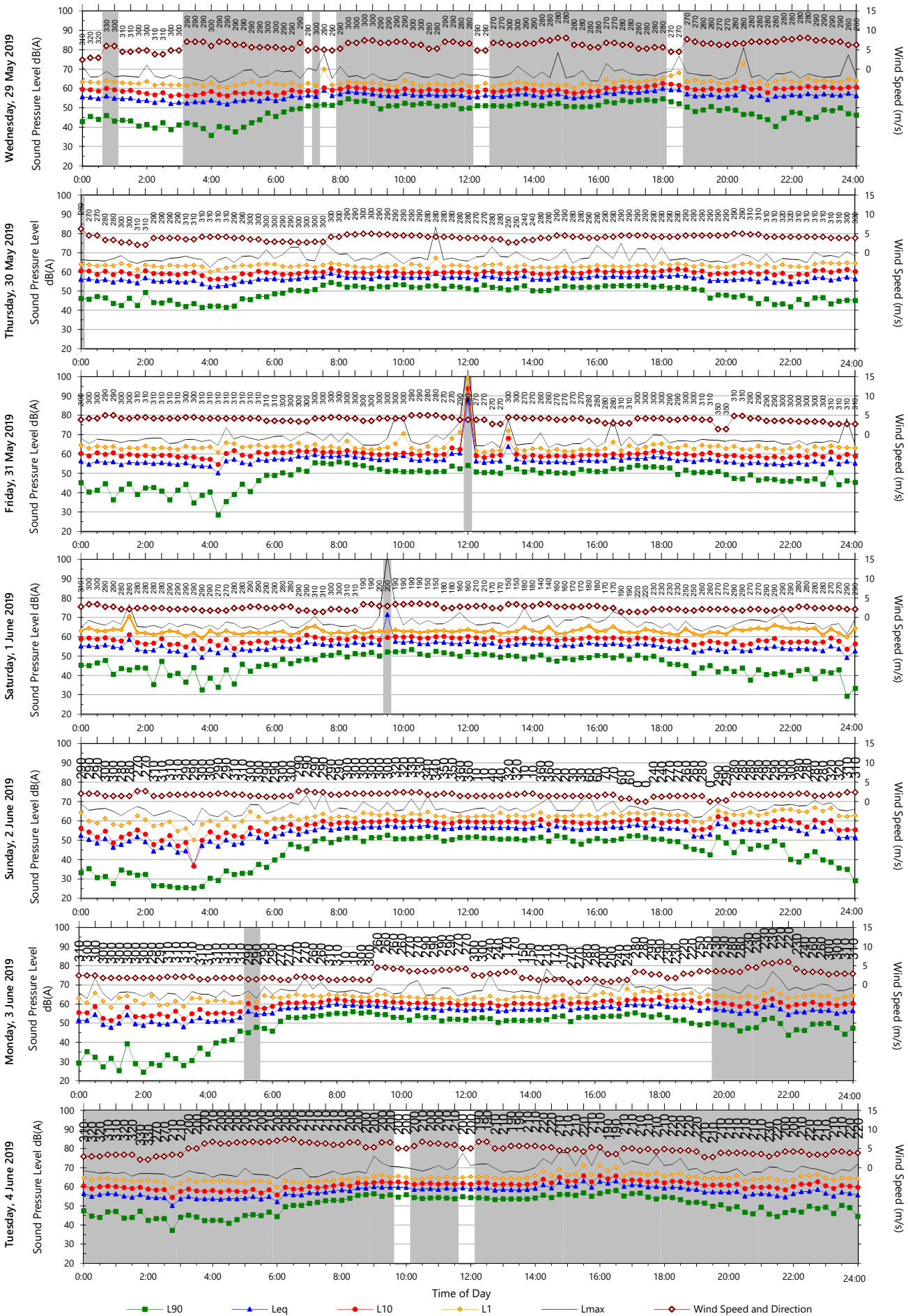


Data File: 2019-05-22_SLM_100_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

Unattended Monitoring Results

Location: 22 Letitia Close

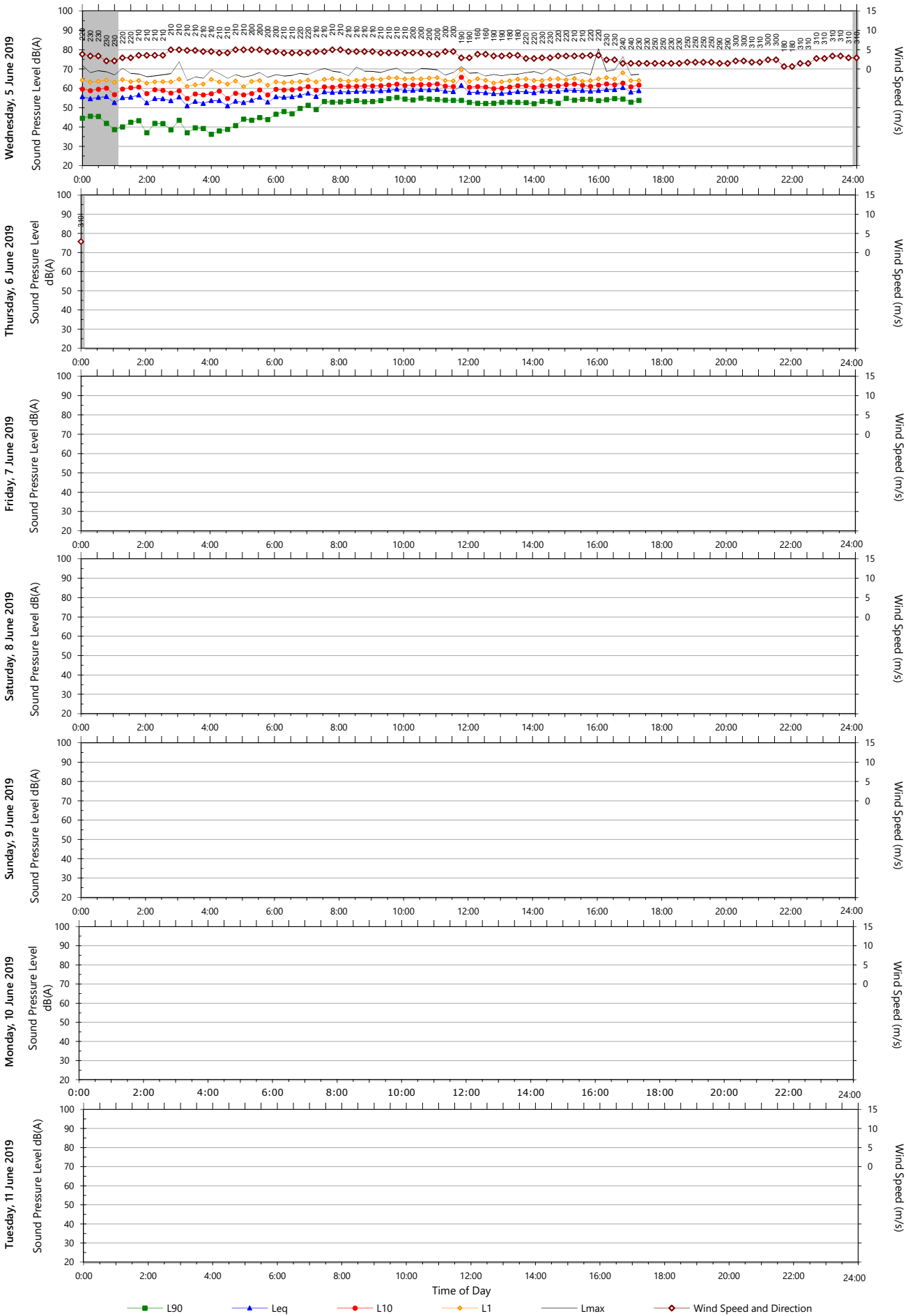


Data File: 2019-05-22_SLM_100_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

Unattended Monitoring Results

Location: 22 Letitia Close

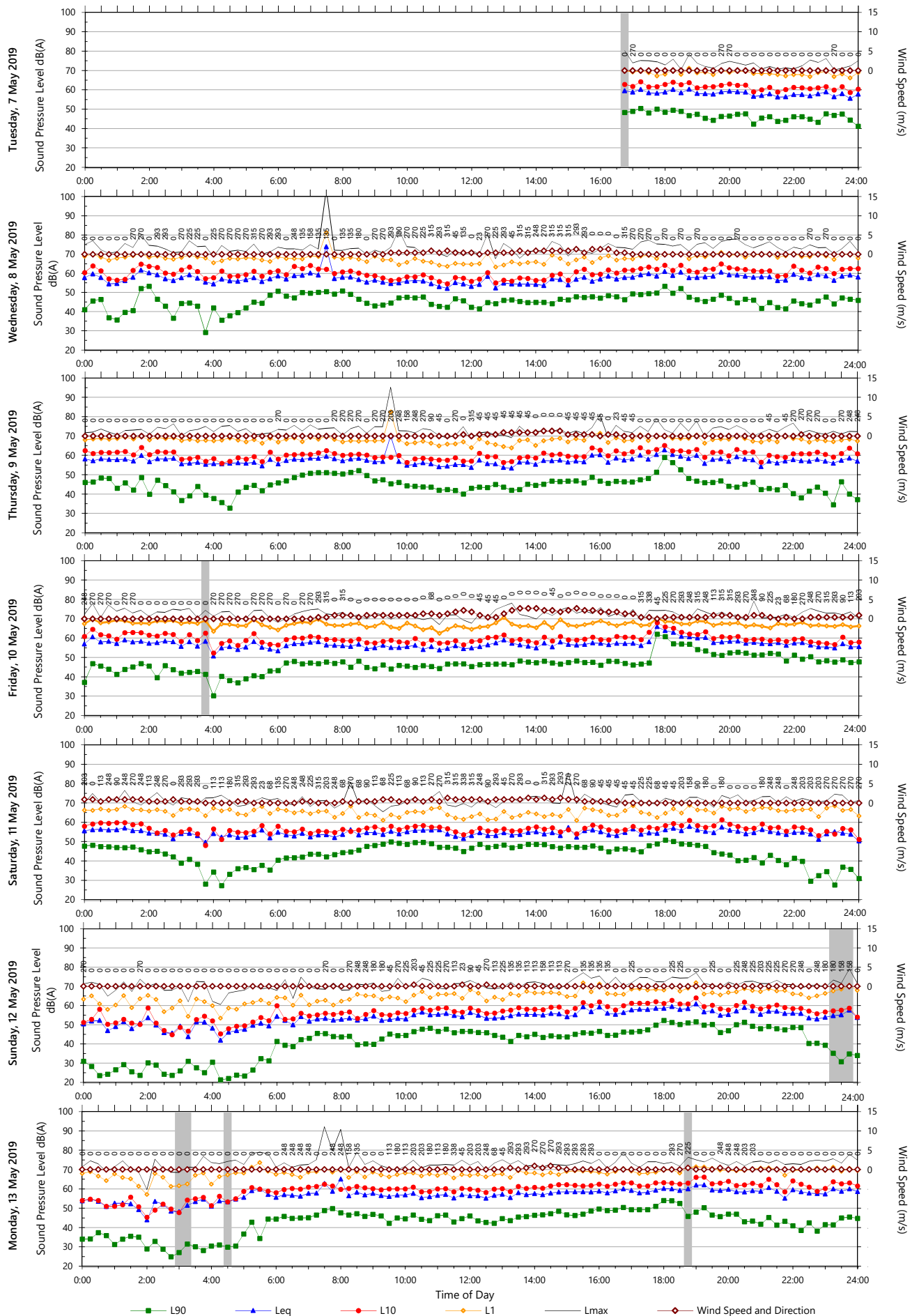


Data File: 2019-05-22_SLM_100_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

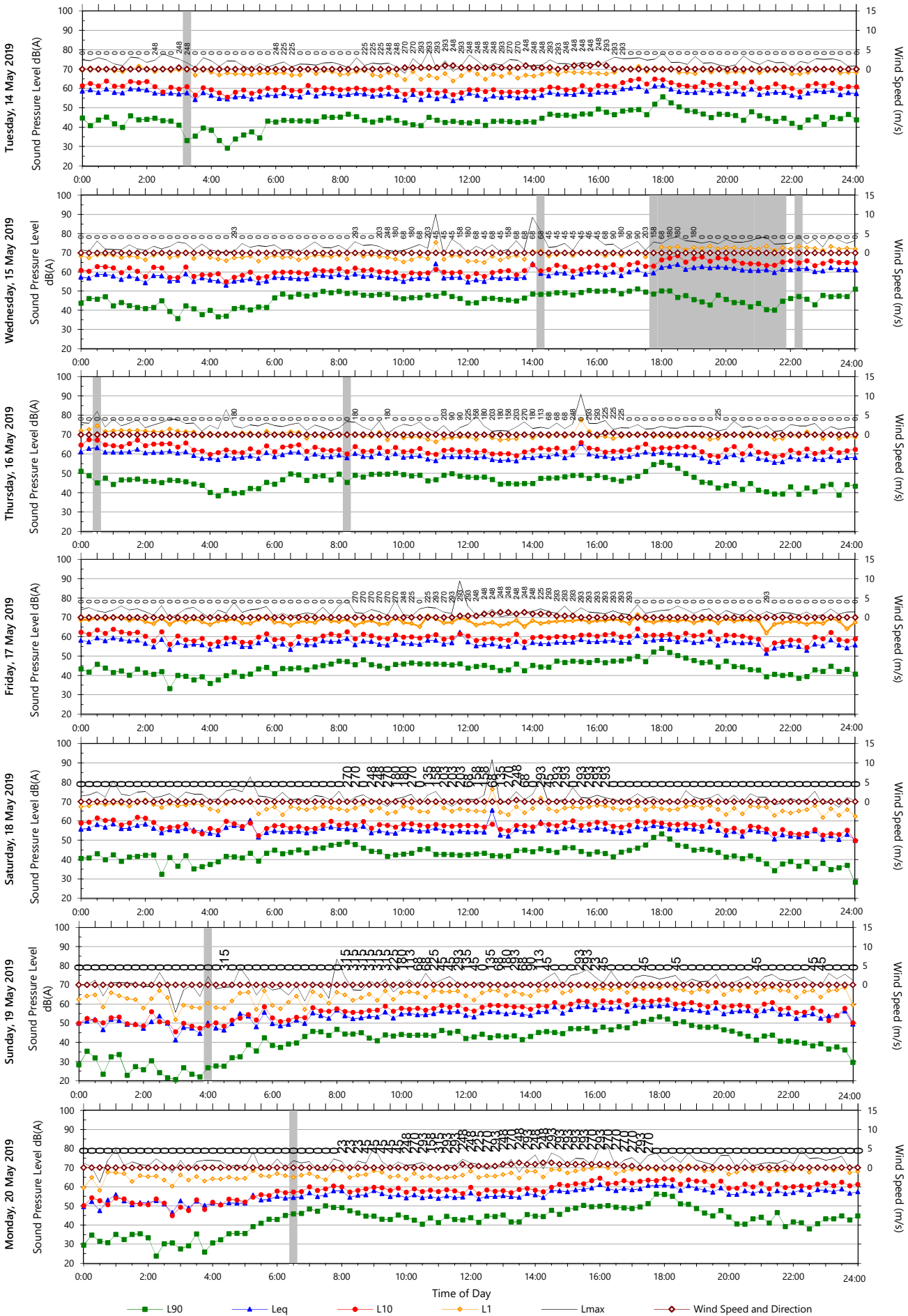
Unattended Monitoring Results

Location: 4227 Queens Lane



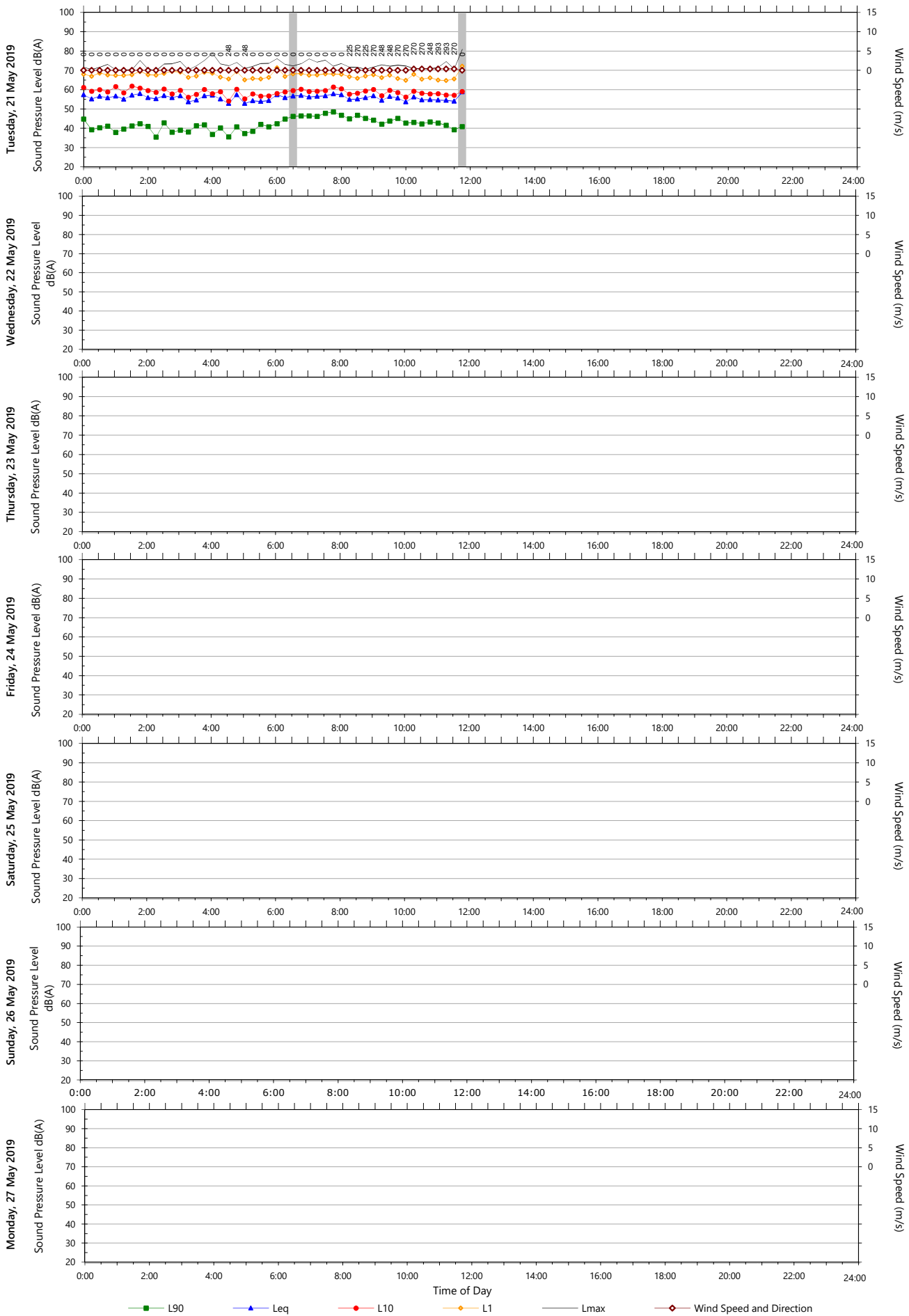
Data File: 2019-05-07_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)



Unattended Monitoring Results

Location: 4227 Queens Lane

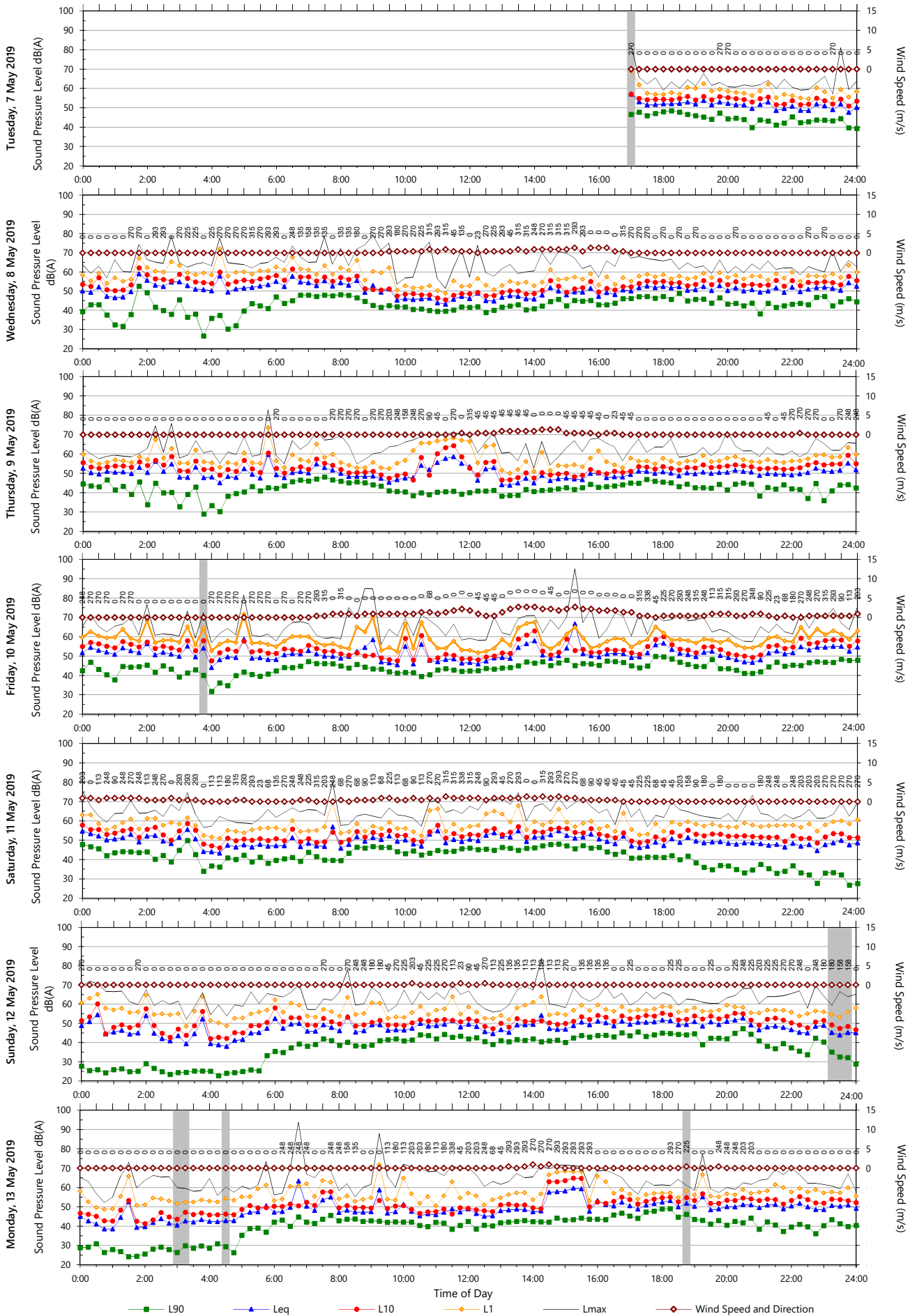


Data File: 2019-05-07_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

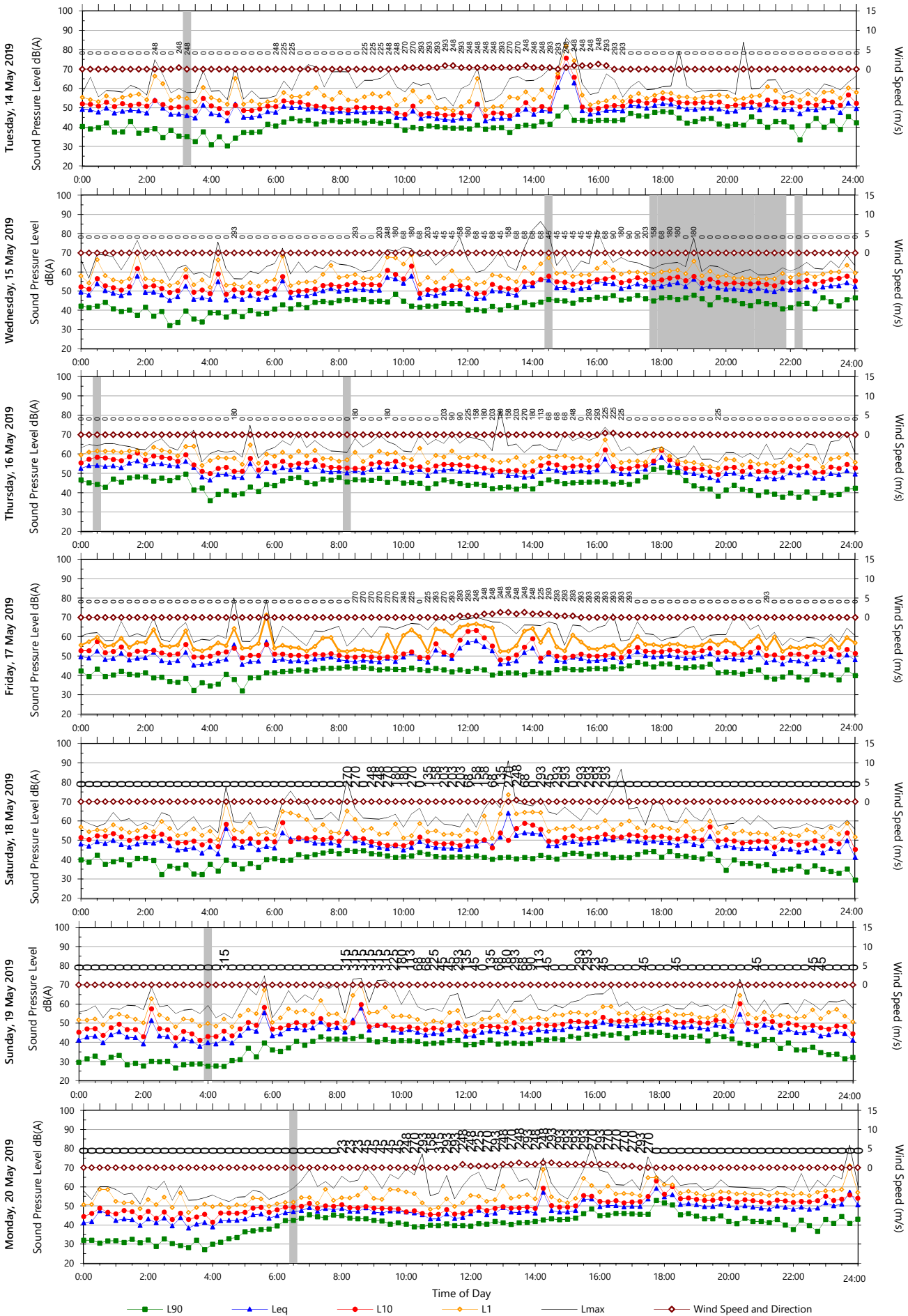
Unattended Monitoring Results

Location: 46 Rosewood Road

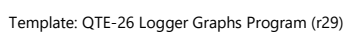


Data File: 2019-05-07_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

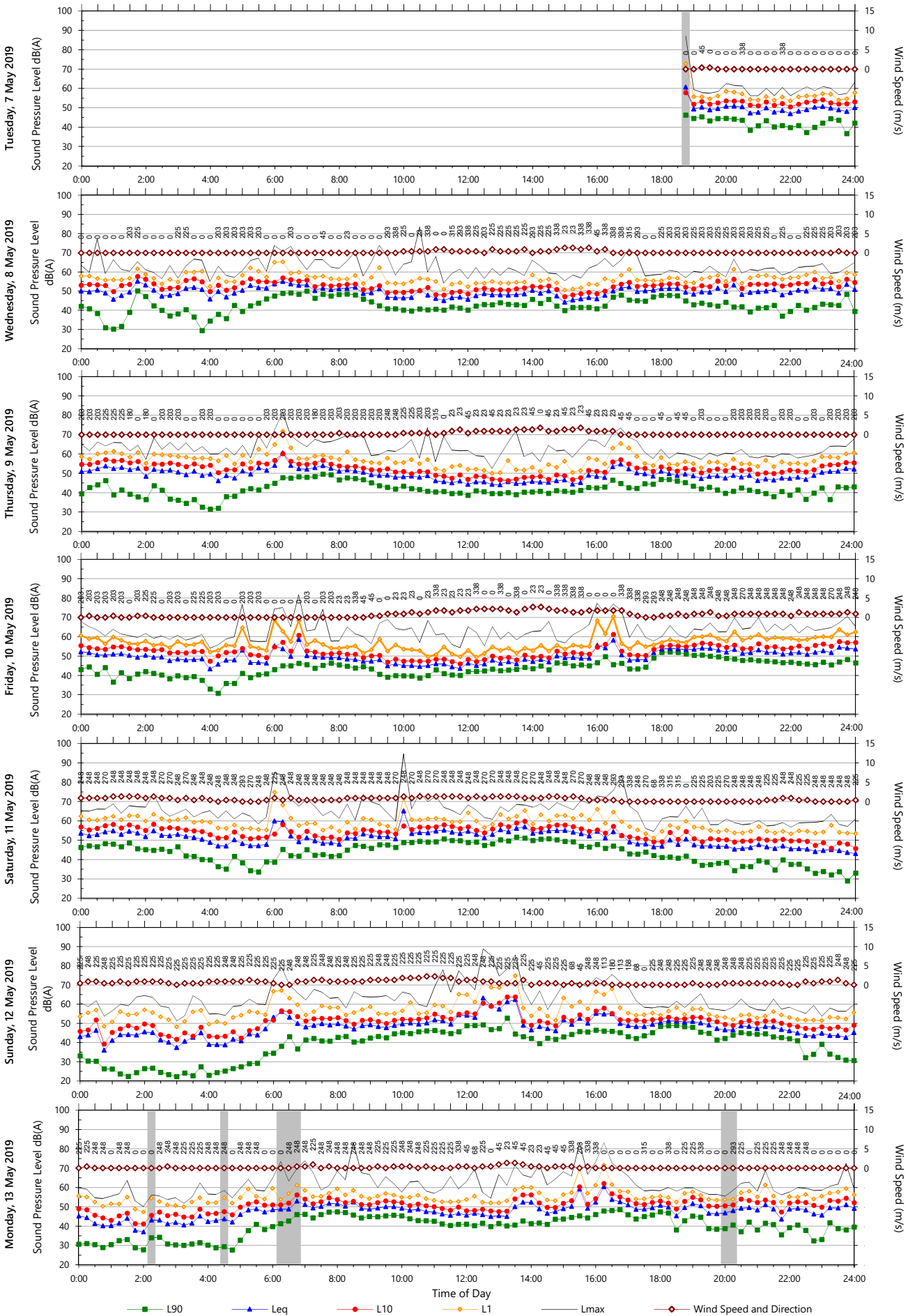


Location: 46 Rosewood Road



Unattended Monitoring Results

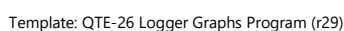
Location: 12 Kerr Drive



Data File: 2019-05-07_SLM_000_123_Rpt_Report.txt

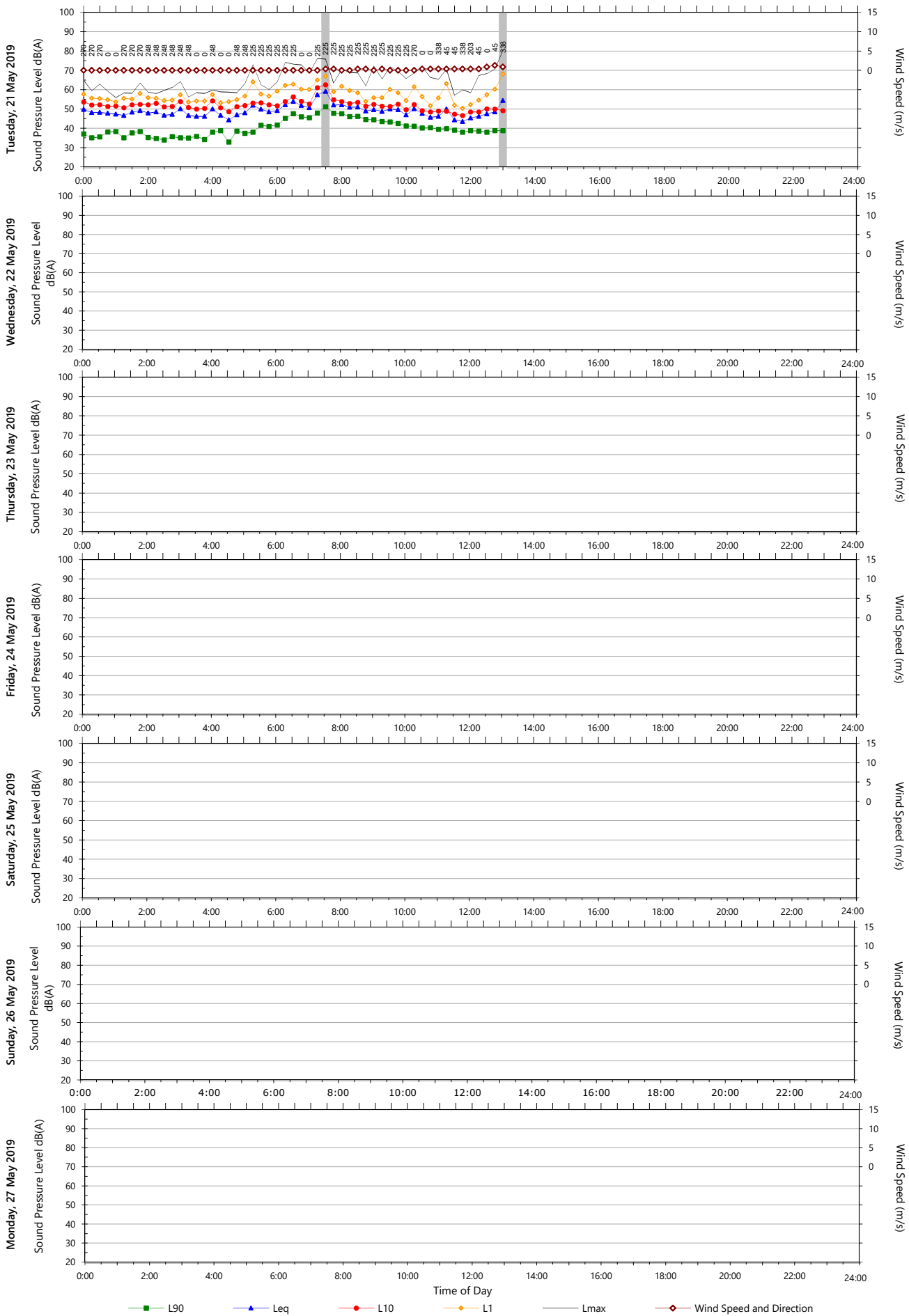
Template: QTE-26 Logger Graphs Program (r29)

Location: 12 Kerr Drive



Unattended Monitoring Results

Location: 12 Kerr Drive

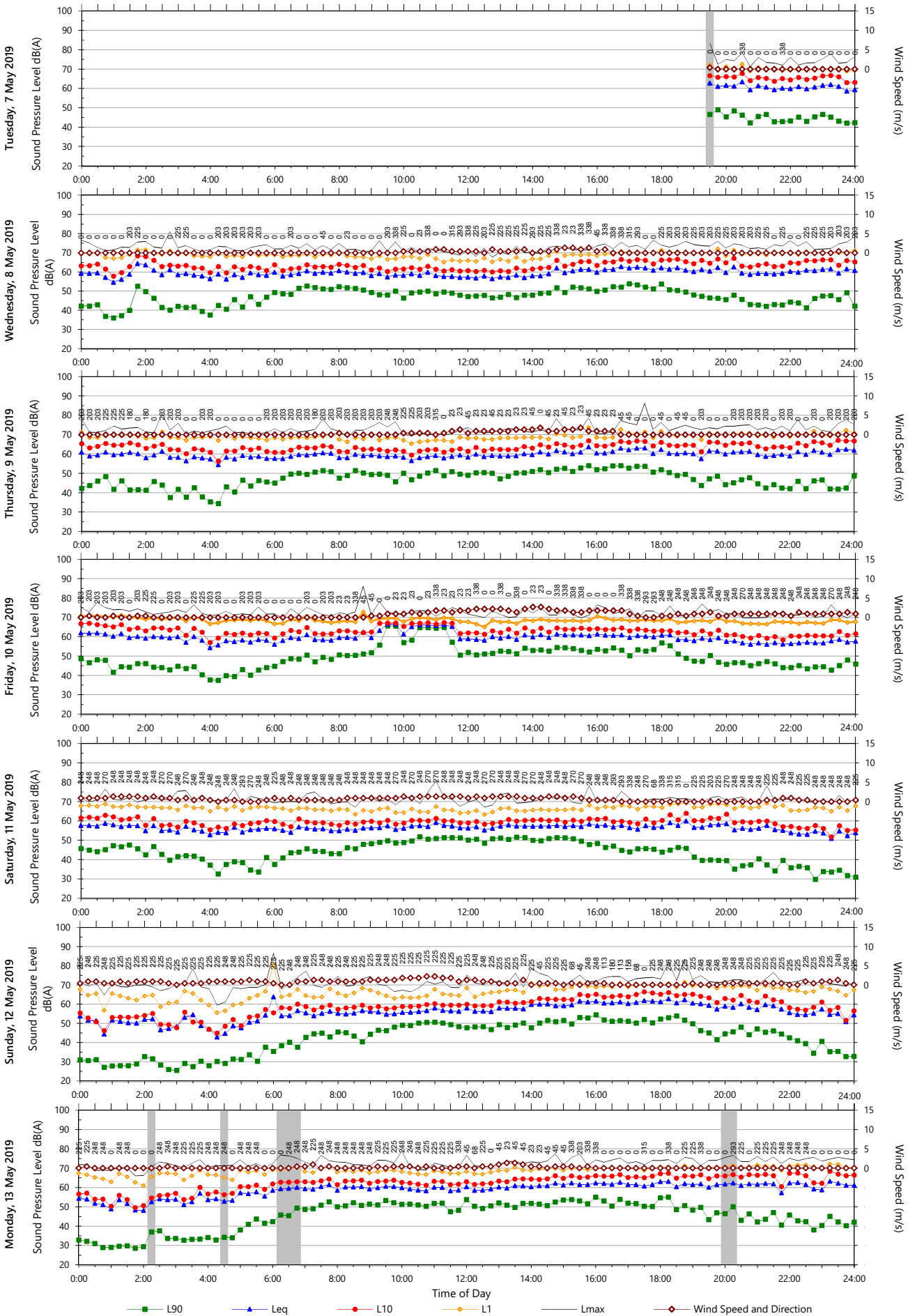


Data File: 2019-05-07_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

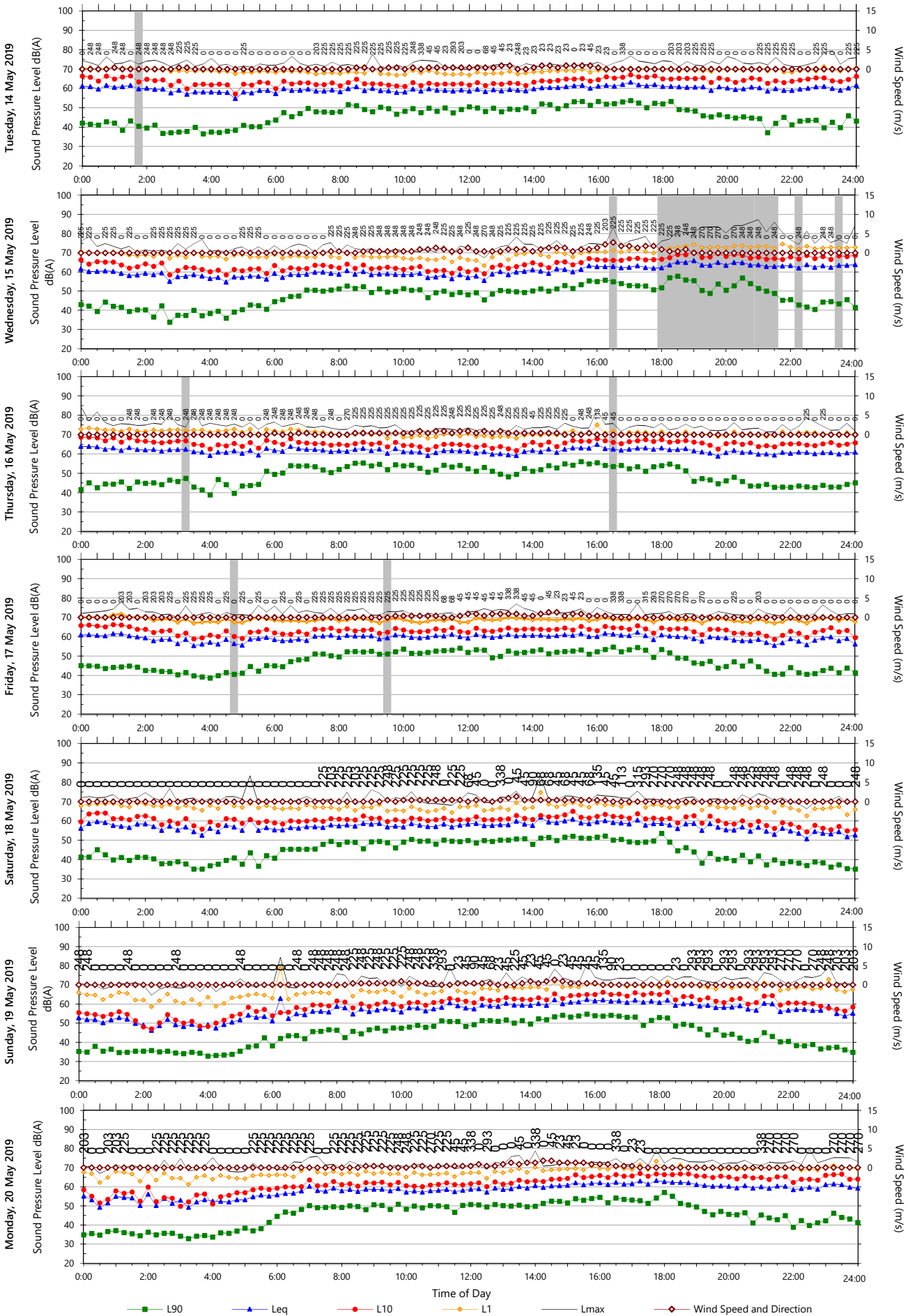
Unattended Monitoring Results

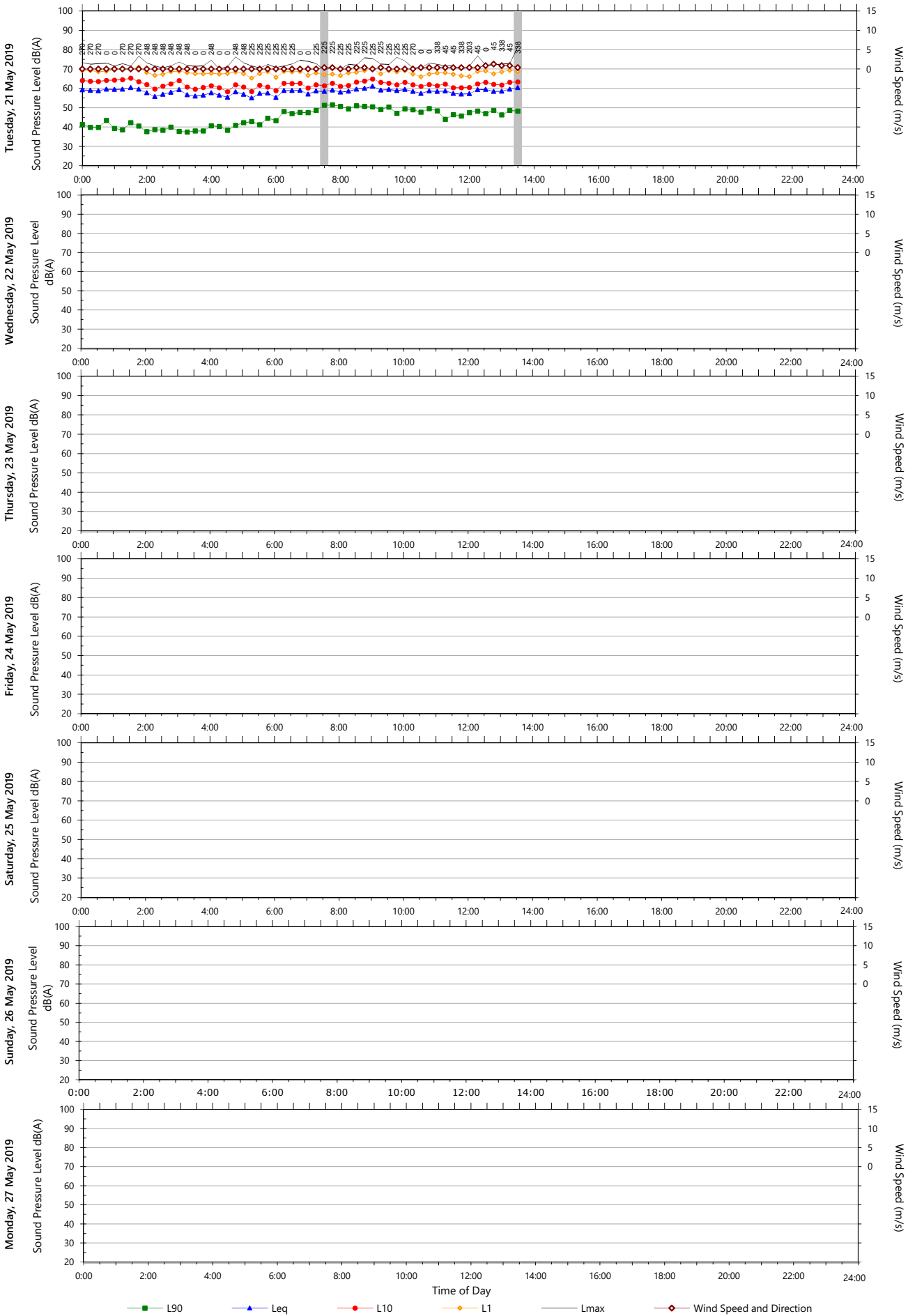
Location: 41 Bald Hill Road

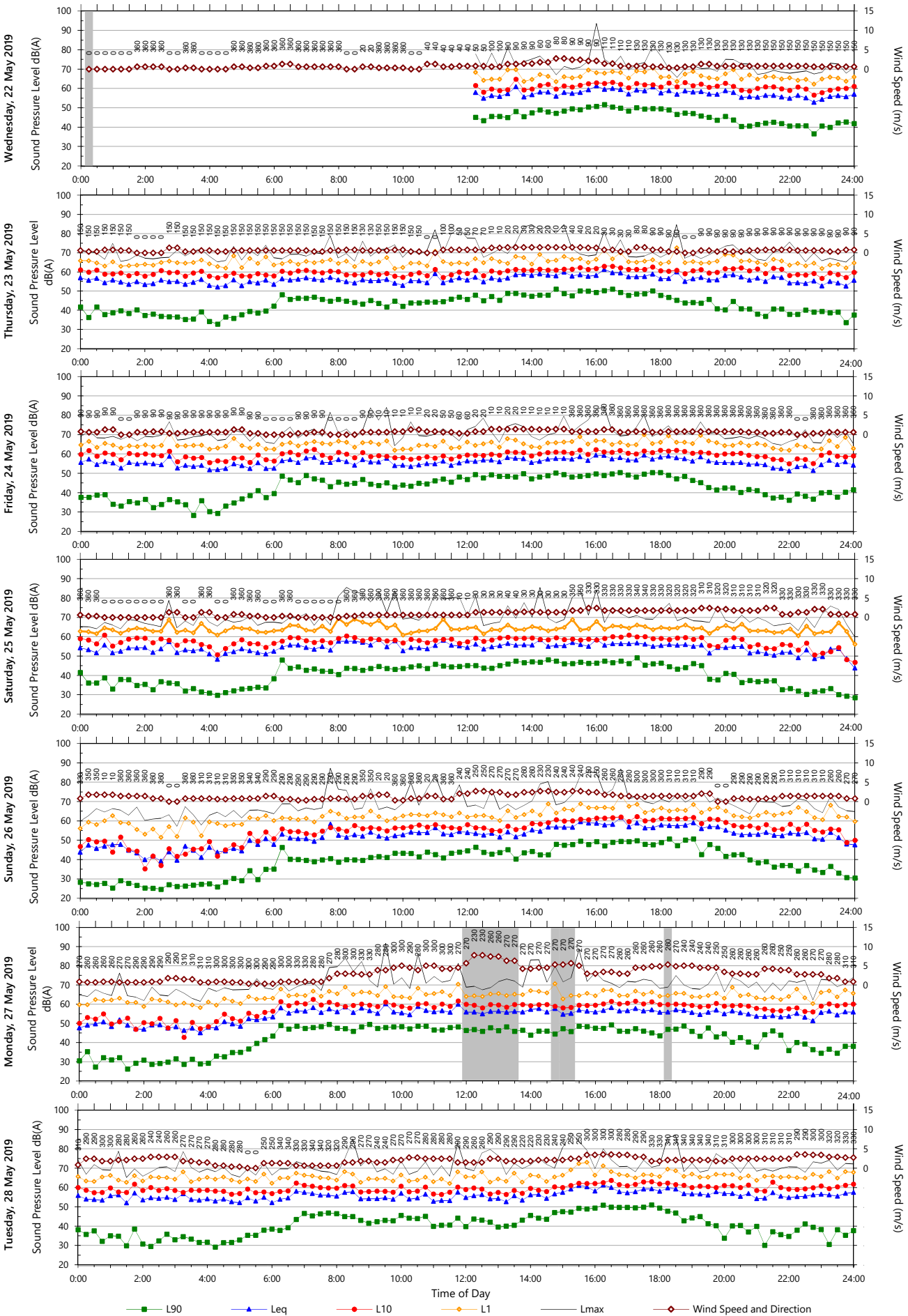


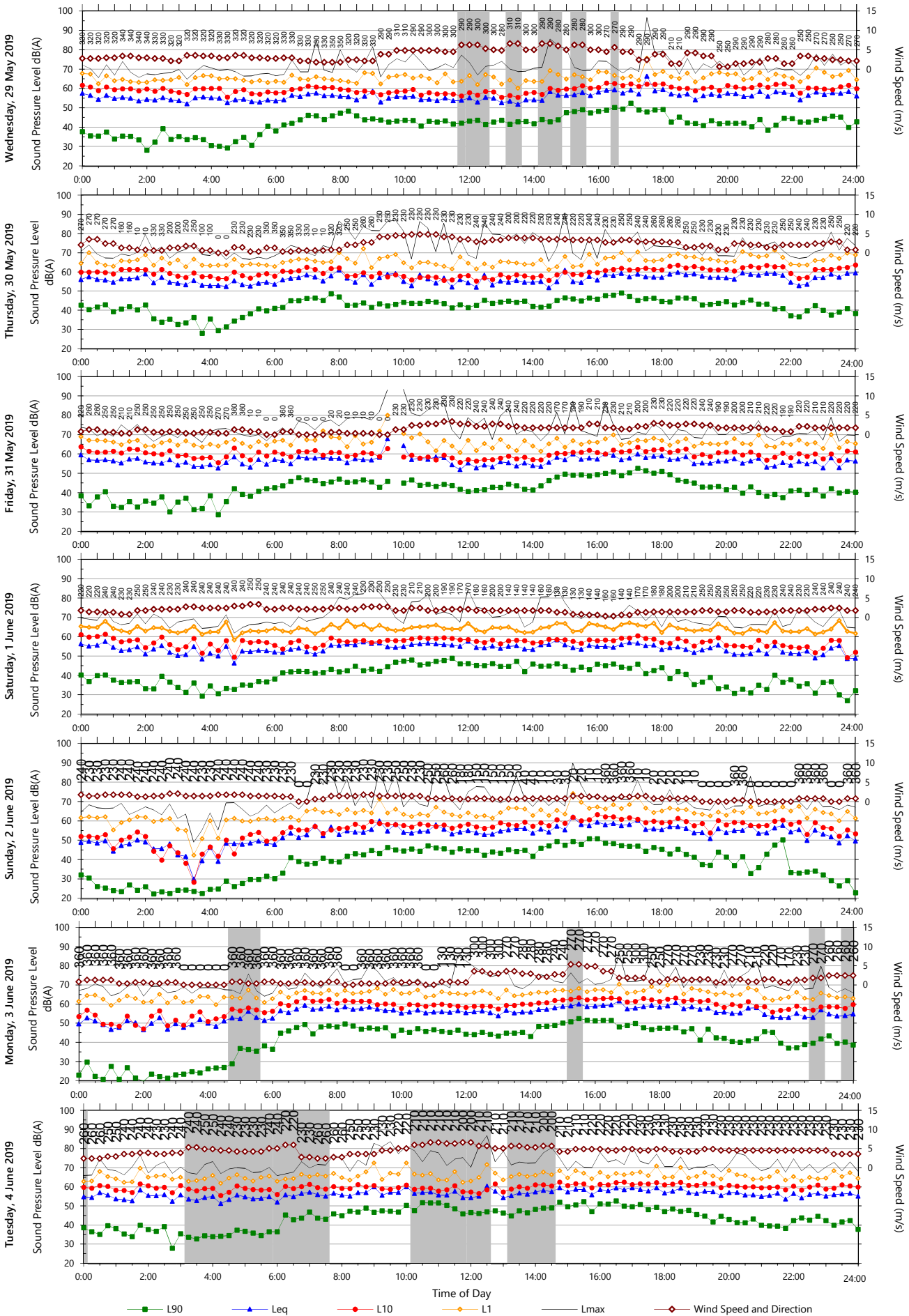
Data File: 2019-05-07_SLM_000_123_Rpt_Report.txt

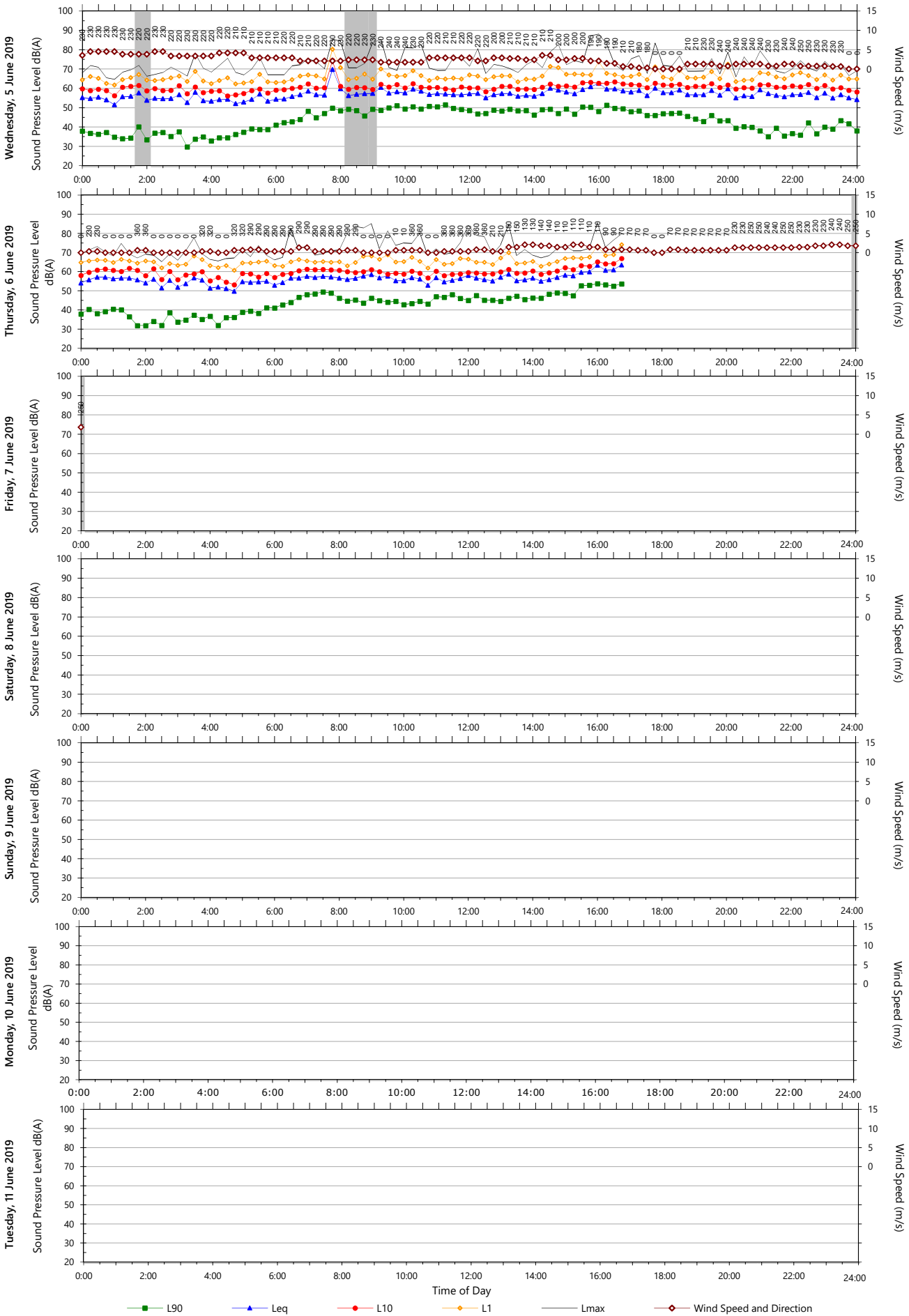
Template: QTE-26 Logger Graphs Program (r29)

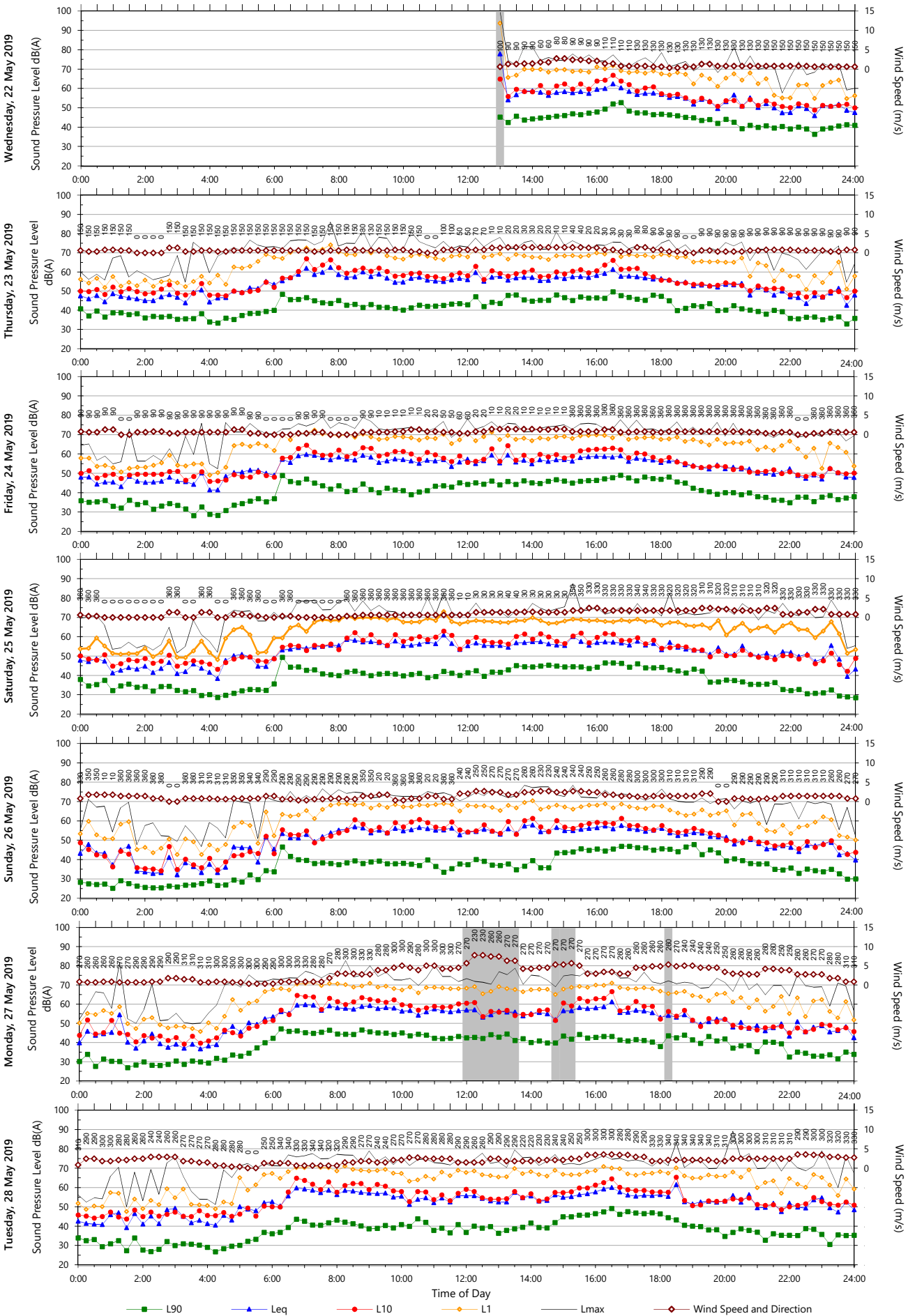


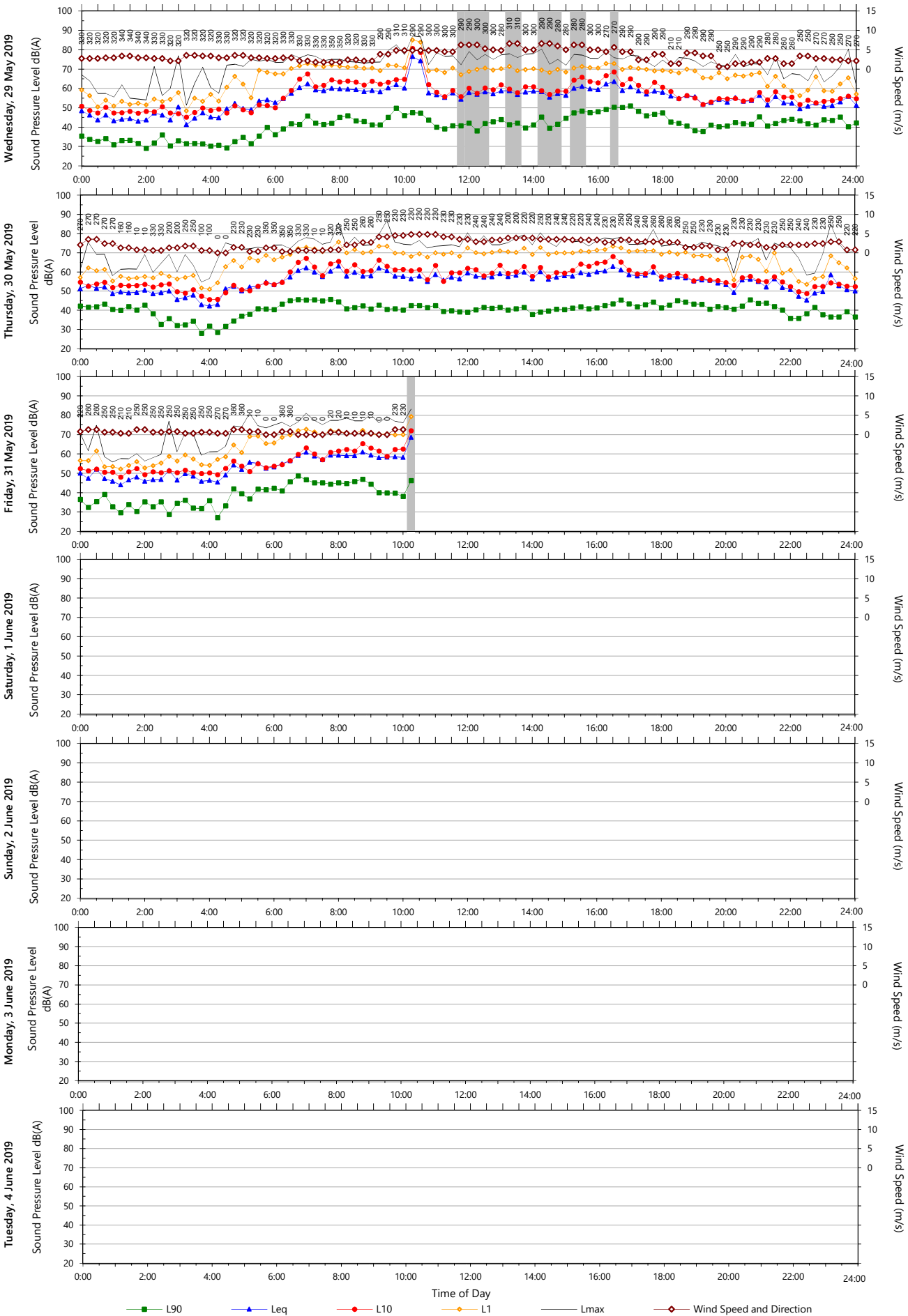






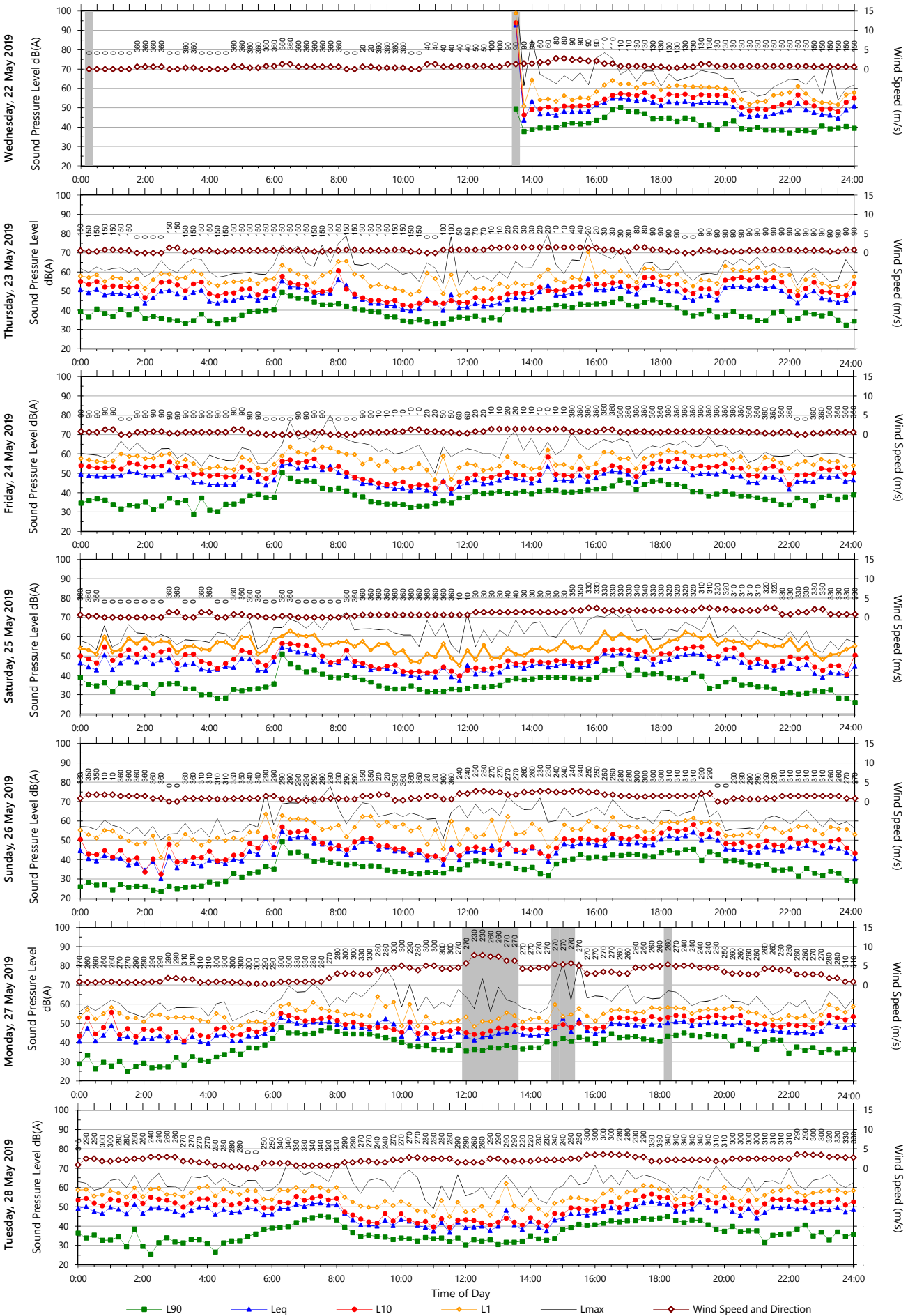






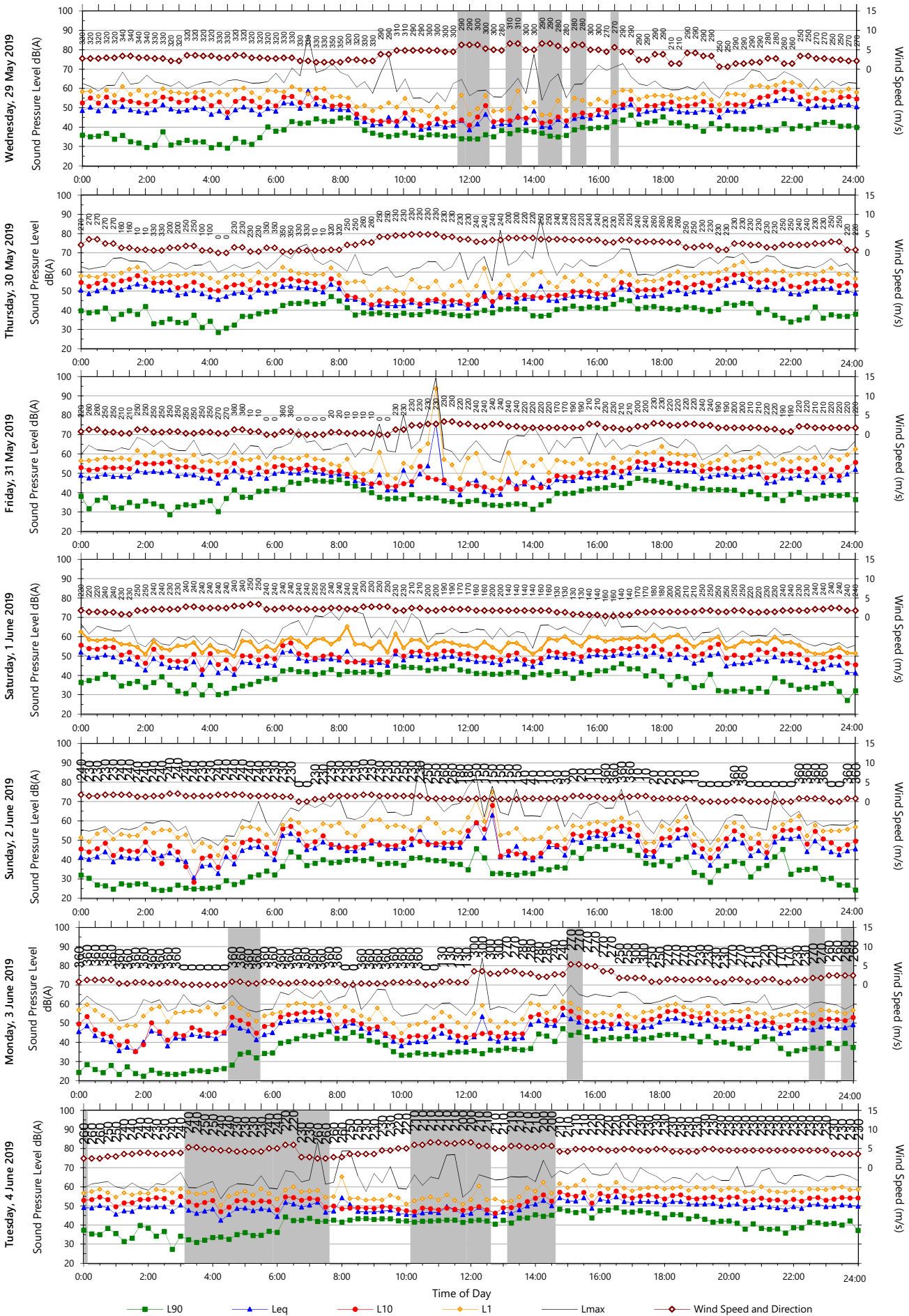
Unattended Monitoring Results

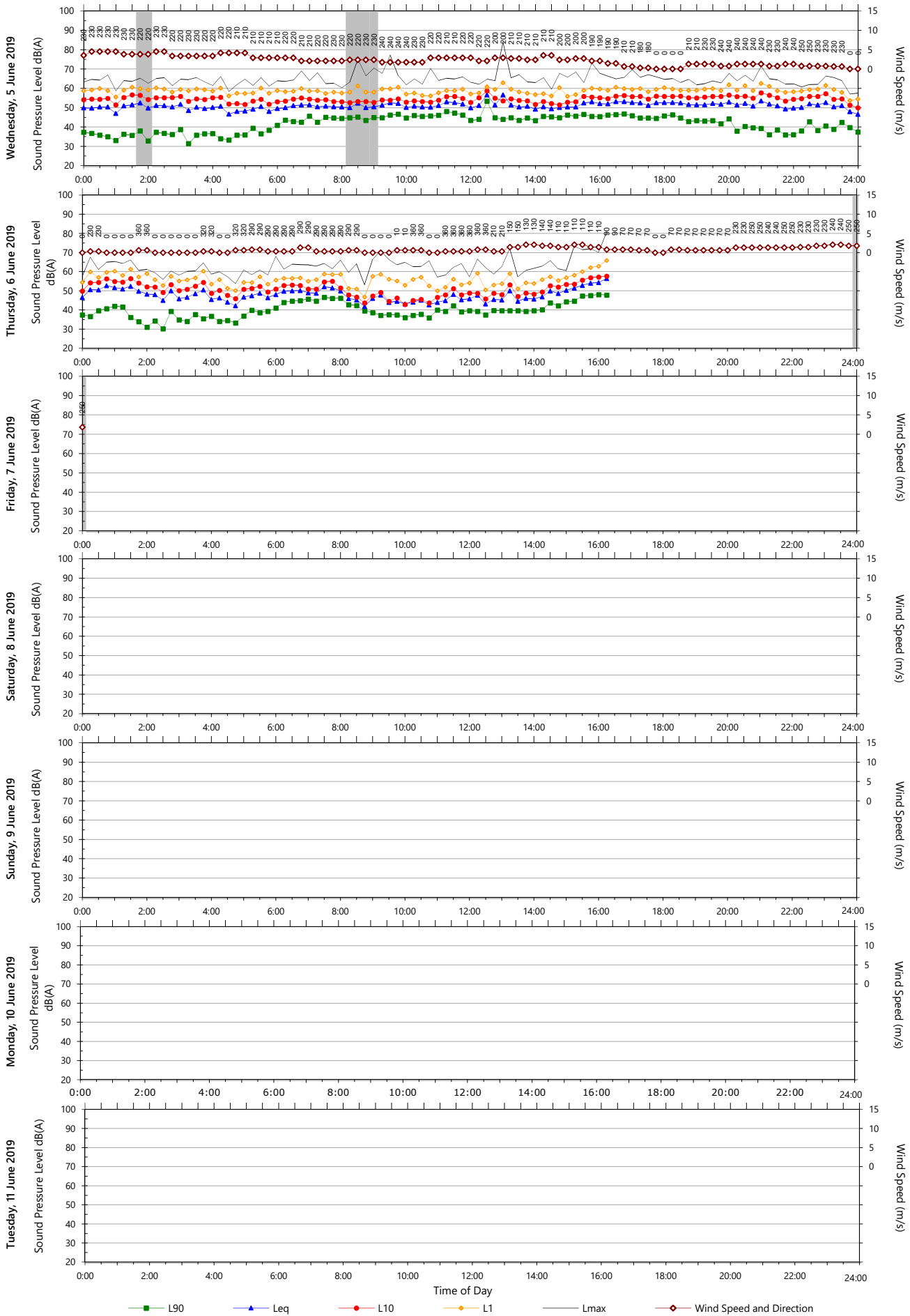
Location: 63 River Street

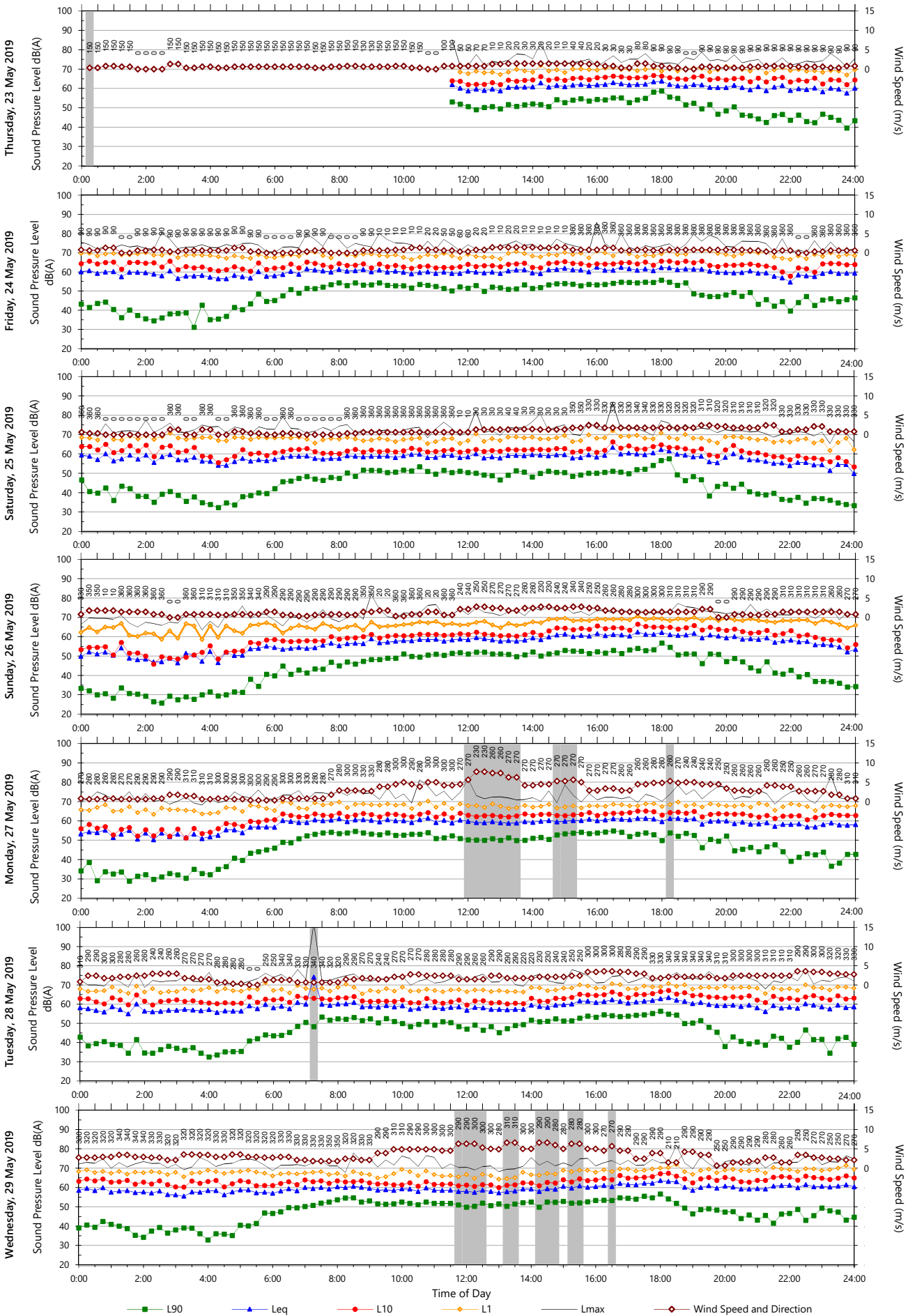


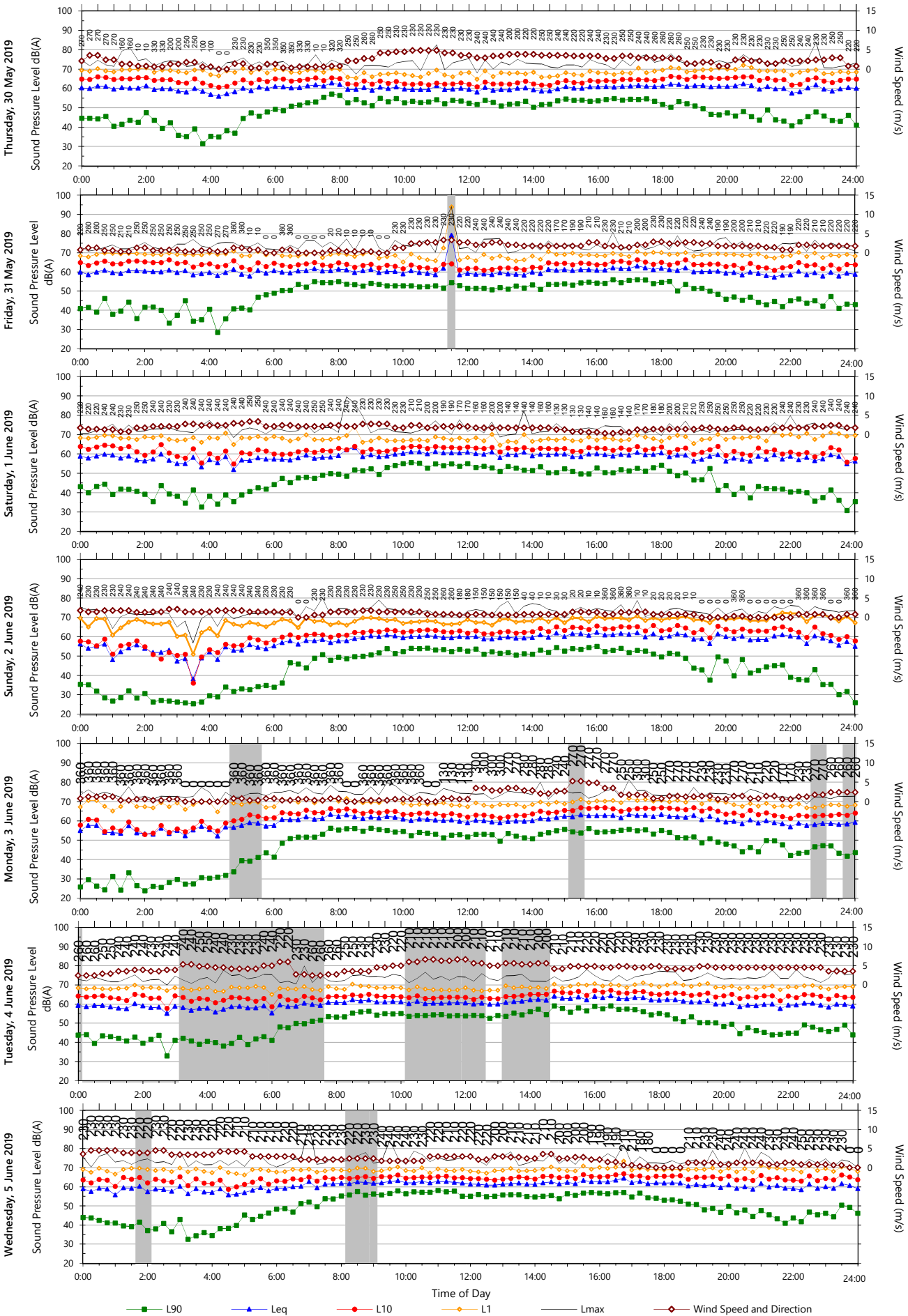
Data File: 2019-05-22_SLM_100_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)



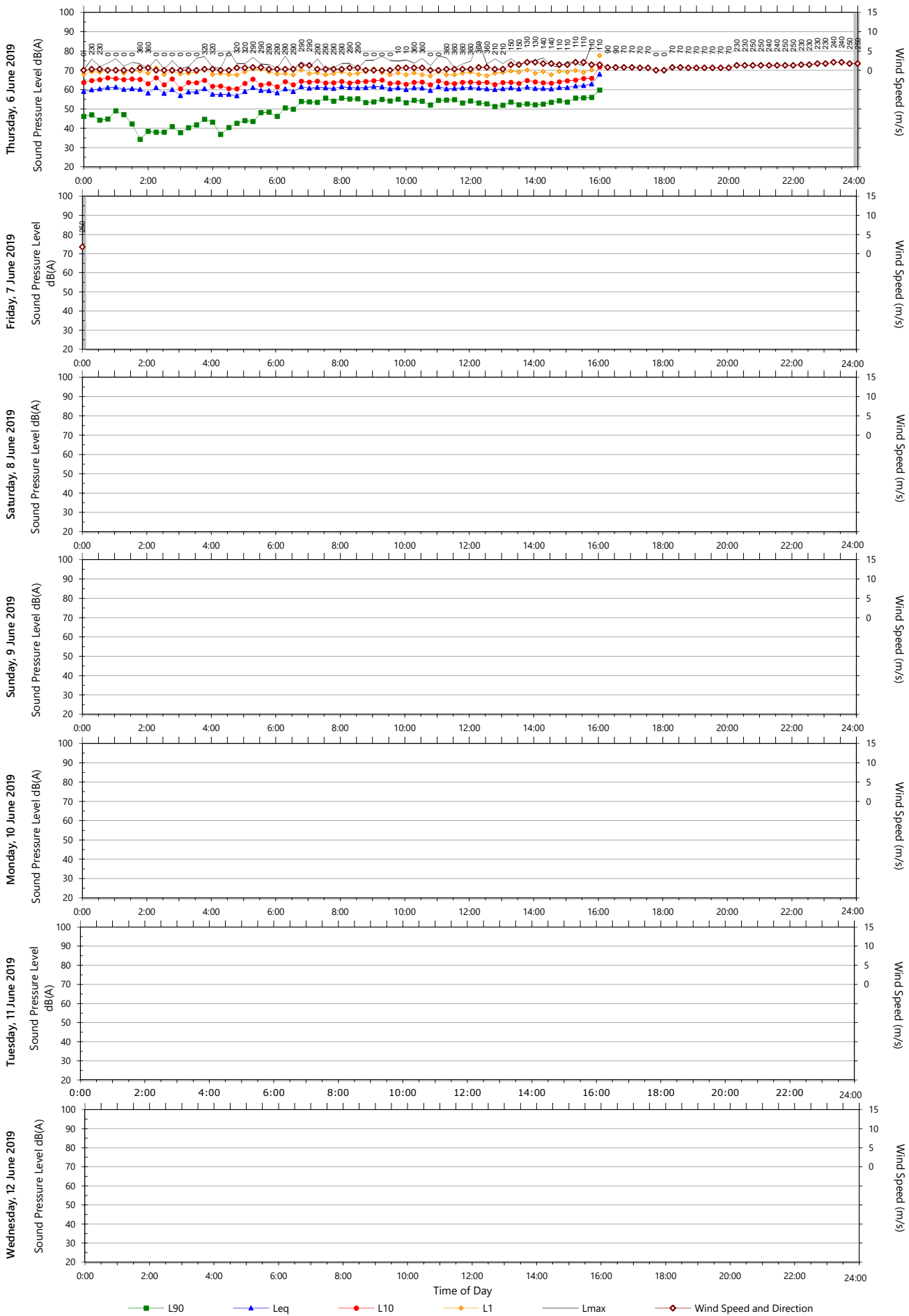






Unattended Monitoring Results

Location: 35 Old Coast Road

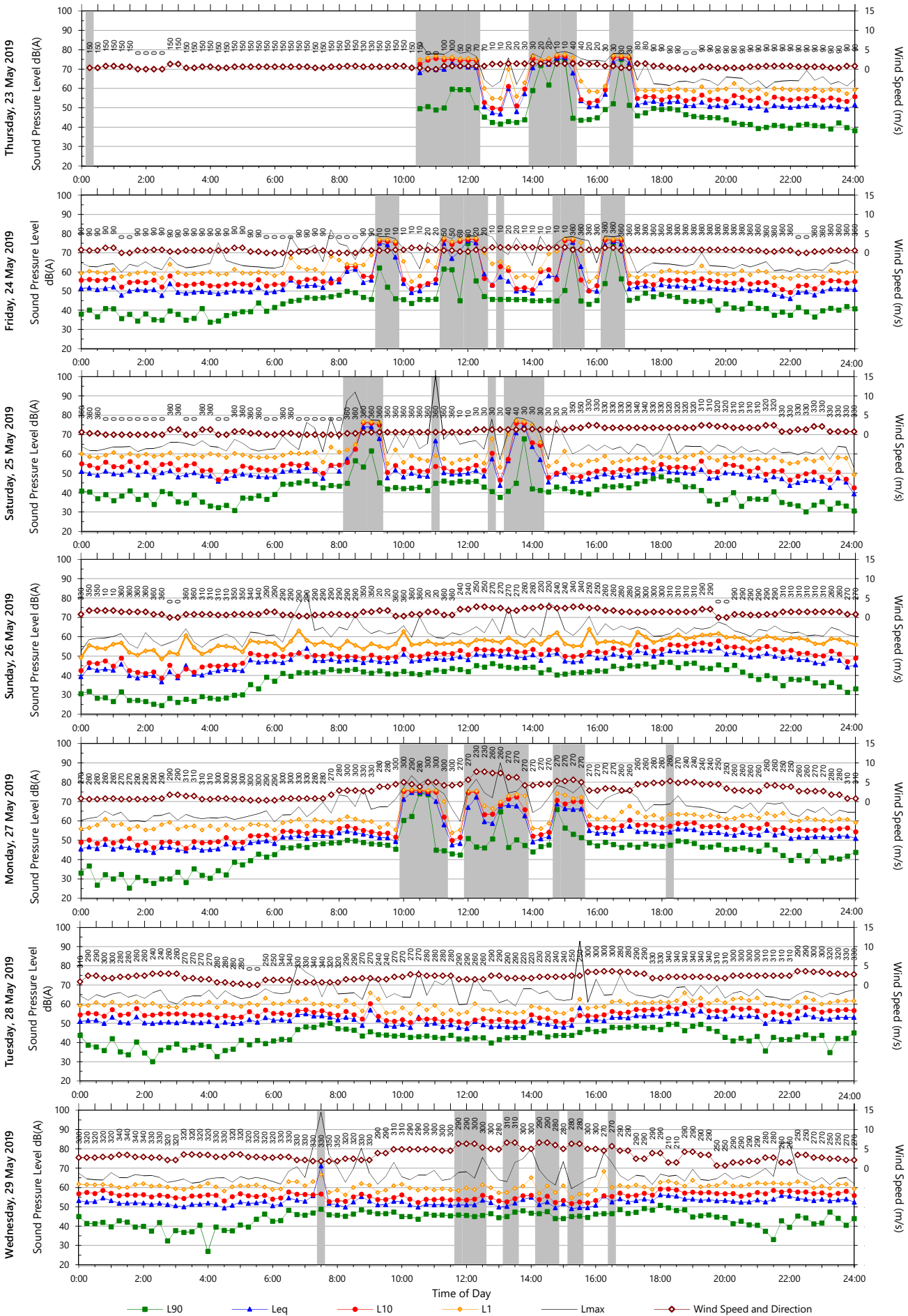


Data File: 2019-05-23_SLM_100_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

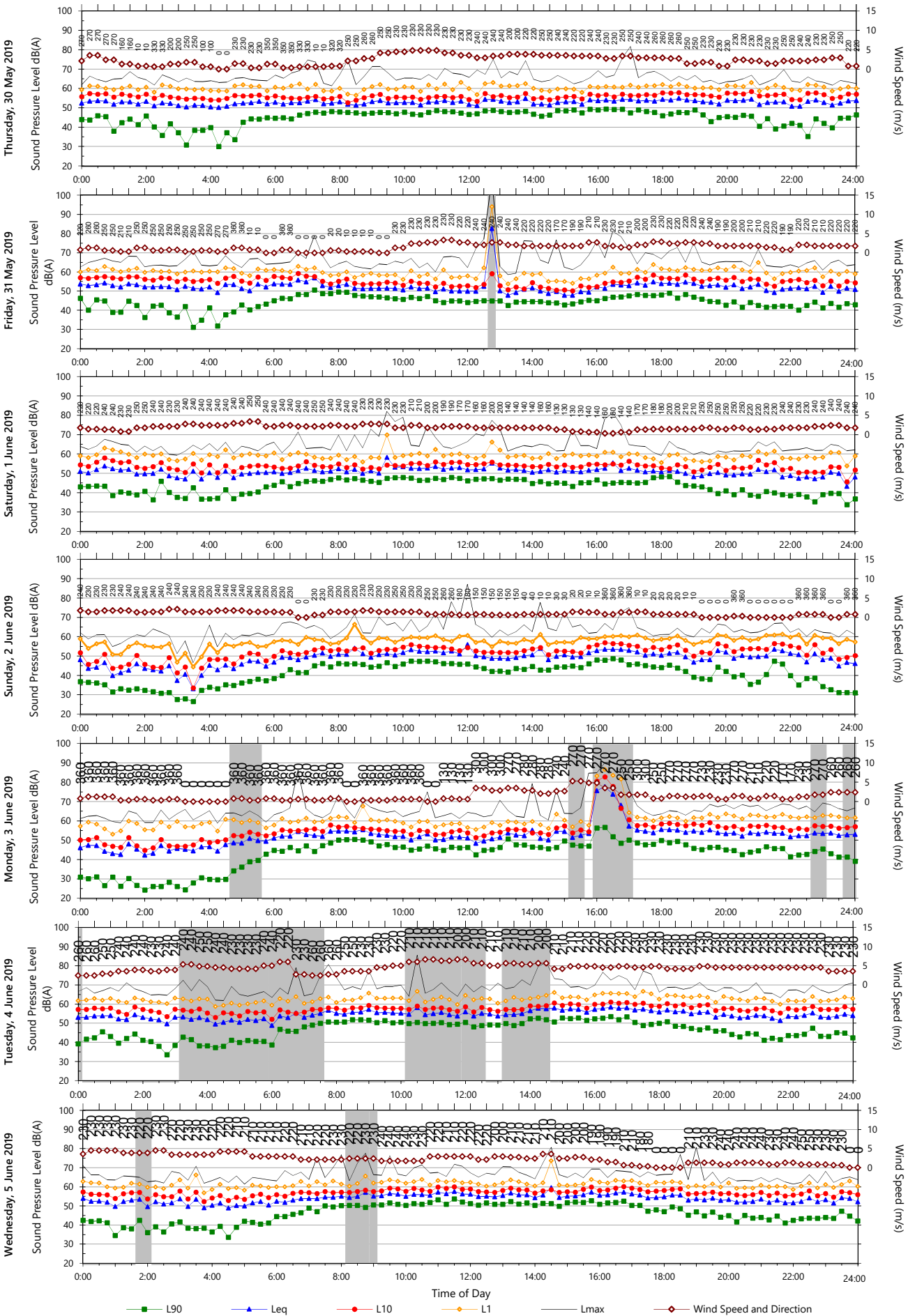
Unattended Monitoring Results

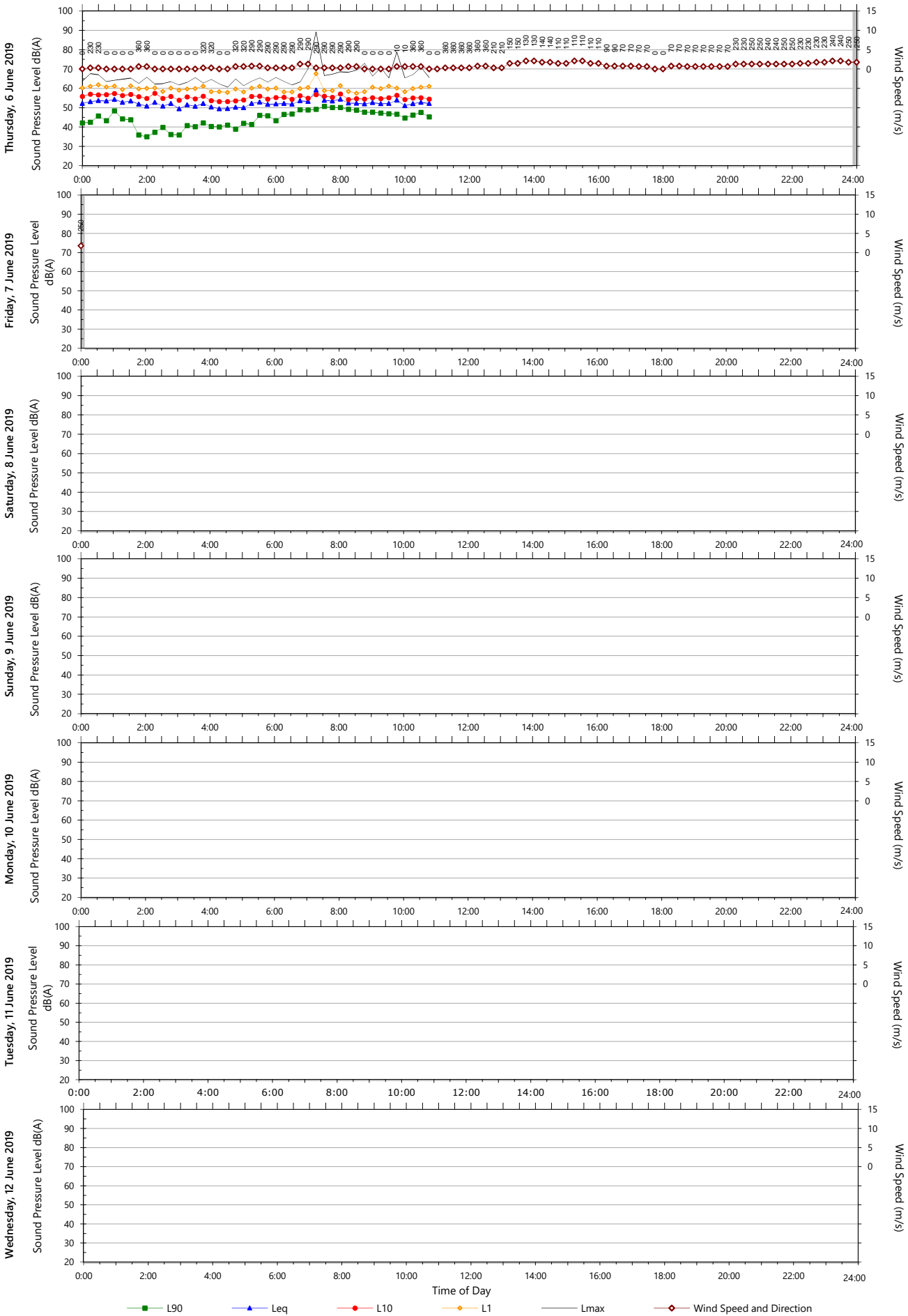
Location: 18 Mattick Road

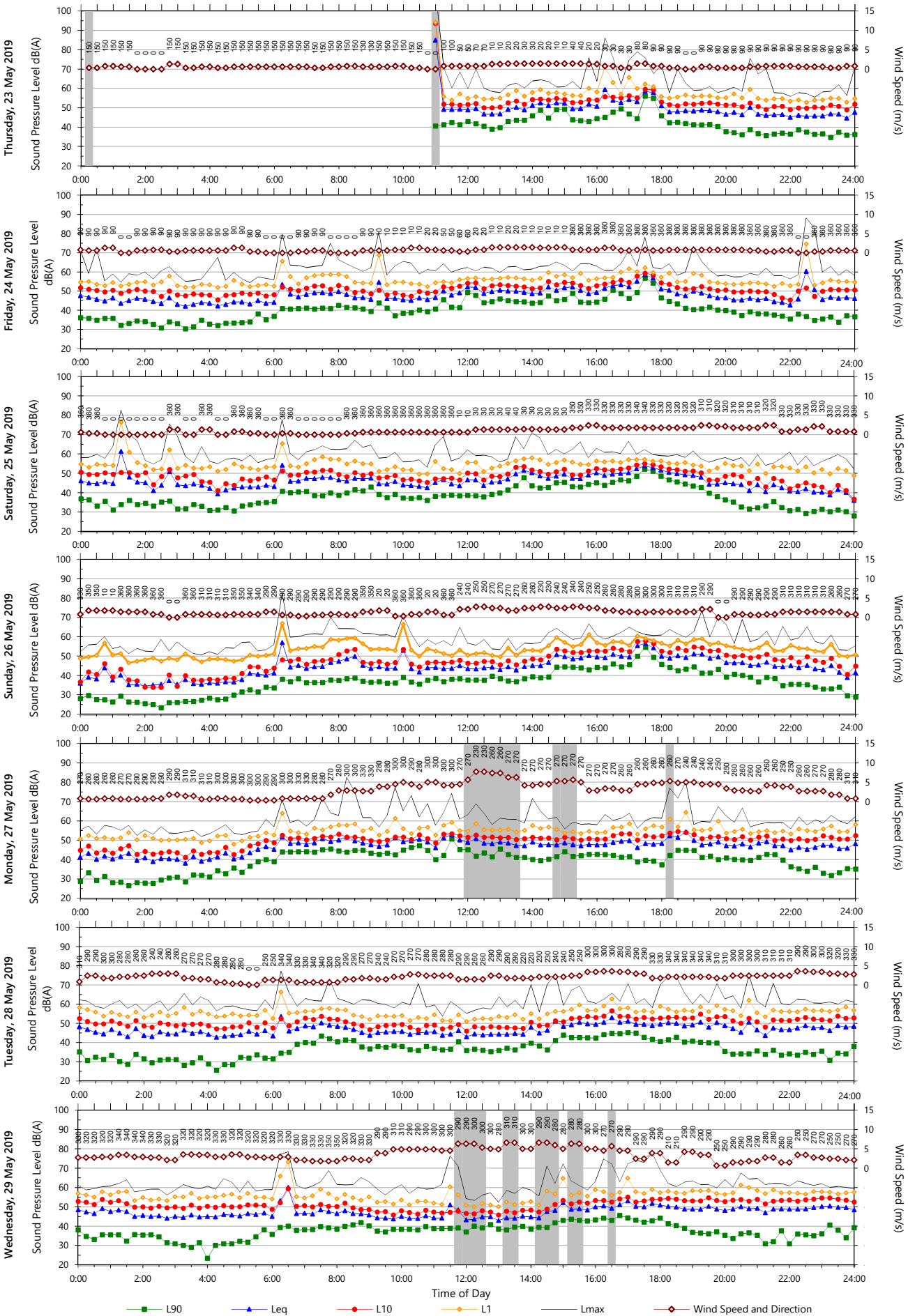


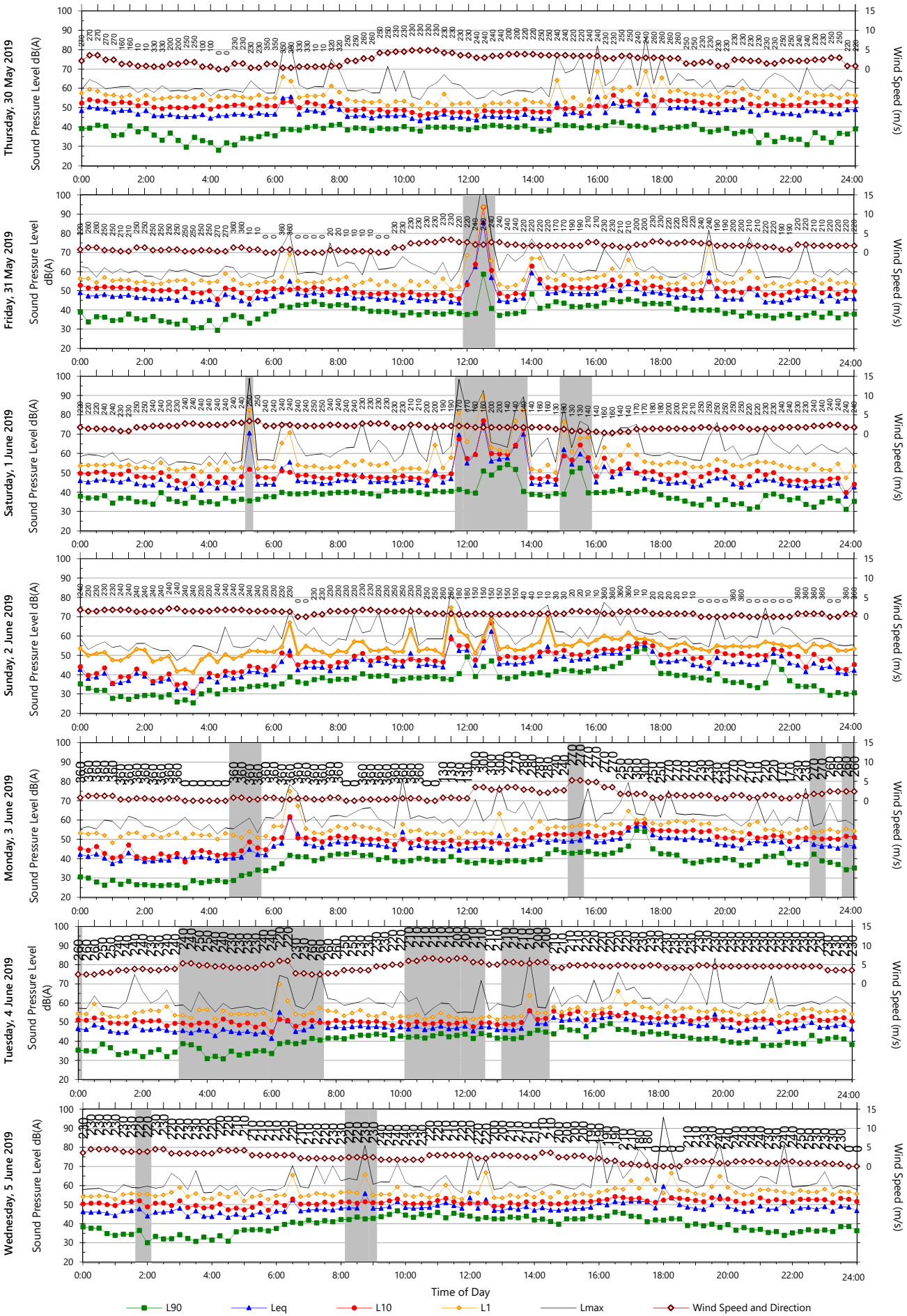
Data File: 2019-05-23_SLM_100_123_Rpt_Report.txt

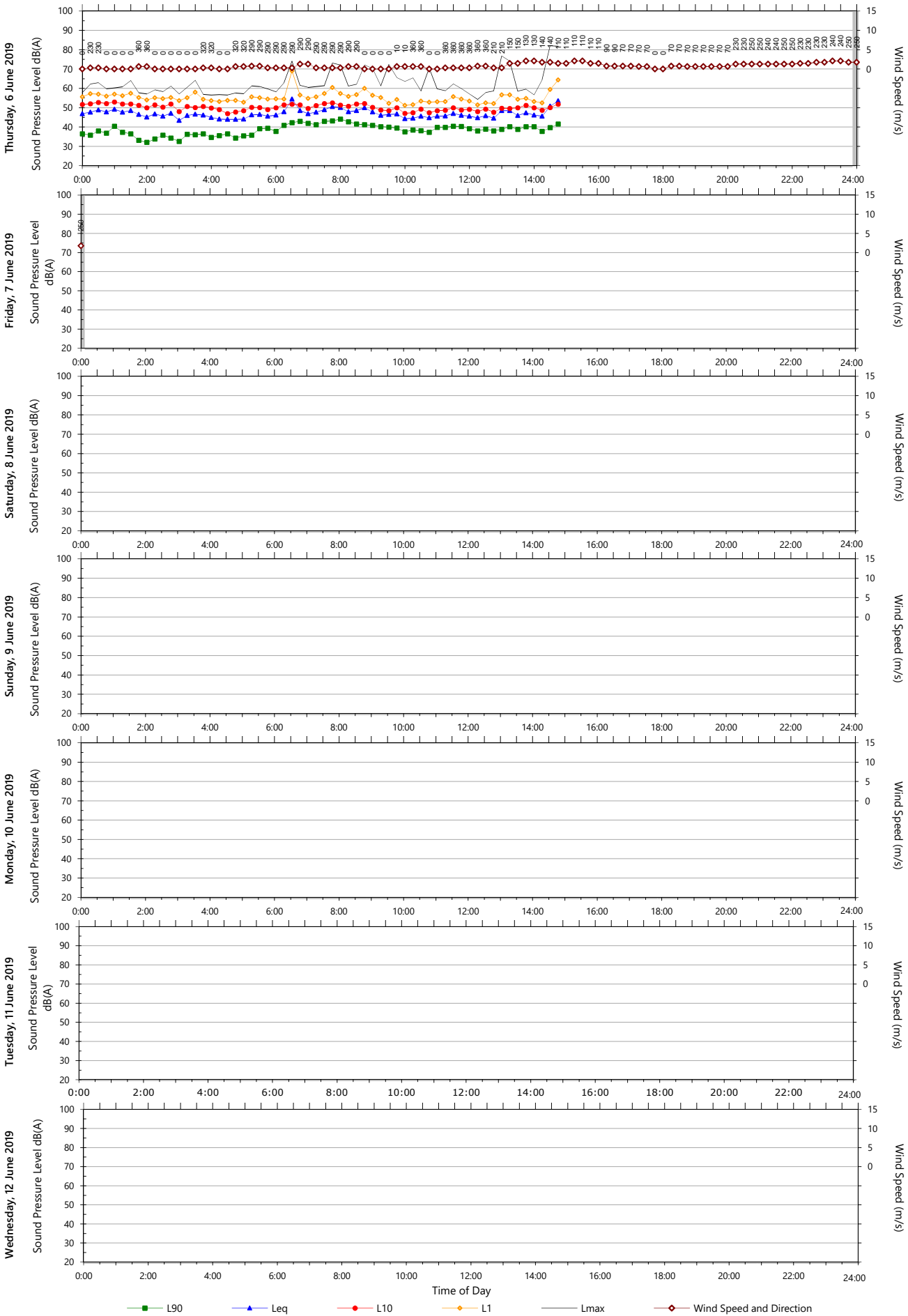
Template: QTE-26 Logger Graphs Program (r29)





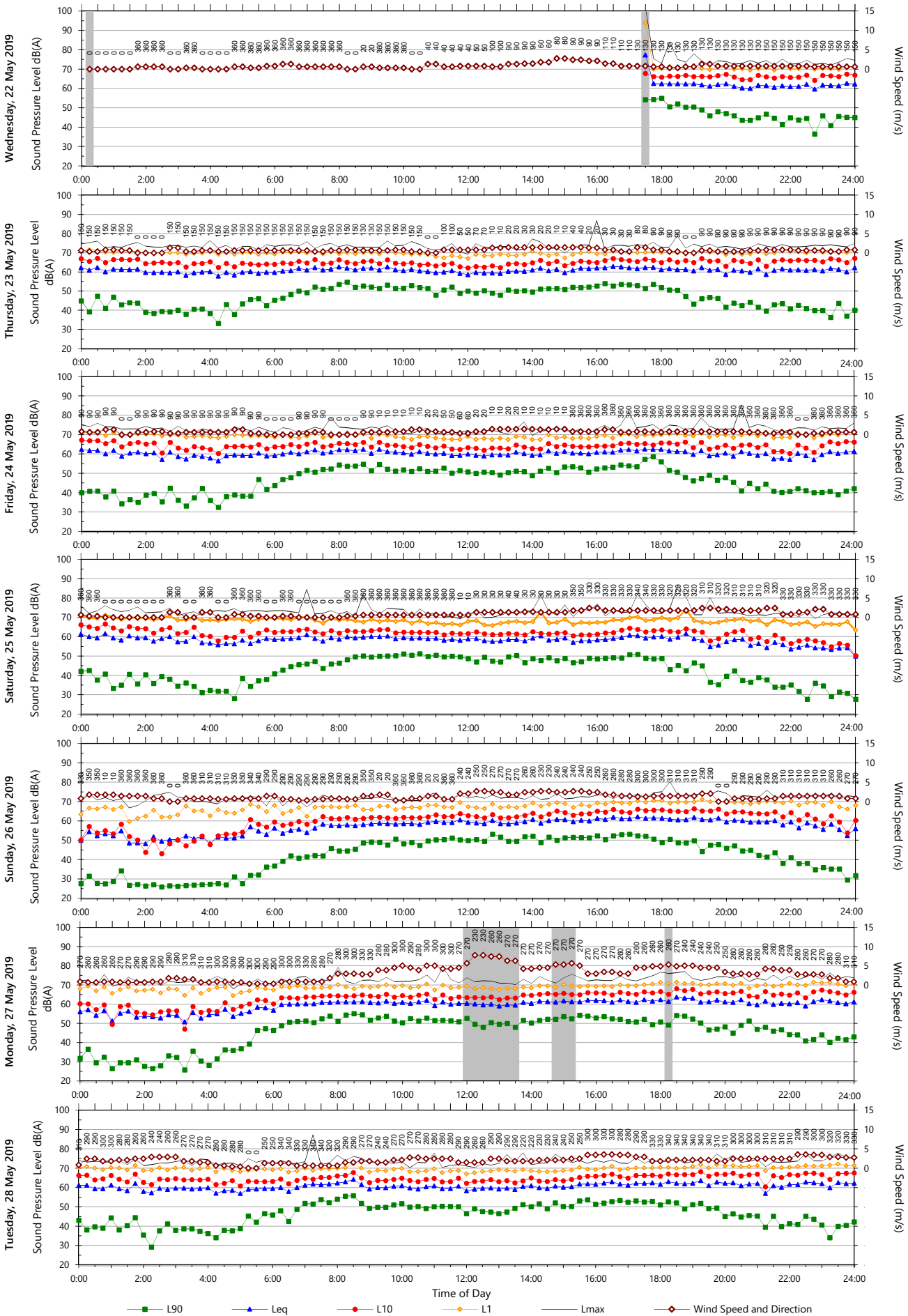






Unattended Monitoring Results

Location: 101 Old Coast Road

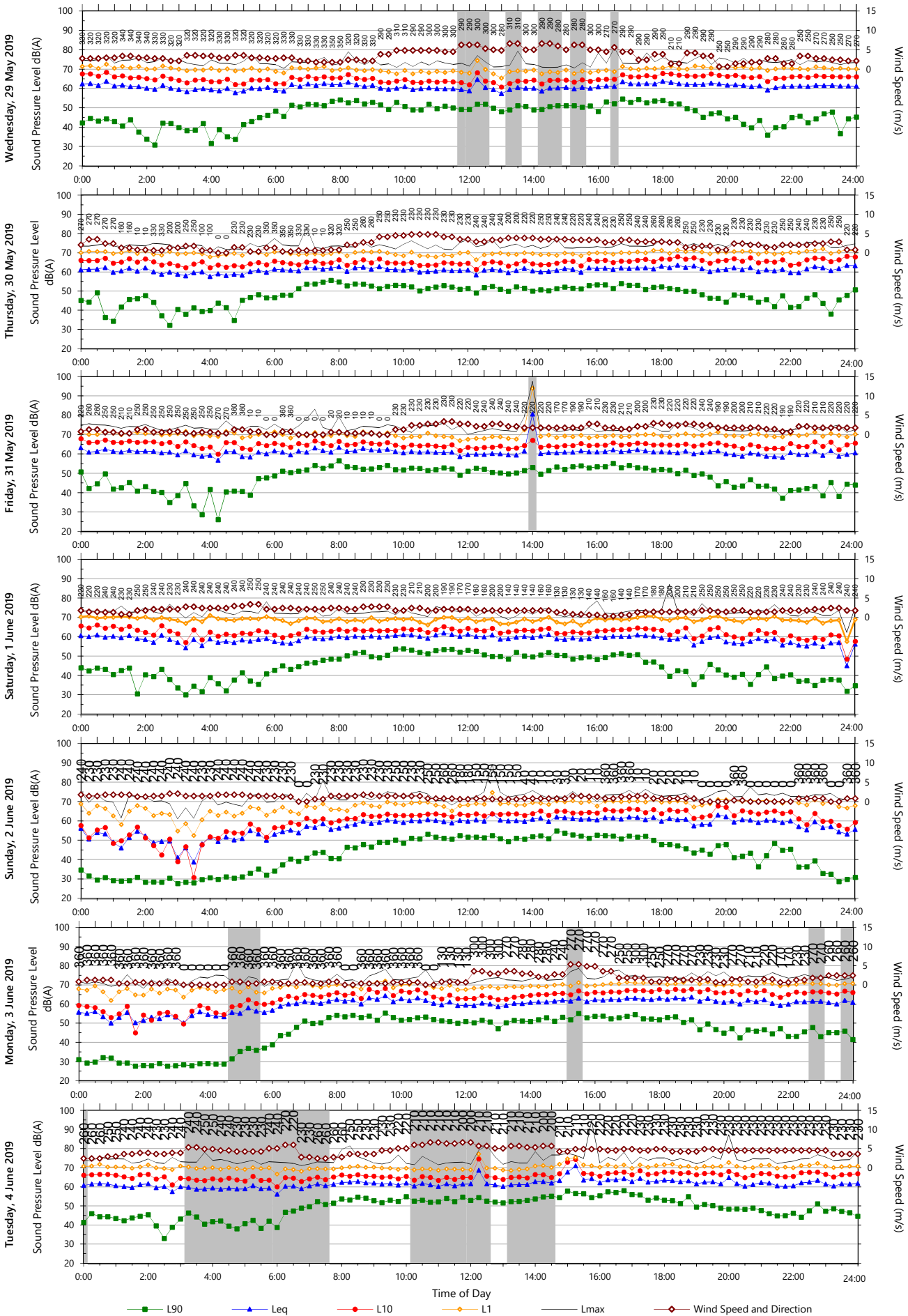


Data File: 2019-05-22_SLM_100_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

Unattended Monitoring Results

Location: 101 Old Coast Road

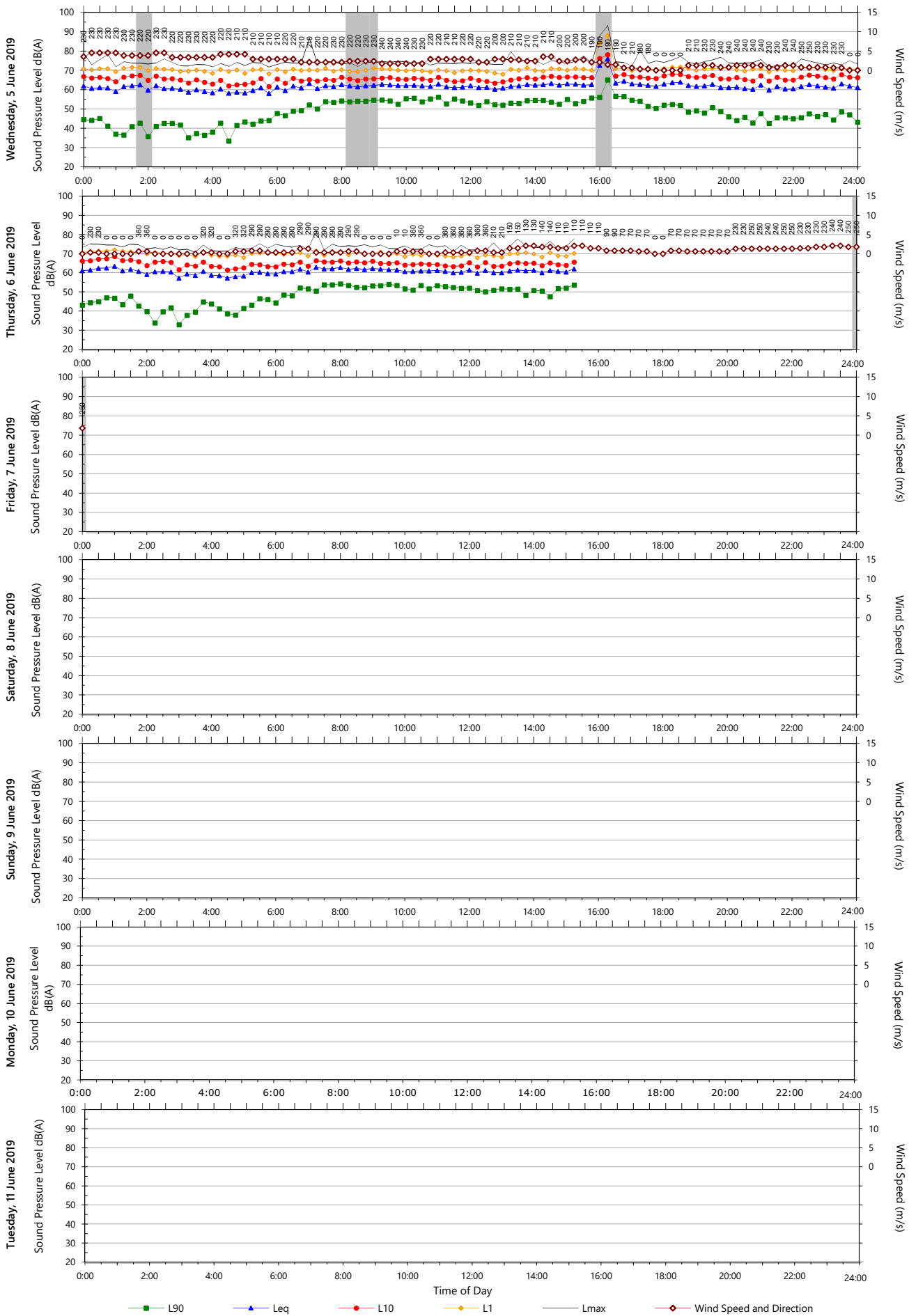


Data File: 2019-05-22_SLM_100_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

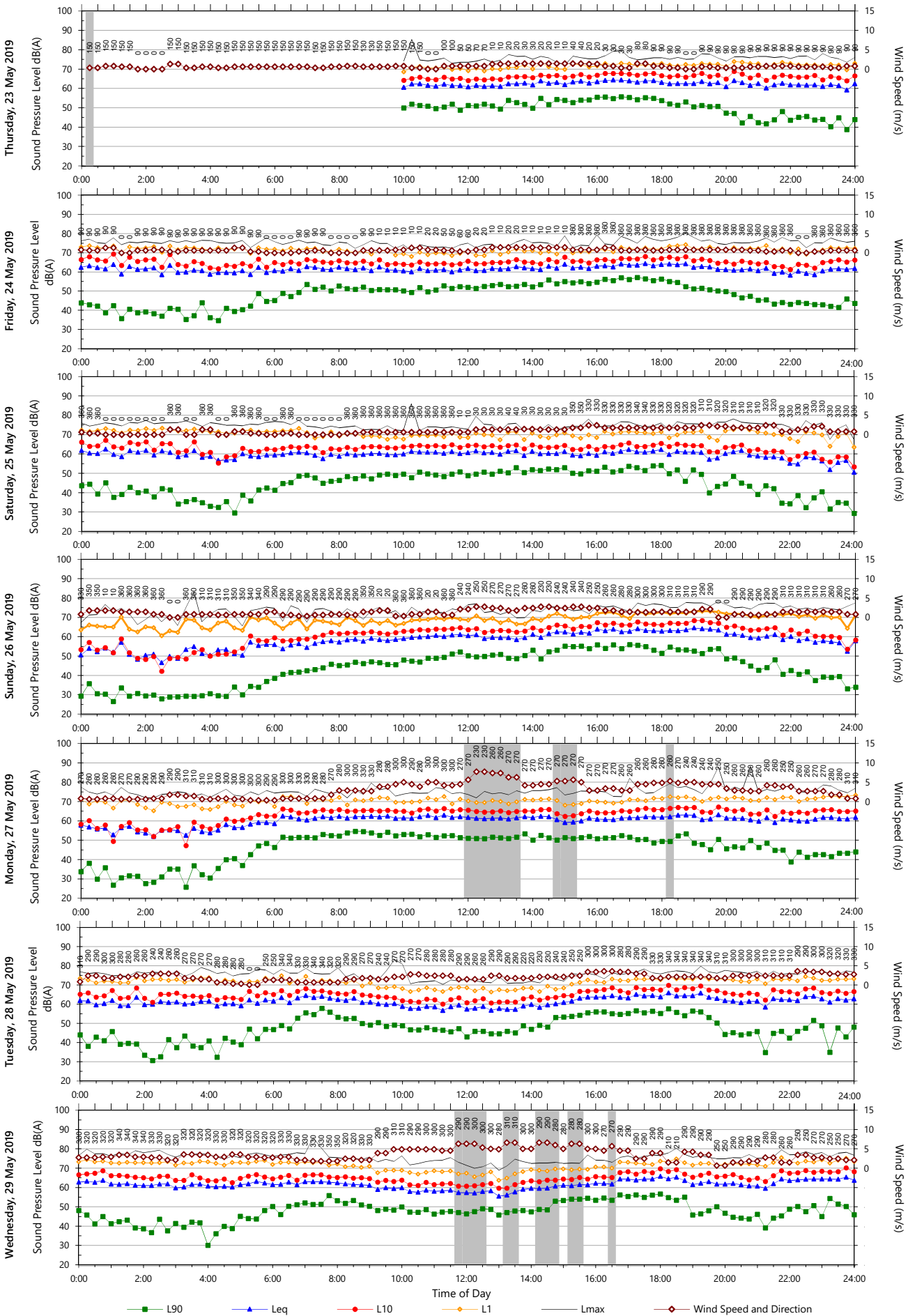
Unattended Monitoring Results

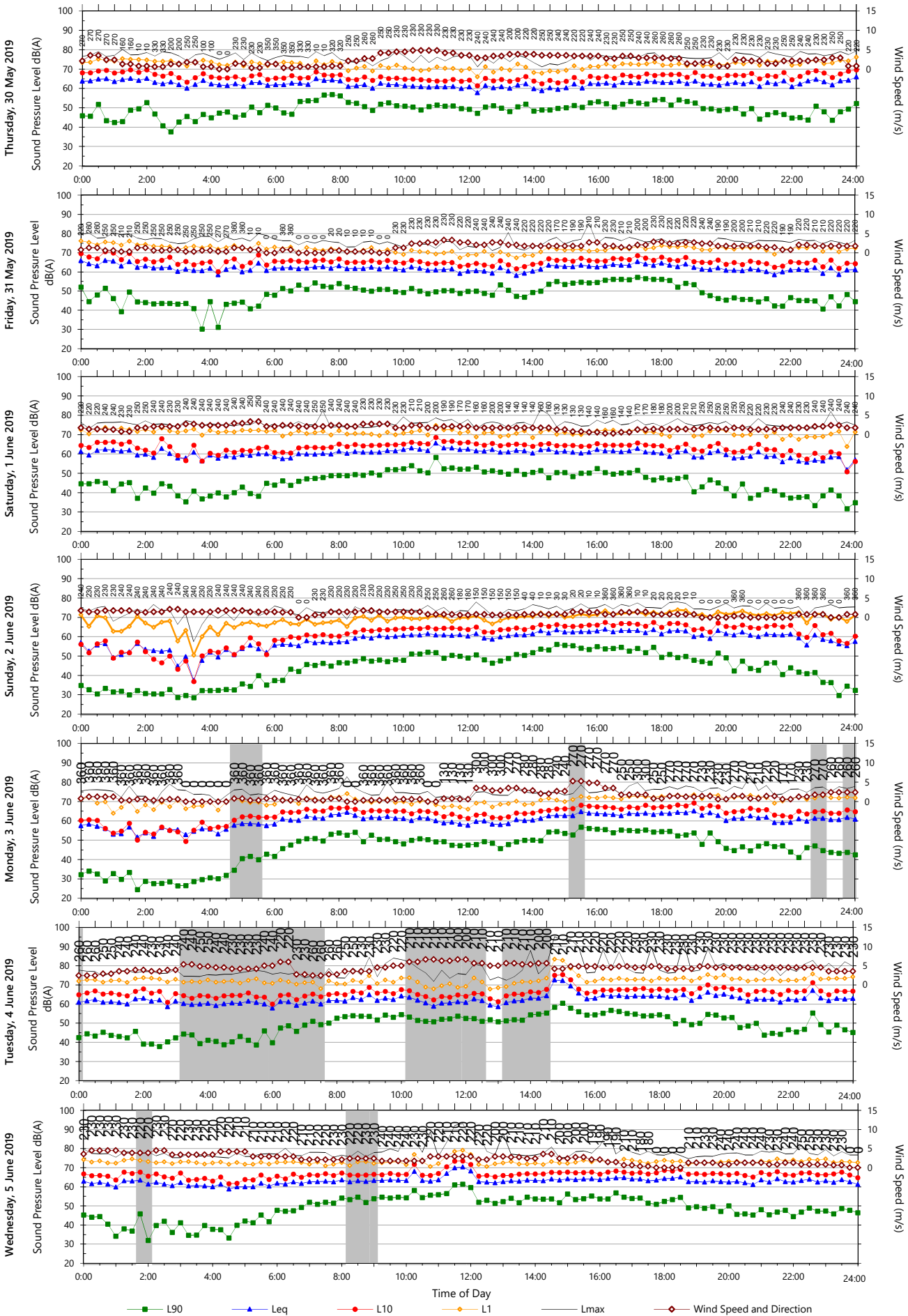
Location: 101 Old Coast Road

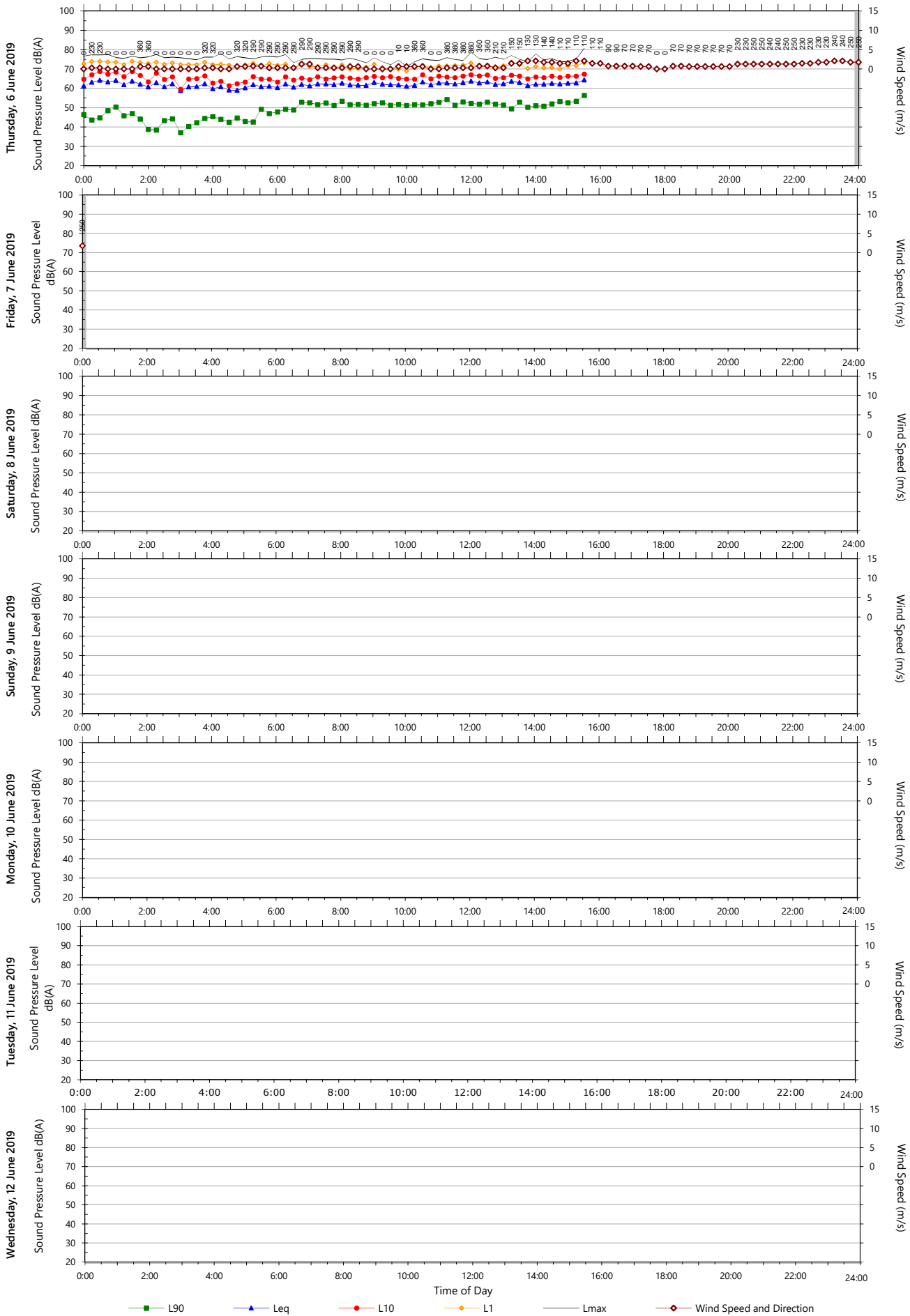


Data File: 2019-05-22_SLM_100_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

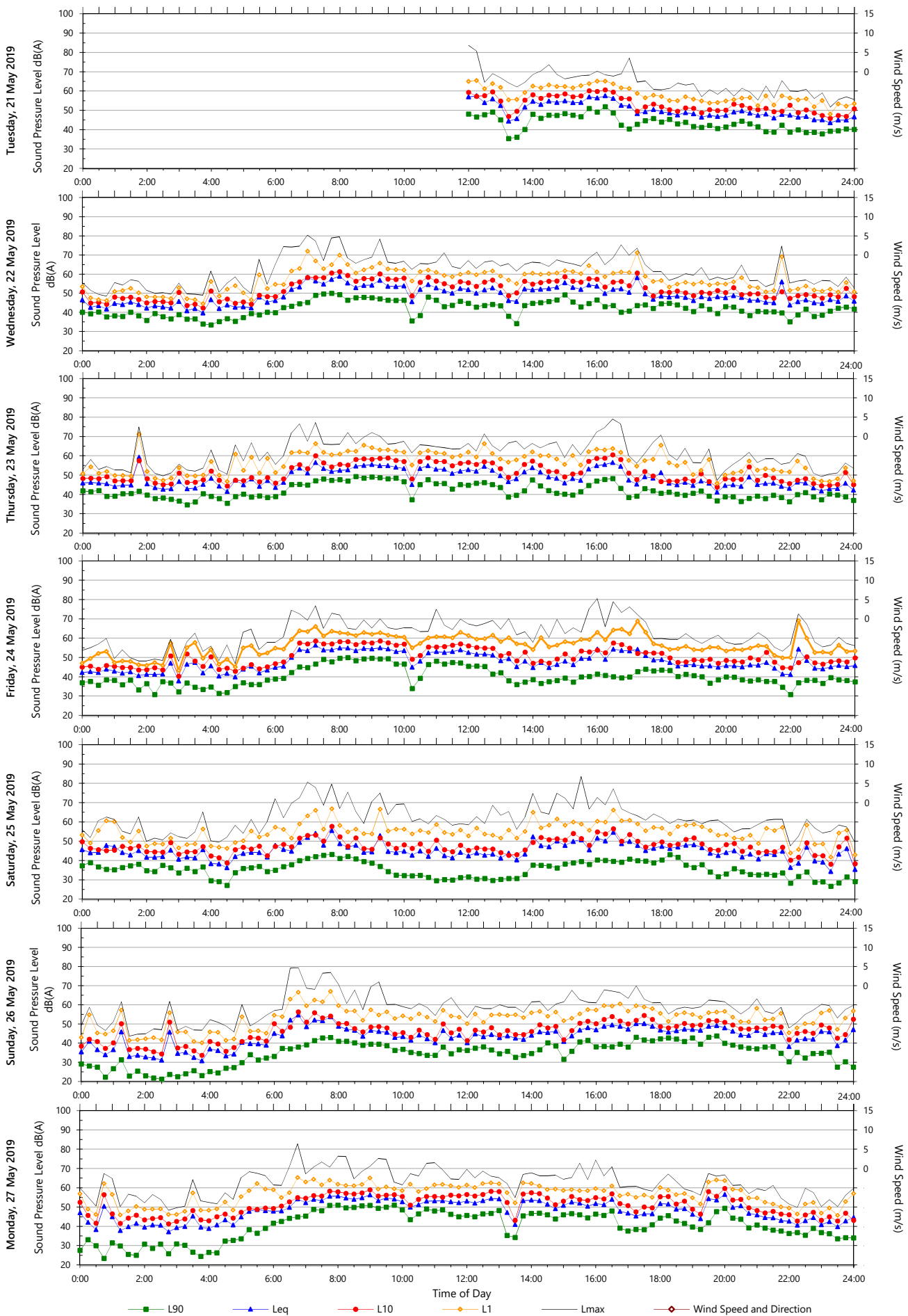






Unattended Monitoring Results

Location: 4317 Pacific Highway

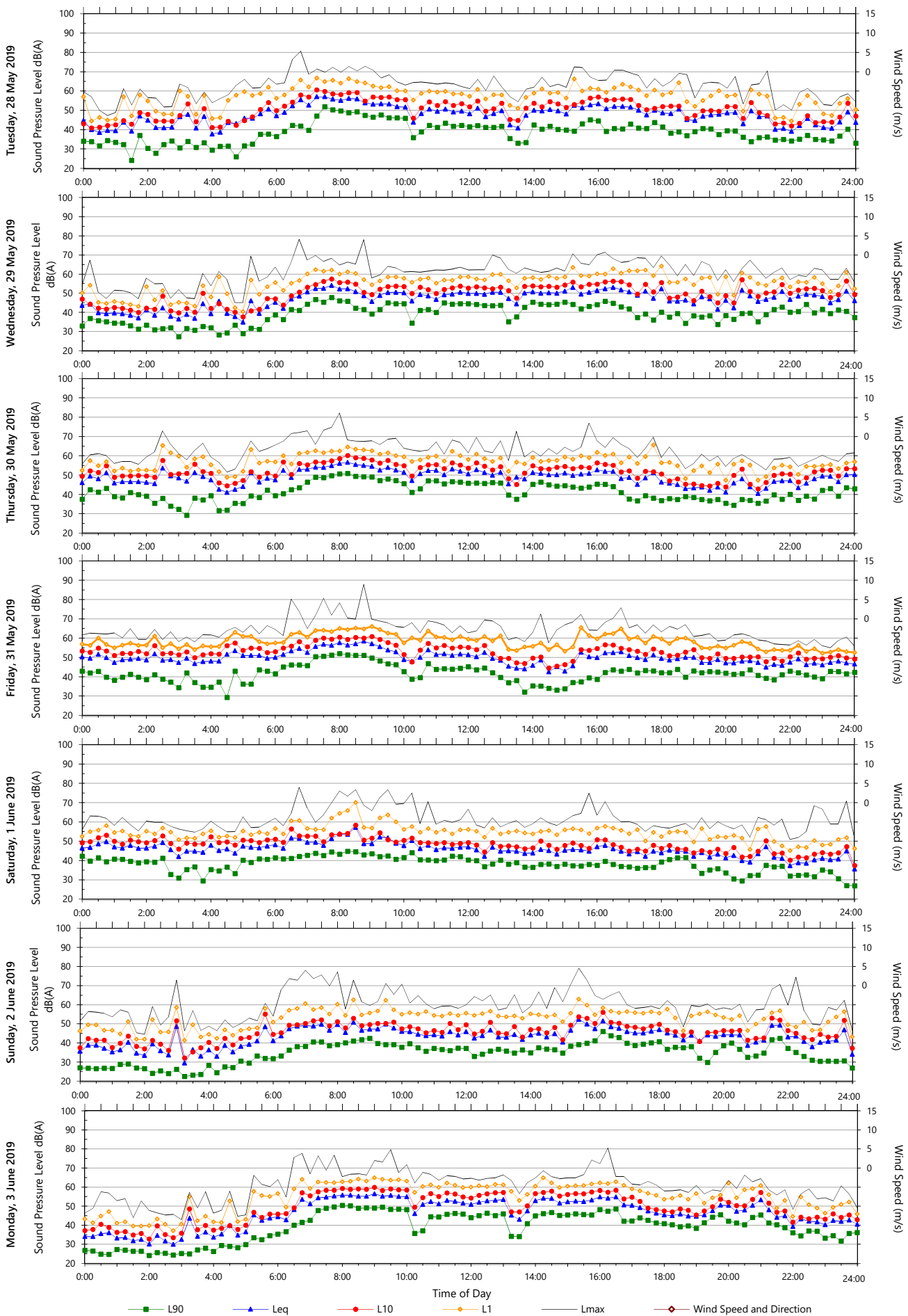


Data File: 2019-05-21_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

Unattended Monitoring Results

Location: 4317 Pacific Highway

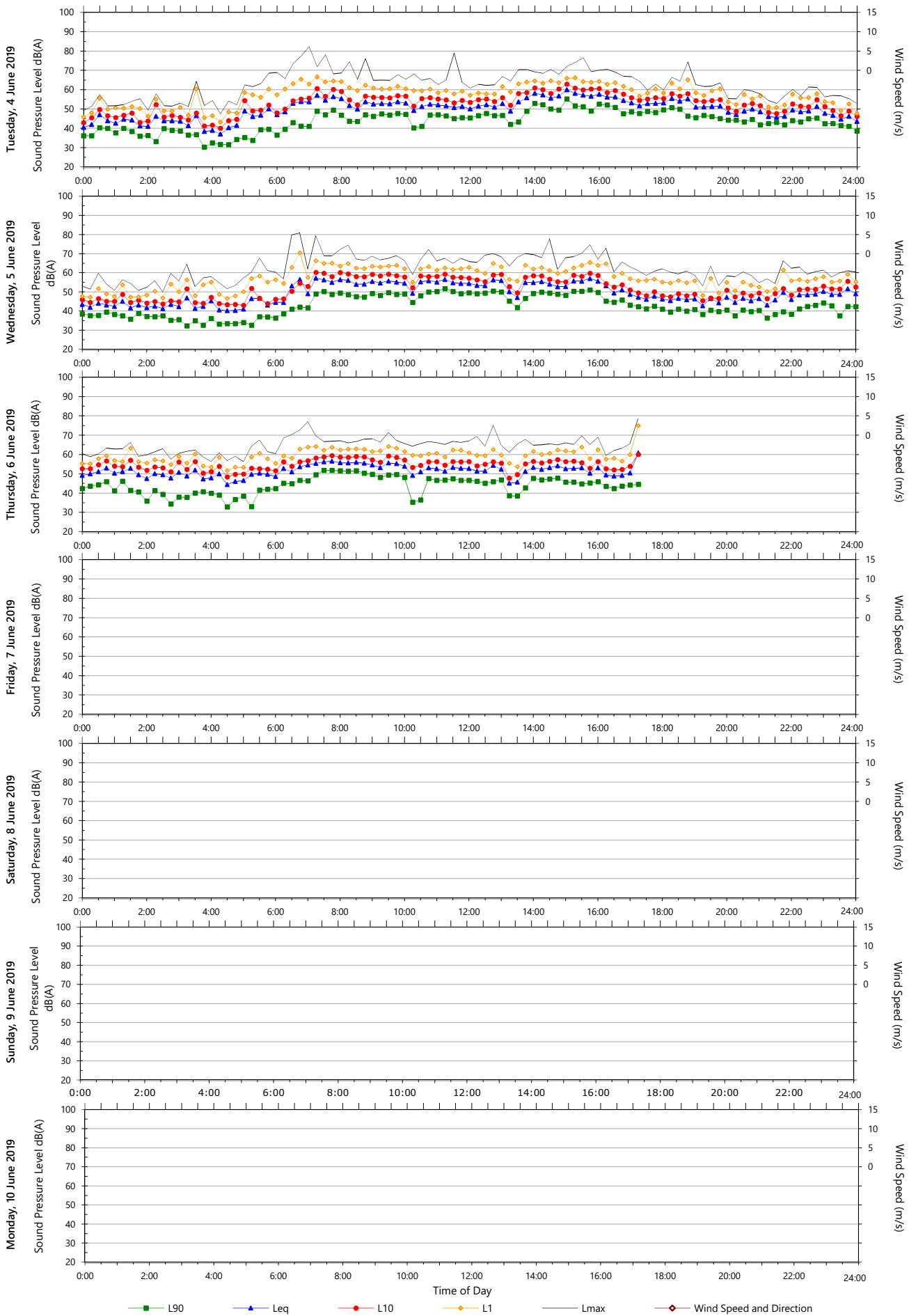


Data File: 2019-05-21_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)

Unattended Monitoring Results

Location: 4317 Pacific Highway



Data File: 2019-05-21_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r29)