Report

Noise Impact Assessment

Meppem Quarry

Regional Group Australia

17 February, 2021
Rev 6 (Final)

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Report Details

Noise Impact Assessment - Meppem Quarry

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Endorsements

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EXECUTIVE SUMMARY

Advitech Environmental was engaged to prepare an assessment of potential noise impacts associated with the development of the proposed Meppem Quarry. The development is proposed to service bulk construction material requirements of the proposed Narrabri to North Star section of the Inland Rail project. The operation may produce up to 490ktpa of quarried material per annum.

Project Trigger Noise Levels for adjacent receiving environments were reviewed, and the assessment conservatively adopted the most stringent criteria for the project area. Modelling indicates that noise levels associated with the project are expected to meet these criteria.

While adverse operational, construction, and blasting impacts are not expected, this activity may be audible at some locations given the characteristics of the receiving environment. It is thus recommended that measures be put in place to ensure the timely and effective response to any concerns raised by adjacent receivers.

Assessment indicates that receivers along the proposed haulage route already experience high levels of noise associated with the Newell Highway. Despite potential for high levels of traffic noise, assessment indicates that the majority of exceedances are situated in Bellata and Gurley townships and along the Newell Highway where existing levels are already exceeded or close to exceeding. Increases of road traffic noise are expected to be no more than 2dB above the criteria are predicted at any receivers in close vicinity to the Newell Highway at Bellata and Gurley.

Road traffic noise is expected to exceed the relative increase criteria (existing traffic L_{Aeq}+ 12dB) during the day period at the two identified receivers along Boo Boo Road. Although there is predicted to be a significant increase in road traffic noise contributions under the build option, it should be noted that road traffic noise contributions from the development will still be well below the most stringent noise assessment criteria for road traffic noise for both the day and night periods.

Road construction noise is expected to cause noise impacts at one receiver near Manamoi Rd, all receivers near Boo Boo Rd, and all receivers in Gurley Township. During construction, it is recommended that appropriate mitigation measures should be applied to minimise these impacts as far as possible.

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1. INTRODUCTION

Advitech Pty Limited (trading as Advitech Environmental) was engaged by GroundworkPlus Pty Ltd (GroundworkPlus) on behalf of Regional Group Australia (RGA) to undertake a Noise Impact Assessment for the proposed hard rock quarry site located north east of Bellata on the land formally identified as Lot 10 DP 751753 and Lot 110 DP 257328. Regional Group Australia propose to operate the quarry for the land owner and proponent, John Meppem. This Noise Impact Assessment (NIA) has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) dated 24 August, 2018. This report aims to provide an assessment of potential noise impacts generated from the proposed hard rock quarry in accordance with the policy and guidance set out in the SEARs.

It should be noted that this report was prepared by Advitech Pty Limited for Regional Group Australia ("the customer") in accordance with the scope of work and specific requirements agreed between Advitech and the customer. This report was prepared with background information, terms of reference and assumptions agreed with the customer. The report is not intended for use by any other individual or organisation and as such, Advitech will not accept liability for use of the information contained in this report, other than that which was intended at the time of writing.

2. BACKGROUND AND OBJECTIVES

The proposed Meppem Quarry is located along Manamoi Road, approximately 10 kilometres north east of the township of Bellata, midway between Narrabri and Moree in northern New South Wales. The proposed quarry lies on Lot 10 DP751753 and Lot 110 DP 257328 within the Moree Plains Local Government Area on land zoned RU1 Primary Production. The lots comprise about 143 hectares, although the footprint of the quarry would be 8.34 hectares, with an additional approximate 1.6 hectares for the access/haul road (see **Figure 1**). The haul road connects to the Newell Highway via Manamoi Road, Boo Boo Road, and Gurley Creek Road. A water dam is located to the east of the footprint and will be created for the proposed quarry.

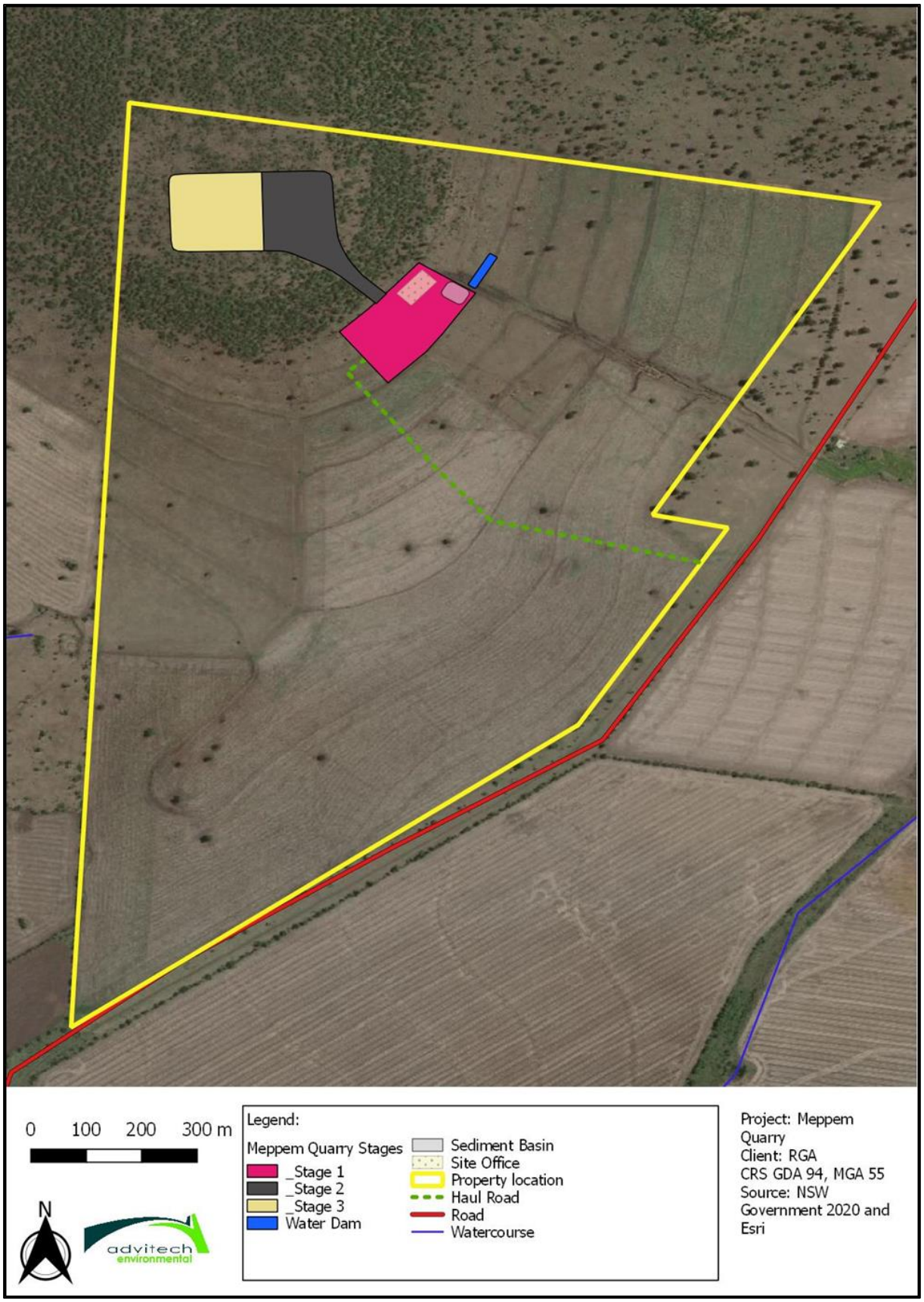


Figure 1: Site Location Map.

3. DESCRIPTION OF THE PROPOSED OPERATIONS

The Meppem quarry would have a yield of 490 ktpa over a lifespan of approximately 5 years, and is proposed to operate between 6:00 to 18:00, Monday to Friday (6:00 to 13:00 Saturday). Operation assumes 11 hours of quarrying activities and an hour of maintenance and sales activities each day. Potential requirements may exist for extended work hours to service short term increases in demand from the Inland Rail construction activity. This may involve 24 hour truck loading and material haulage operations during some stages of the railway development.

The establishment of the Meppem Quarry would involve the construction of an intersection and access road from Manamoi Road to the south of the site. Development of site infrastructure would include offices and machinery sheds adjacent to the quarry footprint, as well as a stockpile pad and associated water management works.

Following construction, operations would involve the extraction (including explosive blasting), processing (crushing and sizing) and despatch of hard rock material. Where required, blasting would be undertaken between the hours of 9:00 and 15:00, and only weekdays (that is, Monday to Friday). A review of proposed site activities was undertaken in order to establish an inventory of significant noise generating plant and processes. These include:

- Pre-blast drilling (where blasting is required);
- Excavation of material and transport (within the quarry) to a crushing plant;
- Operation of a crushing plant to size and screen the material;
- Operation of haulage trucks delivering material from the extraction area to stockpiles;
- Reclaim of stockpiled material for loading into trucks; and
- Haulage of quarried material from the site via road.

Advitech Environmental understands that the following mobile plant will be used within the operation:

- Drilling rig;
- Mobile crushing plant;
- Front End Loader(s) (FEL);
- Excavator(s);
- Dump Truck(s)
- Water-cart and grader;
- Dozer; and
- Light service vehicles.

The mobile plant will be utilised for excavation of material from the quarries, management of the crushing plant, loading of heavy vehicles, and clearance of vegetation (ahead of the quarry shell, as required). While production is likely to be variable, the assessment assumes that the quarry would generate up to 96 heavy vehicle movements per day. The proposed haulage route would utilise Manamoi and Boo Boo Roads, before joining the Newell Highway at the Gurley to the north of the project site.

4. METHODOLOGY

4.1 Assessment Requirements

The Secretary's Environmental Assessment Requirements (SEARs) (EAR 1247) establish the following requirements for:

- Noise: including a quantitative assessment of potential:
  - construction and operational noise and off-site transport noise impacts of the development in accordance with the *Interim Construction Noise Guideline, NSW Industrial Noise Policy* and *NSW Road Noise Policy* respectively;
  - reasonable and feasible mitigation measures to minimise noise emissions; and
  - monitoring and management measures;
- Blasting and vibration:
  - proposed hours, frequency, methods and impacts; and
  - an assessment of the likely blasting and vibration impacts of the development, having regard to the relevant ANZEC guidelines and paying particular attention to impacts on people, buildings, livestock, infrastructure and significant natural features.

4.2 Assessment Methodology

The methodology adopted to address the requirements established by the SEARs includes:

- An assessment of the existing environment, including:
  - identification of potentially sensitive receivers adjacent to the operation;
  - efforts to characterise the existing noise environment, identify relevant receiver types and establish Project Noise Trigger Levels (PNTL) for the assessment of potential impacts. Given the absence of significant ambient noise and the rural character of the proposed development site, minimum Rating Background Levels (RBLs) were assumed in lieu of a site specific (long term) assessment of background noise levels;
  - analysis of prevailing meteorology: to identify significant meteorological conditions that may influence the way that impacts associated with the development may manifest;
- Calculation of noise levels that may be generated by the development, including:
  - identification of significant operational and meteorological scenarios that may have potential to generate different levels of noise;
  - development of a noise model: (ISO9613 calculation methodology) to derive predicted noise levels associated with the development at adjacent sensitive receivers;
  - determination of premises-based contributions from the development, using descriptors established by the relevant guidelines;
  - assessment of potentially annoying noise characteristics;
- Assessment of results, including:
  - recommendations for noise criteria that may be written into a development consent;
  - comparison of noise predictions against these criteria, and evaluation of potential impacts; and
  - recommendations for management of potentially adverse or residual impacts.

4.3 Guidelines and Standards Referenced by this Assessment

The assessment was performed with reference to the following guidelines, policies and standards:

- AS1055:2018 Acoustics – Description and measurement of environmental noise;
- AS 2436 Guide to noise and vibration control on construction, demolition and maintenance sites;
- AS2187.2-2006 Explosives – Storage and Use Part 2: Use of Explosives;
- Noise Policy for Industry (NPfI). EPA, 2017;
- Interim Construction Noise Guideline (ICNG), EPA. 2008;
- Road Noise Policy (RNP). EPA, 2011;
- Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZEC, 1990); and
- Assessing Vibration: a technical guideline (EPA, 2006).
- Construction Noise and Vibration Guideline (CNVG). RMS, 2016

5. THE EXISTING ENVIRONMENT

5.1 Sensitive Receivers

Identification of potentially sensitive receivers was initially undertaken via cross referencing of:

- Aerial imagery;
- The Geocoded National Address File (G-NAF) (an open source national database of address points), maintained by the Federal Department of Industry, Innovation and Science; and
- Limited ground truthing during field inspection.
-

Two distinct receiving environments were identified within the study area, including:

- isolated receivers located in rural areas along the proposed Boo Boo Rd haulage route; and
- a mixture of isolated rural receivers, and receivers in more densely populated areas of Bellata and Gurley.

These receiving environments are described further below and in **Figure 2.**

5.2 Noise Environments Adjacent to the Quarry

Assessment indicates that the nearest sensitive receiver (R1) is located approximately 2km north-east of the proposed quarry site. A further four residential receivers were identified within approximately 5 kilometres of the proposal site as shown in **Table 1** and **Figure 2**.

Table 1: Details of Sensitive Noise Receivers.

Receiver ID	Address	Distance from Site (km)	Direction
R0	'Black Ridge' - 73 Wilgaroi Road	5.0	N
R1	'Manamoi' - 425 Manamoi Road	2.0	NE
R2	'Wilgaroi' - 207 Wilgaroi Road	3.0	NW
R3	'Saltwell' - 1499 Berrigal Creek Road	5.0	SE
R6	'Baringa' - 1215 Berrigal Creek Road	3.2	SSE

5.2.1 Noise Environments Adjacent to the Haul Route

Analysis was undertaken to identify receivers within 600m of the proposed haulage route, in line with guidance established in the RNP. This study area contains approximately 125 receivers, including:

- isolated rural receivers adjacent to (and predominantly affected by) Boo Boo Road;
- isolated rural receivers adjacent to the Newell Highway;
- more densely located receivers within the township of Bellata; and
- more densely located receivers within the township of Gurley.

For brevity, discussion of road traffic noise impacts is discussed in terms of noise levels at a receiver location indicative of expected worst case impacts these four catchment areas. Details of these indicative receiver locations and approximate setbacks from the nearest road are provided in **Table 2**.

Table 2: Road noise catchments.

Catchment	Total Receivers in Catchment	Representative Receiver	Setback from Road
Boo Boo Road	2	74 Boo Boo Road Gurley	370m
Gurley Town	14 (including 2 commercial receivers)	34 Bellata Street	15m
Bellata Town	105 (including 1 school and 5 commercial receivers)	40 Railway Parade	15m
Newell Highway	4	16430 Newell Highway	70m

5.3 Assessment of Existing Noise Environment

Short term operator attended noise monitoring was undertaken during a site inspection on 9 January, 2019, and 23 September, 2020. The purpose of this monitoring was to identify and document predominant sources of noise, and thus characterise the noise environment at the development site and adjacent to the proposed haulage route. A summary of the results is presented in **Table 3**.

Table 3: Details of operator attended monitoring.

Location	Date	Measured noise level dB(A)			Observations
		L_{A90}	L_{A1}	L_{Aeq}	
Development site, adjacent Manamoi Road	9/01/2019 12:58	25	41	32	Birds, insects, gusting wind
Bellata township, adjacent Newell Hwy (10m from road)	9/01/2019 11:13	40	74	64	Road traffic noise, birds, insects, gusting wind
Gurley township, adjacent Newell Hwy (5m from road)	23/9/2020 9:30	41	87	72	Road traffic noise, domestic noise
Boo Boo Road (10m from road)	23/9/2020 8:50	24	53	39	Birds, windblown vegetation

The operator attended monitoring results indicate that receiving environments adjacent to the proposed development site are subject to relatively low levels of noise and may be considered representative of the Rural receiver type identified by the NPfI. On this basis, the minimum Rating Background Levels (RBLs) established by the NPfI were adopted in lieu of a longer term monitoring campaign and site specific background noise assessment.

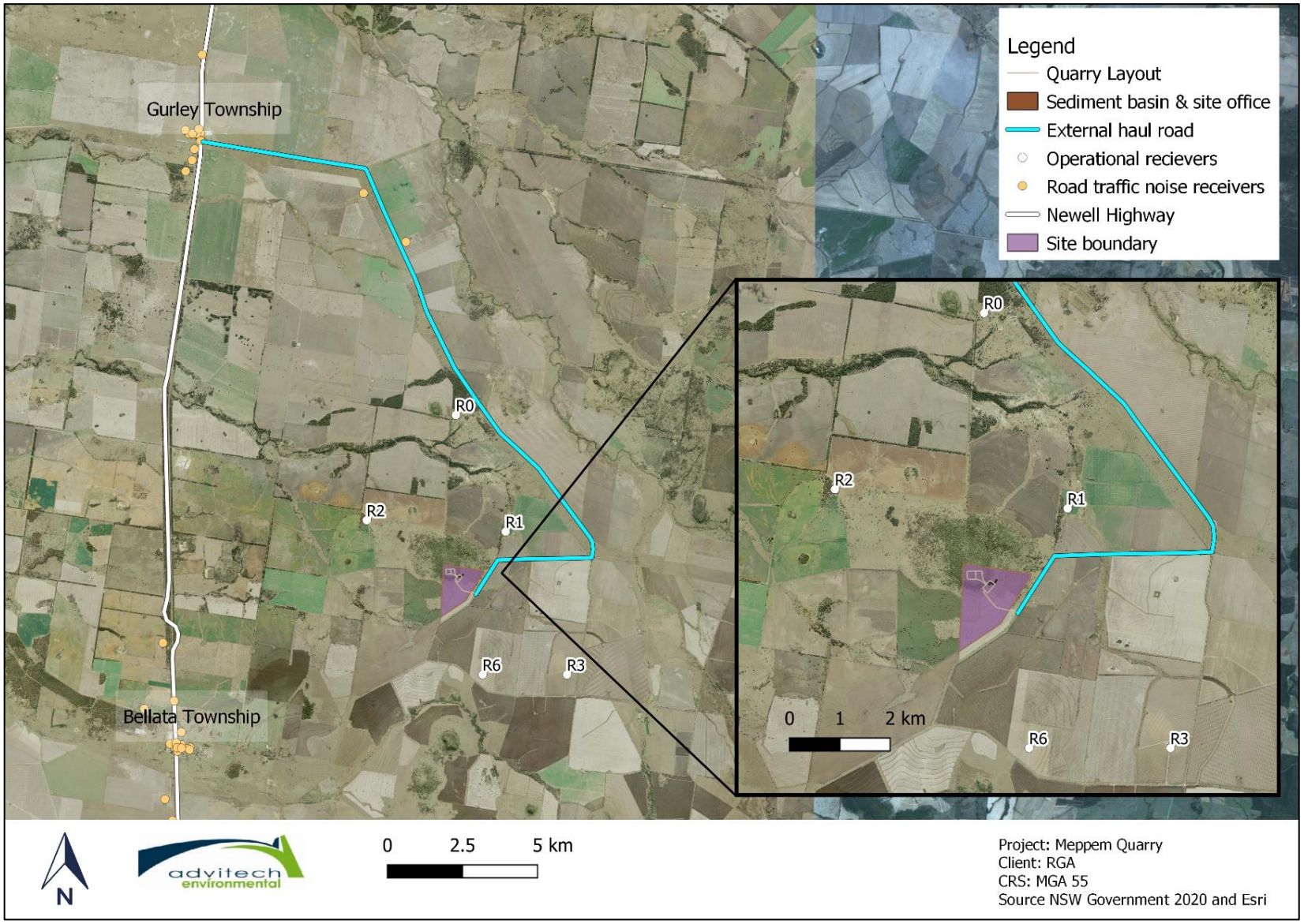


Figure 2: Sensitive Noise Receivers.

5.4 Assessment of Prevailing Meteorology

The NPfI identifies that noise propagation may be enhanced under certain meteorological conditions, and that (if present) these conditions should be accounted for as part of the assessment process. The guide provides two options for the assessment of these impacts:

- A simple method, which adopts worst case noise enhancing conditions;
- A more detailed analysis of prevailing meteorology, to identify whether enhancing conditions occur with sufficient frequency to be considered a feature of the local environment:
  - where enhancing conditions occur with sufficient frequency, noise enhancing meteorological parameters should be adopted by the noise modelling; and
  - where enhancing conditions are not a feature of the environment, modelling should adopt a set of standard meteorological parameters.

The NPfI indicates that where a wind or stability condition may occur for more than 30% of the time during any assessment period (day, evening or night) of any season, then the parameters for noise enhancing conditions should be adopted as part of the assessment. Definitions of the standard and enhancing conditions established by the NPfI are reproduced in **Table 4**.

Table 4: Standard and noise-enhancing meteorological conditions.

Meteorological Condition	Meteorological Parameters
Standard conditions	Day/evening/night: stability categories A-D with wind speed up to 0.5 m/s at 10 m AGL.
Noise-enhancing conditions	Daytime/evening: stability categories A-D with light winds (up to 3 m/s at 10 m AGL) Night-time: stability categories A-D with light winds (up to 3 m/s at 10 m AGL) and/or stability category F with winds up to 2 m/s at 10 m AGL.

The nearest Bureau of Meteorology (BoM) Automatic Weather Station (AWS) is located at Moree Airport, approximately 65km south west of the proposed development site. Monitoring records from Spring 2016 through to Winter 2017 were analysed to identify whether any prevailing wind patterns may be considered a feature of this environment.

The results presented in **Table 5** indicate that none of the prevailing winds are observed for more than 30% of the time during any season. Prevailing winds are therefore not considered significant feature of this environment, and standard meteorological conditions were adopted for the assessment of potential gradient wind impacts. Seasonal wind-roses associated with this assessment are provided in **Appendix I**.

Table 5: Frequency of most dominant prevailing winds (+/-22.5deg, <3m/s)

Season	Day	Evening	Night
Spring	SE (7%), E, S, SW (6%)	NE (3%), E, SE, S (2%)	NE (3%), E, SE (2%)
Summer	SE (5%), E, SE (4%)	E, SE, S (1%)	E, SE, S (1%)
Autumn	S, SW (10%), SE (9%)	NE, E (3%), N, SE, S (2%)	NE (3%), E, SE (2%)
Winter	E (10%), NE, (9%), SE (8%)	NE, E, SE (5%)	NE, E (3%), N, SE (2%)

The AWS at Moree Airport does return observations that would enable assessment of atmospheric stability and temperature inversion frequency; however, previous experience suggests that these phenomena have potential to be a feature in rural environments. On this basis, the parameters for noise enhancing conditions are conservatively adopted in noise modelling.

5.5 Assessment of Existing Road Traffic

While monitoring results **Table 3** provide assessment of existing levels of road traffic noise, data relating to existing traffic volumes in the study area was obtained through query of the NSW Roads and Maritime Services (RMS) Traffic Volume Viewer (TVV)(RMS, 2019). This interactive tool allows users to browse historical traffic count data in NSW. Data is generally available in the form of Annual Average Daily Traffic Volume (AADT) counts; however, some sites also return data relating to hourly flows and heavy vehicle composition rates.

A summary of available traffic volume data relevant to the study area (Newell Highway) is provided in **Table 6**. No data relating to traffic flows on Boo Boo Road was identified, however observations during site inspection and long term logging indicate very intermittent flows (typically less than 5 vehicles per hour).

Table 6: Traffic count data from Newell Highway (StnID:91022, Year: 2008, 120m north of Brigalow Lane, Gurley).

Hour of Day	Total Vehicles	Proportion Heavy Vehicle
0:00 to 1:00	33	79%
1:00 to 2:00	27	78%
2:00 to 3:00	27	78%
3:00 to 4:00	25	76%
4:00 to 5:00	24	67%
5:00 to 6:00	37	57%
6:00 to 7:00	72	54%
7:00 to 8:00	110	40%
8:00 to 9:00	151	36%
9:00 to 10:00	164	37%
10:00 to 11:00	161	37%
11:00 to 12:00	155	38%
12:00 to 13:00	157	39%
13:00 to 14:00	157	40%
14:00 to 15:00	167	38%
15:00 to 16:00	170	35%
16:00 to 17:00	168	38%
17:00 to 18:00	152	44%
18:00 to 19:00	134	51%
19:00 to 20:00	98	56%
20:00 to 21:00	73	63%
21:00 to 22:00	69	74%
22:00 to 23:00	50	74%
23:00 to 0:00	44	73%

6. ASSESSMENT CRITERIA

The proposed operation of the quarry will generate noise from a wide variety of sources. Various elements of the site's noise generation were assessed against criteria defined in the following references:

- Overall nosie levels during operation of the quarry: NPfI
- Maximum noise levels during operation of the quarry: NPfI
- Construction of facilities on site: NSW *Interim Construction Noise Guideline* (ICNG) (2009)
- Road traffic noise: NSW Road Noise Policy (RNP) (2011)
- Construction related to road upgrades: RMS Construction Noise & Vibration Guideline (CNVG) (2016)
- Blasting: ANZEC *Technical basis for guidelines to minimise annoyance due to blasting overpressure and vibration* (1990)

6.1 Project Trigger Noise Levels

The NPfI presents a methodology for determining Project Noise Trigger Levels (PNTL) for industrial developments. The project noise trigger level is a level that, if exceeded, would indicate a potential noise impact on the community. A combination of ambient and background noise level data is used to determine PNTL relevant to the proposed development.

The NPfI minimum RBL were adopted for the day, evening and night periods in lieu of a site-specific background noise assessment. **Table 7** provides an analysis of both the Intrusiveness and Amenity noise levels for the purposes of establishing a PNTL for the proposed development. Section 2 of the NGfI establishes that the lower of the Amenity and Intrusiveness noise levels should be adopted as the PNTL for the development.

Table 7: Assessment of PNTL in adjacent receiving environment

Metric	Day 7:00-18:00	Evening 18:00-22:00	Night 22:00-7:00
Rating Background Level	35	30	30
Project Intrusiveness Criteria	40	35	35
Recommended Amenity Level	50	45	40
Project Amenity Criteria	48[1]	43[1]	38[1]
Project Trigger Noise Level	40	35	35

Note: All criteria measured in dB(A).

Note 1: Project amenity level established as level equal to the Recommended Amenity Noise Levels for Rural receivers minus 5dB(A) plus 3dB(A) to convert from a period level to a 15-minute level, in accordance with guidance established in Fact Sheet F of the NPfI.

The Project Intrusiveness Criterion is the more stringent of the two criteria and is thus adopted as the PTNL for the development.

6.2 Maximum Noise Level Triggers

The NGfI provides updated guidance relating to the assessment of maximum noise level events that carry potential to cause sleep disturbance. In this context, potential for sleep disturbance is considered

in terms of events that may induce awakenings or cause disturbance to sleep stages. The guide establishes the following requirements:

Where the subject development night-time noise levels at a residential location exceed:

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

… a detailed maximum noise level event assessment should be undertaken.

The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period. As approval for 24-hour operations is sought, assessment of potential maximum noise level events forms part of this assessment. The Maximum Noise Level Triggers adopted as part of this assessment are provided in **Table 8**.

Table 8: Maximum Noise Level Triggers (MNLT).

Metric	MNLT
$L_{Aeq,15minute}$	40 dB(A)
L_{AFMax}	52dB(A)

6.3 Construction Noise Criteria

The ICNG provides guidance on managing construction works to minimise noise. Equipment and site activities during construction are likely to be similar to those occurring during operation of the quarry. However, it's likely that equipment will be operating at (or close to) natural surface levels during initial excavation of the quarry workings and associated stockpile areas. This means that higher noise levels may be expected relative to operational noise levels, which may benefit from attenuation by the quarry pit.

The Noise Management Levels (NMLs) relevant to construction noise are typically slightly higher than for operations noise, as the construction activity typically represents a shorter term impact. **Table 9** summarises the NMLs relevant to the proposed development. It is noted that the NML are not statutory criteria above which impacts are deemed to be non-compliant, but the level at which reasonable and feasible management measures would be required.

Table 9: Construction Noise Management Levels, $L_{Aeq,15\ minute}$.

Receiver Type	Construction Hours	Management Level ($L_{Aeq,\ (15\ min)}$)	
Residential Receivers	Monday to Friday: 7am to 6pm Saturday: 8am to 1pm	Noise Affected NML (RBL + 10 dB)	45 dB(A)
		Highly Noise Affected NML	75 dB(A)
	Outside recommended standard hours	Noise Affected NML (RBL + 5 dB)	40 dB(A)

6.4 Road Traffic Noise Criteria

The RNP provides a framework for the management of noise issues associated with road traffic from existing roads, new road projects, road redevelopment projects and new traffic-generating

developments. The primary aim of the RNP is to provide assessment criteria for road traffic noise based on protecting amenity and wellbeing.

The criterion adopted for this assessment is provided in **Table 10** and **Table 11**. This is based on review of existing receiving environments, and description of road types established in the RNP. Contributions from road traffic generated by the proposed development may be compared against management levels (or existing traffic noise levels) to evaluate potential project related impacts.

Table 10: Road traffic noise assessment criteria for residential land uses.

Road Category	Type of Project / Land Use	Assessment Criteria - dB(A)	
		Day 7am - 10pm	Night 10pm - 7am
Local Roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq, (1hour)}$ 55 (external)	$L_{Aeq, (1hour)}$ 50 (external)
Freeway / arterial / sub-arterial roads	Existing residences affected by additional traffic on existing freeways / arterial / sub-arterial roads generated by land use developments	$L_{Aeq, (15hour)}$ 60 (external)	$L_{Aeq, (9hour)}$ 55 (external)

Table 11: Road traffic noise assessment criteria for non-residential land uses.

Land Use	Assessment Criteria		Additional Considerations
	Day 7am - 10pm	Night 10pm - 7am	
School Classroom	$L_{Aeq,1hour}$ 40dB (internal, when in use)	n/a	In the case of buildings used for education or health care, noise level criteria for spaces other than classrooms and wards may be obtained by interpolation from the 'maximum' levels shown in Australian Standard 2107:2000 (Standards Australia 2000)
Open Space (Active Use)	$L_{Aeq,15hour}$ 60dB(A) (external)	n/a	Active recreation is characterised by sporting activates

6.4.1 Relative increase criteria

In addition to the assessment criteria outlined in **Table 10** and **Table 11**, any increase in the total traffic noise level at a location due to a proposed project or traffic-generating development must be considered. A relative increase of 12dB represents slightly more than an approximate doubling of perceived loudness (AS2659.1-1988) and is likely to trigger community reaction, particularly in environments where there is a low existing level of traffic noise.

The relative increase criteria are primarily intended to protect existing quiet areas from excessive changes in amenity due to noise from a road project. Receivers experiencing increases in total traffic noise level above the relative increase criteria outlined in **Table 12** should be considered for mitigation.

Table 12: Relative increase criteria for residential land uses.

Road Category	Type of project/development	Total traffic noise level increase – dB(A)	
		Day 7am – 10pm	Night 10pm – 7am
Freeway/arterial/ sub-arterial roads and transitways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road	Existing traffic LAeq, (15 hour) + 12 dB (external)	Existing traffic LAeq, (9 hour) + 12 dB (external)

6.5 Road Construction Noise Criteria

Methods for the assessment of road construction noise impacts are defined in the CNVG. Rather than defining a single set of criteria, the CNVG defines tiers of impacts based on the exceedance of the RBL. The thresholds of these tiers depend on the time period under consideration:

- Standard hours – Mon-Fri 7am-6pm, Sat 8am-1pm;
- Out of Hours Period 1 (OOHW1) – Mon-Fri 6pm-10pm, Sat 7am-8am & 1pm-10pm, Sun/Public Holiday 8am-6pm; and
- Out of Hours Period 2 (OOHW2) – Mon-Fri 10pm-7am, Sat 10pm-7am, Sun/Public Holidays 6pm-7am.

The relevant threshold definitions, drawn from Appendix C of the CNVG, are stated in **Table 13**. Note that thresholds are defined relative to the RBL as the CNVG work period definitions do not match the day/evening/night RBL definitions.

Table 13: Road Construction Noise Criteria

Impact Tier	dB(A) above RBL	Additional mitigation measures[1]		
		Standard hours	OOHW1	OOHW2
Noticeable	5-10	-	-	N
Clearly Audible	10-20	-	N, R1, DR	V, N, R2, DR
Moderately Intrusive	20-30	N, V	V, N, R1, DR	V, IB, N, PC, SN, R2, DR
Highly Intrusive	>30	N, V	V, IB, N, R1, DR, PC, SN	AA, V, IB, N, PC, SN, R2, DR
Highly Affected	75 dB(A) overall level	N, V, PC, RO	N, V, PC, RO	N, V, PC, RO

Note 1: Additional mitigation measures are defined in the CNVG; a summary of their meanings is presented in **Appendix V**. The full names are included below:

N - Notification

V - Verification

SN - Specific Notifications

PC - Phone Calls

IB - Individual Briefings

RO - Respite Offers

R1 - Respite Period 1

R2 - Respite Period 2

DR - Duration Respite

AA - Alternative Accommodation

6.6 Ground Vibration and Air-blast Overpressure Criteria

The NSW EPA recommends that impacts associated with blasting be assessed in accordance the Australian and New Zealand Environment Council (ANZEC 1990) *Technical basis for guidelines to minimise annoyance due to blasting overpressure and vibration*. The guideline establishes the following criteria to minimise annoyance associated with blasting:

- Air-blast Overpressure:
  - the recommended peak maximum level for air blast overpressure at sensitive receivers is 115 dB(Lin); and
  - the maximum air blast overpressure level should not exceed 115 dB(Lin) during more than 5% of blasts in any 12 month period, and should never exceed 120 dB(Lin);
- Ground Vibration:
  - the recommended maximum peak particle velocity (PPV) value of 5 mm/s; and
  - the maximum PPV should not exceed 5mm/s during more than 5% of blasts in any 12 month period, and should never exceed 10 mm/s; and
- Timing:
  - blasting should be restricted to the hours 9:00 to 15:00pm, Monday to Saturday; and
  - blasting should not take place on Sundays or public holidays.

These criteria represent thresholds for the assessment of potential impacts at residential receivers adjacent to the proposed development. Australian Standard AS2187.2-2006 provides outline methods for evaluating potential ground vibration and air blast overpressure impacts.

7. ASSESSMENT OF OPERATIONAL NOISE LEVELS

7.1 Operational Activities

A model of operational noise impacts was constructed using the ISO9613 calculation method within the Predictor-Lima software package. The proposed operation is comprised of a number of noise generating activities, including:

- Drilling to prepare the quarry for blasting;
- Operation of the quarry, crushing plant, stockpiling and reclaim at quarry areas; and
- Haulage of material in heavy vehicles along internal hauls routes within the site;
  - noise generated by heavy vehicle haulage along public roads (i.e. during delivery to end users) is addressed in **Section 9**, as part of the road traffic noise assessment.

A summary of Sound Power Level (SWL) for plant utilised during these operational phase activities are shown in **Table 14.** Given that the configuration of the quarrying plant will not be determined until the approval is in place, assumptions relating to equipment and power levels were determined on the basis of the production rates that are sought. Where information was not available directly from the proponent, SWL data were sourced from a library of representative plant, and cross referenced against existing assessment of similarly sized quarrying operations.

Table 14: Operational phase noise sources.

Scenario	Description of Utilisation	Plant	SWL, dB(A)
Pre-blast Drilling	Drilling rig operating to drill blast pattern	Drill Rig	117
Quarrying Operations	Including extraction, crushing and sizing operations	Jaw Crusher	124
		Secondary Crusher	118
		Screen	116
		Excavator	108
		Front End Loader	108
		Dozer	116
		Dump truck	112
		Water Truck	109
		Grader	113
		Generator / Site Power	96
Truck loading and Haulage	Loading and movement of heavy vehicles between quarry & stockpile areas, and on internal haul roads	Road Registered Heavy Vehicle (Truck & Dog) (3x per 15 minutes)	109
		Front End Loader	108

The operational noise model assumes:

- Progressive extraction from benches within a formed pit. The floor of the pit is located at an RL of approximately 330m AHD;
- Crushing and screen plant centrally located within the pit;
- Pre-blast drilling takes place at natural ground level ahead of the pit, but does not occur during the evening or night period;
- Material is reclaimed from temporary stockpiles adjacent to screening sizing plant, and transported to a formed stockpile area approximately 200m south-east of the pit; and
- Product is hauled from the site along an internal haul route, then onto Manamoi Rd, Boo Boo Rd, Gurley Creek Rd, and finally the Newell Highway.

Noise predictions presented in **Table 15** are determined on this basis. The proposed locations of noise generating activities are shown in **Appendix II.**

7.2 Meteorological Scenarios

This operational configuration was modelled using enhancing meteorological parameters, following analysis of prevailing meteorology presented in **Section 4.5**. This includes:

- Assessment under daytime (standard) conditions:
  - stability category D with 0.5m/s winds from the SE, SSW and NW to evaluate propagation along various source-receiver vectors; and
- Assessment under (enhancing) conditions which may occur during the evening and night:
  - light winds (up to 0.5m/s) that may be observed under stable atmospheric conditions (Pasquil Gifford Stability Class F). As above, winds along predominant source-receiver vectors were assessed (SE, SSW and NW).

7.3 Noise Level Predictions

A summary of predicted $L_{Aeq,15minute}$ noise levels at the nearest sensitive receivers associated with operation of the proposed quarry (including simultaneous pre-blast drilling, quarrying and stockpiling activities) is provided in **Table 15**.

Table 15: Worst case noise impact predictions $L_{Aeq,15minute}$ dB(A).

	Predicted $L_{Aeq,15minute}$				PNTL (D /E / N) $L_{Aeq,15minute}$	Above PNTL?
	Day		Night			
Receiver	Calm	Enhancing	Calm	Enhancing		
R0	<30	<30	<30	<30	40 / 35 / 35	No
R1	36	36	40	40	40 / 35 / 35	Yes (Evening / Night)
R2	31	31	31	35	40 / 35 / 35	No
R3	<30	<30	<30	<30	40 / 35 / 35	No
R6	30	30	30	34	40 / 35 / 35	No

The results of modelling indicate that predicted operational noise levels will be below the PTNL at all receiver locations during the day period. Results indicate that noise contributions above the PTNL at R1 are likely if the quarry operates during the evening and night period.

Further review of site activities was undertaken to identify which noise sources may contribute to these levels, as a means of assessing whether any site activities would be permissible during the evening and night period. These analyses are presented **Table 16** to **Table 18.**

Table 16: Impact predictions, quarrying operations $L_{Aeq,15minute}$ dB(A).

	Predicted $L_{Aeq,15minute}$				PNTL (D /E / N) $L_{Aeq,15minute}$	Above PNTL?
	Day		Night			
Receiver	Calm	Enhancing	Calm	Enhancing		
R0	<30	<30	<30	<30	40 / 35 / 35	No
R1	36	36	40	40	40 / 35 / 35	Yes (Evening / Night)
R2	31	31	31	34	40 / 35 / 35	No
R3	<30	<30	<30	<30	40 / 35 / 35	No
R6	<30	<30	<30	33	40 / 35 / 35	No

Table 17: Impact predictions, pre-blast drilling operations $L_{Aeq,15minute}$ dB(A).

	Predicted $L_{Aeq,15minute}$				PNTL (D /E / N) $L_{Aeq,15minute}$	Above PNTL?
	Day		Night			
Receiver	Calm	Enhancing	Calm	Enhancing		
R0	<30	<30	<30	<30	40 / 35 / 35	No
R1	<30	<30	<30	<30	40 / 35 / 35	No
R2	<30	<30	<30	<30	40 / 35 / 35	No
R3	<30	<30	<30	<30	40 / 35 / 35	No
R6	<30	<30	<30	<30	40 / 35 / 35	No

Table 18: Impact predictions, stockpile and product haulage operations $L_{Aeq,15minute}$ dB(A).

Receiver	Predicted $L_{Aeq,15minute}$ Day Calm	Day Enhancing	Night Calm	Night Enhancing	PNTL (D /E / N) $L_{Aeq,15minute}$	Above PNTL?
R0	<30	<30	<30	<30	40 / 35 / 35	No
R1	<30	<30	<30	<30	40 / 35 / 35	No
R2	<30	<30	<30	<30	40 / 35 / 35	No
R3	<30	<30	<30	<30	40 / 35 / 35	No
R6	<30	<30	<30	<30	40 / 35 / 35	No

Assessment indicates that predicted noise levels are controlled by crushing and screening activities within the quarry operation. In order to achieve PTNL during the evening and night period, it is recommended that crushing and processing activities is restricted to the day period (7:00 to 18:00). This analysis does indicate that stockpile maintenance and loading of trucks may be undertaken during the evening and night period (including the early morning shoulder prior to 7:00) without expectation of adverse impact.

7.4 Maximum Noise Level Predictions

Assessment of predicted noise levels associated with short term high level events (L_{AMax}) with potential to cause sleep disturbance at adjacent sensitive receivers are provided in **Table 19**. Loading of material into hoppers or truck bodies was identified as the activity most likely to generate peak noise events. Modelling results presented in **Table 19** indicate that maximum noise levels are not expected to exceed the MNTL of 52dB(A) at received adjacent to the proposed development, and further assessment of impacts is not undertaken.

Table 19: Maximum noise level predictions, activities outside daytime hours (L_{AMax} dB(A)).

Receiver	Prediction L_{AMAX} Calm	Enhancing	Criteria (Night) L_{Amax}	Above MNLT?
R0	33	33	52	No
R1	46	46	52	No
R2	39	39	52	No
R3	40	40	52	No
R6	45	45	52	No

Assessment presented in **Table 15** indicates that noise levels above the PTNL are not expected, and would thus comply with the $L_{Aeq,15minute}$ MNTL of 40dB(A). On this basis, assessment is limited to analysis of emissions against prediction of L_{AMax} values.

7.5 Annoying Noise Assessment

An assessment of annoying noise characteristics was carried out for operational plant in accordance with Fact Sheet C of the NPfI. A detailed review of the annoying noise assessment is presented in **Appendix III**.) The results of the assessment show that annoying noise characteristics are not expected at any receivers in the vicinity of the site.

8. ASSESSMENT OF CONSTRUCTION NOISE LEVELS

8.1 Construction Activities

The operational noise model was also used to evaluate emissions associated with preliminary earthworks and construction activities within the project site. Assessment of construction activities associated with road and intersection upgrades to the proposed haulage route is provided in **Section 10**. Review indicates that construction activities with potential to generate noise impacts may include:

- Intersection upgrades at the site access and along the haul route, and construction of internal access roads between the site access and quarry;
- Earthworks associated with establishment of the stockpile pad and associated surface water management (i.e. sediment pond); and
- Operation of quarrying plant (drilling rig, crushing plant) at natural surface levels prior to cutting of working faces and pit development.

A summary of Sound Power Level (SWL) for plant utilised during these construction phase activities are shown in **Table 14.** Assumptions relating to equipment and power levels were determined on the basis of the information provided by the proponent (construction hours and plant itinerary). Working SWL for initial crushing operations at natural level are based on the summation of crushing and excavation plant discussed in **Table 14.** Noise level predictions are presented in **Table 21**, and adopt the following assumptions:

- Day period meteorological conditions from the operational noise model are adopted for this analysis;
- All items of plant operate simultaneously;
- All noise generating plant is located at natural ground level; and
- While works are assumed to take place only during standard work hours, assessment against the NML for non-standard hours is also presented to enable assessment of potential impacts should Out of Hours Works (OOHW) be required.

Table 20: Construction Noise Sources.

Construction Phase	Plant Description	A-wt Level
Construction of internal access road and intersection works	Grader	113
	Roller	106
	Water cart	109
Construction of stockpile pad and sediment pond	Grader	113
	Dozer	116
	Front end loader	108
	Excavator	108
Initial Pit Development Works at Natural Surface Level	Drill Rig	117
	Crushing Plant and Excavator	124

8.2 Noise Level Predictions

A summary of predicted $L_{Aeq,15minute}$ noise levels at the nearest sensitive receivers associated with proposed construction works is provided in **Table 21**.

Table 21: Worst case construction noise levels $L_{Aeq,15minute}$ dB(A).

Receiver	Site Access	Stockpile Pad	Quarry Development	NML (Standard / OOHW)	Above NML?
R0	<30	<30	<30	45 / 40	No
R1	<30	<30	31	45 / 40	No
R2	<30	<30	30	45 / 40	No
R3	<30	<30	32	45 / 40	No
R6	<30	<30	41	45 / 40	If conducted Outside Std Hours

The results of modelling indicate that noise emissions from construction activities are likely to be below NMLs for all receivers adjacent to the site. Minor exceedance of the NML may be expected at R6 where quarry development (crushing) activities are taken outside of standard work hours. On this, basis, it is recommended that any crushing activities at natural surface level be restricted to standard work hours (7:00 to 18:00) to ensure NML are achieved.

9. ASSESSMENT OF ROAD TRAFFIC NOISE

9.1 Road Traffic Generated by the Development

Heavy vehicle movements generated by the development are evaluated against the criteria established in the RNP. Assessment of road traffic noise is based on the following assumptions:

- Receivers are exposed to an existing level of road traffic noise, and additional movements generated by the proposed development have potential to increase existing levels of impact;
  - this may require assessment against both absolute and relative increase noise limits;
- Assessment of noise levels associated with quarry related traffic movements was undertaken on the basis that the quarry is expected to generate 94 heavy vehicle (HV) movements between 6am to 6pm;
- Laden vehicles are assumed to travel north west from the quarry along Manamoi Road, Boo Boo Road, and Gurley Creek Road, with a 50/50 north/south split assumed upon reaching the Newell Highway at Gurley; and
- Vehicle speeds are assumed to follow signposted limits of:
  - 60km/h on Manamoi Road, Boo Boo Road, and Gurley Creek Road;
  - 110km/h on the Newell Highway; and
  - 60km/h on all road sections within the town limits of Bellata and Gurley.

9.1.1 Road Traffic Noise Model Validation

A road traffic noise model was constructed within the Predictor environmental noise modelling software package using the Calculation of Road Traffic Noise (CRTN) method. A summary of the modelling assumptions is included in **Table 22**.

Table 22: Operational noise model parameters.

Parameter	Details
Traffic Volumes (Existing)	Newell Highway: Refer to **Table 6** Manamoi, Boo Boo, Gurley Creek Roads: 2 light vehicle (LV) movements per hour
Traffic Volumes (Build option)	Existing + Expected Quarry traffic (approximately 8 movements per hour along Manamoi, Boo Boo, Gurley Creek Roads, with 50/50 split north south upon reaching Newell Highway)
Traffic Speed	Posted Speeds (110km/h outside town limits, 60km/h within towns, 60km/h along Manamoi, Boo Boo, Gurley Creek Roads)
Modelling Method	CoRTN (Predictor v8.11)
Split Height Sources	Cars (RL+0.5m) Trucks (RL+1.5m) Exhaust (RL+3.6m)
Road Surface Corrections	Bitumen (-2.20dBA) along Newell Hwy and Macadam (-3.5dBA) along Manamoi, Boo Boo, Gurley Creek Roads
Receiver Locations	1m from building Height RL +1.5m
Facade Correction	+2.5dB at 1m from building

A model based on existing traffic conditions was constructed in order to validate predictions against available measurement data. Results presented in **Table 23** indicate agreement between the model and available measurement data. The model was subsequently used to characterise existing levels of road traffic noise across the study area, and evaluate potential impacts associated with the proposed development.

Table 23: Validation of road traffic noise model.

Scenario	Measured Level dB(A)	Model Prediction dB(A)	Variance dB(A)
Existing road traffic noise Bellata township ($L_{Aeq,1hour}$) adjacent to Newell Highway	64	65	1.5
Existing road traffic noise Gurley township ($L_{Aeq,1hour}$) adjacent to Newell Highway	72	71	0.8

9.2 Existing Road Traffic Noise Levels

A model representative of current conditions was developed to characterise existing levels of road traffic noise at receivers adjacent to the proposed haul route. The existing levels of road traffic noise are important to understand as it enables evaluation of not just absolute road traffic noise levels against limits, but also assessment of any relative increase that may be experienced. Following guidance established in the RNP, relative increase criteria are not applicable to those receivers predominantly affected by noise from local roads. A summary of predicted existing noise levels along the proposed haul route is provided in **Table 24**.

Table 24: Existing traffic noise levels.

Catchment	Period	Criteria dB(A) ($L_{Aeq,15hour}$)	Total receivers above criteria[1]
Gurley Town	Day	60	7
Newell Highway		60	1
Bellata Town		60	12
Manamoi, Boo Boo, Gurley Creek Roads		55[2]	0
Gurley Town	Night	55	7
Newell Highway		55	1
Bellata Town		55	15
Manamoi, Boo Boo, Gurley Creek Roads		50[2]	0

Note 1: denotes number of receivers already experiencing levels above the criteria.

Note 2: Boo Boo Road is identified as local road and is assessed under $L_{Aeq\ 1hour}$ for both Day and Night period.

Analysis presented in **Table 24** indicates that receivers located within Bellata and Gurley are the most impacted by road traffic noise, as large traffic volumes on the Newell highway pass through both townships. The most affected receivers within these townships also have a shorter setback distance from the road when compared to the setback distance for surrounding rural properties.

9.3 Road Traffic Noise Level Prediction

Further analysis was undertaken to evaluate changes in noise levels associated with traffic generated by the proposed development (build option). A summary of these results is presented in **Table 25**.

Table 25: Assessment of predicted traffic noise levels (Build option).

Catchment Day	Criteria dB(A) ($L_{Aeq,15hour}$)	Total receivers above criteria	Maximum relative increase at receivers dB(A)	Total receivers to experience relative increase
Gurley Town	60	7	0.6	12
Newell Highway	60	1	0.2	4
Bellata Town	60	14	0.4	105
Manamoi, Boo Boo, Gurley Creek Roads	55[1]	0	13.2	6
Night	**Criteria dB(A) ($L_{Aeq,9hour}$)**	**Total receivers above criteria**	**Maximum relative increase at receivers dB(A)**	**Total receivers to experience relative increase**
Gurley Town	55	7	0.4	12
Newell Highway	55	1	0.1	2
Bellata Town	55	15	0.3	93
Manamoi, Boo Boo, Gurley Creek Roads	50[1]	0	6	6

Note 1: Manamoi, Boo Boo, and Gurley Creek Roads are identified as local road and is assessed under $L_{Aeq\ 1hour}$ for both Day and Night period.

Review of modelling results indicates that:

- only two additional receivers within the Bellata township will experience road traffic noise impacts above the criteria during the day period under the build option. The predicted traffic noise impacts at additional receivers are only expected to exceed to day period criteria by less than 1dB(A);
- the maximum relative increase in road traffic noise as a result of this project is expected to:
  - be less than 1dB(A) for all receivers in the Bellata and Gurley Townships, as well as isolated properties along the Newell Highway during both the night and day periods; and
  - above 12dB(A) at two receivers along Boo Boo Road (291 & 74 Boo Boo Road) as well as three receivers in the vicinity of Manamoi Rd during both the day period, and above 5dB(A) when haulage is conducted prior to 7am.

Increases in traffic noise levels (in the case of only two receivers in Bellata, levels above the criteria outlined in the RNP) are to be expected. For receivers along the Newell Highway (including the townships of Gurley and Bellata), these results should be interpreted in the context of already high levels of road traffic noise associated with existing traffic volumes on the Newell Highway. Although the receivers along the Newell Highway experience high levels of traffic noise, the additional truck movements from the Meppem quarry development are expected to contribute less than 1dBA increases in the existing traffic noise.

These impacts are considered minor when assessed in accordance with the RNP criteria assessment, which indicates that for existing residences and sensitive land uses affected by additional traffic on existing roads generated by land use developments any increase should be limited to 2dB above that of the 'no build' (existing) road traffic noise levels.

Road traffic noise is expected to exceed the relative increase criteria (existing traffic LAeq+ 12dB) during the day period at the two identified receivers along Boo Boo Road and three receivers in the vicinity of Manamoi Rd. Although there is predicted to be a significant increase in road traffic noise contributions under the build option, it should be noted that road traffic noise contributions from the development will still be well below the most stringent noise assessment criteria for road traffic noise. The highest level received at any of the receivers along Manamoi Rd and Boo Boo Rd was predicted to be 44 dB(A), which is 11 dB less than the relevant taytime criterion of 55 dB(A).

In addition, the receivers along Manamoi Rd are set back from the road by a distance of more than one kilometre. Given this setback and the very low volume of traffic on Manamoi Rd, existing road noise contributions are so low (less than 25 dB(A)) that typical rural environmental noise sources (e.g. vegetation movements, bird calls) will dominate. The projected road noise increase is likely to exaggerate the increase in road noise impacts, as the emergence above the actual environmental noise level will be significantly lower.

9.4 Mitigation of Road Noise Impacts

There is potential for community response due to significant increases in road traffic noise at two receivers along Boo Boo Road. Feasible and reasonable mitigation measures that may assist in minimising adverse road noise impacts are discussed in **Table 26**.

Table 26: Reasonable and Feasible Road Noise Mitigation

Proposed mitigation measure	Is the measure feasible?	Is the measure reasonable?	Use mitigation measure?
Consult with residents adjacent to the haul route	Yes	Yes	Yes
Institute a traffic management plan to ensure vehicles are operated in a manner than minimises noise	Yes	Yes	Yes
Monitor adherence to traffic management plan	Yes	Yes	Yes – mechanisms to be determined by proponent
Reduce number of vehicle movements	Yes	Only where higher capacity vehicles can be used to transport the same volume of material in fewer movements	Where higher capacity vehicles are available
Use alternative transport methods	No – no nearby rail connection	-	No
Use alternative haul route	Yes	No – alternative haul route (via Bellata) will result in similar impacts on a larger number of receivers	No

Detailed results presented in **Appendix IV** provide a thorough analysis of receivers that may experience impacts as a result of the proposed development.

10. ASSESSMENT OF ROAD CONSTRUCTION NOISE

10.1 Construction Activities

Noise from the construction works associated with the haul route upgrade is assessed in accordance with the CNVG. Six scenarios were considered, with two activities at three locations. Sound power levels of plant items were adopted from Appendix F of the CNVG; however, as the scale of works in this project is projected to be small, the total number of plant operating in the 'road formation' activity is less than that suggested in this document.

The plant used, their sound power levels, and the number per activity are listed in **Table 27**. These activities are meant to represent a worst-case 15-minute period – it is likely that plant use will be staggered so that not all equipment is operating at the same time.

Table 27: Plant used for construction noise modelling

Plant Item	SWL (dBA)	Earthworks & Road Formation	Paving
Vibratory Roller	109	1x	-
Grader	113	1x	-
Excavator (tracked 35T)	110	2x	-
Wheeled front-end loader	112	1x	-
Water cart	107	1x	-
Pavement layer	114	-	1x
Concrete mixer truck	109	-	1x
Asphalt truck & sprayer	103	-	1x
Concrete saw	118	-	1x
Smooth drum roller	107	-	1x
Dump truck	110	-	2x (4x per hour – assumes that not all trucks arrive at once)

The following construction activity scenarios were assessed at four locations along the proposed haul route:

- Along Manamoi Road (earthworks only as this section of road will not be paved);
- Along the stretch of road closest to 74 Boo Boo Road;
- Along the stretch of road closest to 291 Boo Boo Road; and
- At the intersection of Gurley Creek Road and the Newell Highway.

The model was constructed using the ISO 9613 calculation methodology implemented in modelling software iNoise v2020. Noise levels were modelled at the residences identified as potentially affected by the quarry's operation (marked in **Figure 2**), at 74 Boo Boo Road, 291 Boo Boo Road, and in the township of Gurley.

10.2 Road Construction Noise Level Predictions

Table 28 shows the noise levels received at affected residences during the construction works along Manamoi Road, Boo Boo Road, and Gurley Creek Road. The levels presented are the highest received across all construction scenarios; full details on the noise levels in each scenario are available in **Appendix V**.

Table 28: Road Construction Noise Levels

Receiver	Highest Scenario $L_{Aeq,15min}$	Associated Scenario
Receivers in Vicinity of the Project Site		
Residential Receiver 2	<25	Paving near 291 Boo Boo Rd
Residential Receiver 6	<25	Earthworks on Manamoi Rd
Residential Receiver 3	27	Earthworks on Manamoi Rd
Residential Receiver 1	43	Earthworks on Manamoi Rd
Residential Receiver 0	29	Paving near 291 Boo Boo Rd
Receivers in Vicinity of Gurley		
17 Millie Street	51	Paving near Gurley Township
2 Bellata Street	50	Paving near Gurley Township
21 Gurley Street	67	Paving near Gurley Township
25 Gurley Street	70	Paving near Gurley Township
27 Keith Smith Place	62	Paving near Gurley Township
31 Gurley Street	74	Paving near Gurley Township
34 Bellata Street	80	Paving near Gurley Township
41 Gurley Street	76	Paving near Gurley Township
5 Gurley Street	54	Paving near Gurley Township
9 Millie Street	53	Paving near Gurley Township
Firestation - Bush	49	Paving near Gurley Township
Post Office	72	Paving near Gurley Township
SHERWOOD Homestead 27 Keith St	45	Paving near Gurley Township
WYNDELLA Homestead 18583 NEWELL Hwy	39	Paving near Gurley Township
Isoalted Receivers Along Boo Boo Road		
291 Boo Boo Rd	67	Paving near 291 Boo Boo Rd
74 Boo Boo Rd	62	Paving near 74 Boo Boo Rd

The results show that road construction works are likely to cause noise impacts to receivers on Boo Boo Rd and in Gurley Township. In addition, two receivers – 34 Bellata St and 41 Gurley St – received noise levels high enough to be considered “Highly Affected”.

10.3 Road Construction Noise Mitigation

The predicted noise levels were compared to the adopted RBL for the project and to Table C.1 of the CNVG to determine appropriate community management mitigation measures. In addition, the following control measures are recommended to minimise the generated noise levels:

- Construction activities should be limited to standard hours only (weekdays 7am-6pm, Saturday 8am-1pm);
- Where possible, erect temporary noise barriers between highly affected receivers and works associated with the intersection at Gurley township; and
- If concrete sawing is required, the saw should only be operated when no other plant is running.

Note that the effect of these mitigation measures was not included in the noise modelling and all results presented in **Appendix V** and **Table 28** exclude the impacts of these mitigation measures. The assessment is provided in this way to enable the identification of potentially impacted receivers and appropriate mitigation measures.

11. ASSESSMENT OF BLAST IMPACTS

Australian Standard AS2187.2-2006 provides outline methods for evaluating potential ground vibration and air blast overpressure impacts associated with explosive blasting. A quantitative assessment of potential impacts has been prepared on the basis of minimum separation distances to the nearest sensitive receiver (2,000m to the north-east) and preliminary blast design information. Impacts at more distant receiver locations are assumed to be acceptable where air blast and ground vibration levels comply with limits at these assessment locations.

11.1 Estimating Overpressure Levels

Appendix J7 of *AS2187.2-2006 Explosives - Storage and use. Part 2: Use of explosives* provides the following method for evaluating potential airblast overpressure levels:

$$P = K_a \left(\frac{R}{Q^{1/3}} \right)^a$$

Where: P is air pressure (Pa);
R is the distance between charge and point of measurement (m);
Q is maximum instantaneous charge (charge mass per delay) (kg);
K_a,is the site constant; and
a is the site exponent.

Additional detail contained in Clause J7.3 of AS2187.2:2006 provides the following values for the site constant and site exponent for confined blasthole charges:

K_a = range between 10 to 100;
a = -1.45

Equation J5.1 in AS2187.2:2006 allows for the expression of overpressure impacts in decibels:

$$SPL = 10 \times \log_{10} \left(\frac{P}{P_0} \right)^2$$

Where: P is estimated overpressure level (μPa); and
P_0 is the reference pressure of 20 μPa.

11.1.1 Assessment of Overpressure Impacts

A summary of air blast overpressure impacts based on preliminary blast design information is presented in **Table 29**. The results indicate that, based on observed separation distances, air blast overpressure levels are unlikely to exceed the human annoyance criteria presented in the ANZEC guideline at the nearest sensitive receiver.

Table 29: Assessment of air blast impacts at nearest receiver.

Scenario	Sep Distance	Hole Diameter	MIC	Air blast Overpressure	Limit
1	2000m	89mm	67kg	96dB	115dB
2		102mm	88kg	97dB	

11.2 Estimating Ground Vibration Impact

Appendix J7 of *AS2187.2-2006 Explosives - Storage and use. Part 2: Use of explosives* provides the following method for evaluating potential ground vibration levels:

$$V = K_g \left(\frac{R}{Q^{1/2}} \right)^{-B}$$

Where: V is ground vibration as vector peak particle velocity (mm/s);
R is the distance between charge and point of measurement (m);
Q is maximum instantaneous charge (charge mass per delay) (kg); and
K_g, B are constants related to site and rock properties for estimation purposes.

Discussion presented in Clause J7.3 of AS2187.2:2006 states that, in the absence of site specific constants the following values may be used to estimate vibration levels (50% probability of exceedence) in average conditions:

K_g = 1140
B = -1.6

In the absence of detailed understanding of site specific vibration propagation characteristics, the constants for average conditions are applied to this assessment.

11.2.1 Assessment of Ground Vibration Impacts

A summary of assessed ground vibration impacts is presented in **Table 30.** The results indicate that, based on the observed separation distances, ground vibration levels are unlikely to exceed the criteria for human annoyance at sensitive receivers adjacent to the blast site.

Table 30: Assessment ground vibration impacts.

Scenario	Sep Distance	Hole Diameter	MIC	Ground Vibration PPV	Limit
1	2000m	89mm	67kg	<0.2mm/s	5mm/s
2		102mm	88kg	0.2mm/s	

11.2.2 Mitigation of Blast Impacts

While the assessment indicates blasting activities are likely to comply with the relevant criteria, impacts may be perceived by sensitive receivers adjacent to the site. AS2187.2-2006 provides guidance on methods to manage blasting in such a way as to minimise ground vibration and overpressure impacts, including:

- Reducing the maximum instantaneous charge and us of appropriate delays;
- Establishing blast times in accordance with prevailing meteorological conditions;

- Optimising blast design; and
- Orienting blasts away from receivers (where possible).

It is also recommended that provisions are made for notifying neighbours of planned blasts, and monitoring of overpressure and ground vibration of blasts as they occur. This should aid in the establishment of mechanisms to modify blast designs and respond to any complaints as may be required.

12. DISCUSSION AND RECOMMENDATIONS

12.1 Assessment Conditions and Criteria

Analysis of background noise monitoring indicates that the receiving environmental adjacent to the proposed development site is rural in nature, influenced predominantly by environmental and distant transportation sources. In all cases, the PTNL were established in terms of the Intrusiveness Criteria. For the purposes of evaluating potential impacts, it is recommended at that the PTNL be adopted as the assessment criteria for the development.

Review of prevailing meteorology indicates that there are no wind conditions observed more than 30% of the time during any season. Data was not available to evaluate the potential significance of temperature inversions at this location, so conservative assumptions were adopted and enhancing meteorological parameters were applied to the assessment.

12.2 Assessment of Impacts and Recommendations for Management

12.2.1 Operational Noise

Review of noise modelling indicates that the proposed operations will generate offsite noise levels below the PTNL at all receivers, during all assessment periods. Contributions at the nearest receiver (R1) may approach the evening and night period PTNL, but are expected to be well below the day period criteria level. In all cases the primary contribution to offsite noise levels is associated with operation of crushing plant at the proposed hard rock quarry. To achieve PTNL during the evening and night period, it is recommended that crushing and processing activities is restricted to the day period (7:00 to 18:00). This analysis does indicate that stockpile maintenance and loading of trucks may be undertaken during the evening and night period (including the early morning shoulder prior to 7:00) without expectation of adverse impact.

12.2.2 Maximum Noise Levels

Materials' handling within the quarry was identified as the activity with greatest potential to generate maximum noise level impacts. It is important to note that these impacts may only manifest where quarrying or stockpiling operations are required to take place during the night period. Notwithstanding, review of modelling results indicates that L_{AMax} noise levels at adjacent sensitive receivers will be less than the Maximum Noise Trigger Level. Adverse impacts are not expected, and detailed assessment of potential impact was not undertaken.

12.2.3 Construction Noise

The results of modelling indicate that noise emissions from construction activities are likely to be below NMLs for all receivers adjacent to the site. Minor exceedance of the NML may be expected at R6 where quarry development (crushing) activities are taken outside of standard work hours. On this, basis, it is recommended that any crushing activities at natural surface level (during construction period) be restricted to standard work hours (7:00 to 18:00) to ensure NML are achieved.

12.2.4 Road Traffic Noise

Assessment indicates that receivers along the proposed haulage route already experience high levels of noise associated with the Newell Highway. Despite potential for high levels of traffic noise, assessment indicates that the majority of exceedances are situated in Bellata and Gurley townships and along the Newell Highway where existing levels are already exceeded or close to exceeding. Increases of road traffic noise are expected to be no more than 2dB above the criteria are predicted at any receivers in close vicinity to the Newell Highway at Bellata and Gurley.

Road traffic noise is expected to exceed the relative increase criteria (existing traffic L_{Aeq}+ 12dB) during the day period at the two identified receivers along Boo Boo Road. Although there is predicted to be a significant increase in road traffic noise contributions under the build option, it should be noted that road traffic noise contributions from the development will still be well below the most stringent noise assessment criteria for road traffic noise for both the day and night periods.

Given there is potential for community response due to significant increases in road traffic noise at two receivers along Boo Boo Road, the following recommendations are provided to minimise adverse road noise impacts:

- Consultation with residents adjacent to the Haul Route;
- Developing an effective traffic management plan to ensure that drivers:
  - adhere to sign-posted speed limits;
  - maintain and operate vehicles in a manner that does not generate excessive noise;
  - schedule haulage of product to maximise periods of respite;
  - contains a mechanism for monitoring adherence to the plan, and for responding to complaints; and
- Where practical, utilise larger capacity vehicles to minimise the number of movements.

12.2.5 Road Construction Noise

The results of modelling indicate there are potential noise impacts at one residence near Manamoi Rd, two residences along Boo Boo Rd, and at many of the receivers in Gurley Township. Both earthworks and paving were predicted to have the potential to cause noise impacts, although modelled impacts were generally higher for paving activities. Two receivers in Gurley Township were predicted to fall into the "Highly Affected" category ($L_{Aeq,15min}$ of 75 dB(A) or greater) for works at the intersection of Gurley Creek Rd and Newell Highway.

The CNVG recommends mitigation measures which assist with community management; relevant measures have been identified for each receiver in the various modelling scenarios. The construction works are predicted to be short (3 weeks or less at any one location), which will reduce the overall community impact. In addition, the following recommendations are provided in order to minimise noise impacts as far as possible:

- Construction activities should be limited to standard hours only (weekdays 7am-6pm, Saturday 8am-1pm);
- Where possible, erect temporary noise barriers between highly affected receivers and works associated with the intersection at Gurley township; and
- If concrete sawing is required, the saw should only be operated when no other plant is running.

12.2.6 Blasting Impacts

Assessment of the resource indicates that blasting may be required as part of the extraction process. Criteria for both ground vibration and overpressure were adopted from the ANZEC guidelines for the purposes of assessing blast impacts. Assessment of preliminary blast design indicates that compliance with these guideline values is likely. Notwithstanding, it is recommended that monitoring of blasts be undertaken until such time that compliance can be demonstrated. It is also recommended that a strategy for notifying neighbours of planned blasts be developed and implemented, and a method for receiving, investigating and responding to complaints is provided.

12.2.7 Summary of Recommendations

Assessment indicates that the proposed quarry operations will comply with the established PTNL, and that the PNTL may be adopted as appropriate criteria for the proposed development. It is likely that the development will be audible at some receivers, and it is suggested that the above recommendations be put in place to minimise the noise impacts at the surrounding sensitive receivers. It is additionally recommended that systems are put in place to monitor and respond to potential concerns from adjacent sensitive receivers.

13. CONCLUSION

Advitech Environmental was engaged to prepare an assessment of potential noise impacts associated with the development of the proposed Meppem Quarry. The development is proposed to service bulk construction material requirements of the proposed Narrabri to North Star section of the Inland Rail project. The operation may produce up to 490ktpa of quarried material per annum.

Project Trigger Noise Levels for adjacent receiving environments were reviewed, and the assessment conservatively adopted the most stringent criteria for the project area. Modelling indicates that noise levels associated with the project are expected to meet these criteria. While adverse operational, construction, and blasting impacts are not expected, this activity may be audible at some locations given the characteristics of the receiving environment. It is thus recommended that measures be put in place to ensure the timely and effective response to any concerns raised by adjacent receivers.

Assessment indicates that receivers along the proposed haulage route already experience high levels of noise associated with the Newell Highway. Despite potential for high levels of traffic noise, assessment indicates that the majority of exceedances are situated in Bellata and Gurley townships and along the Newell Highway where existing levels are already exceeded or close to exceeding. Increases of road traffic noise are expected to be no more than 2dB above the criteria are predicted at any receivers in close vicinity to the Newell Highway at Bellata and Gurley.

Road traffic noise is expected to exceed the relative increase criteria (existing traffic L_{Aeq}+ 12dB) during the day period at the two identified receivers along Boo Boo Road. Although there is predicted to be a significant increase in road traffic noise contributions under the build option, it should be noted that road traffic noise contributions from the development will still be well below the most stringent noise assessment criteria for road traffic noise for both the day and night periods.

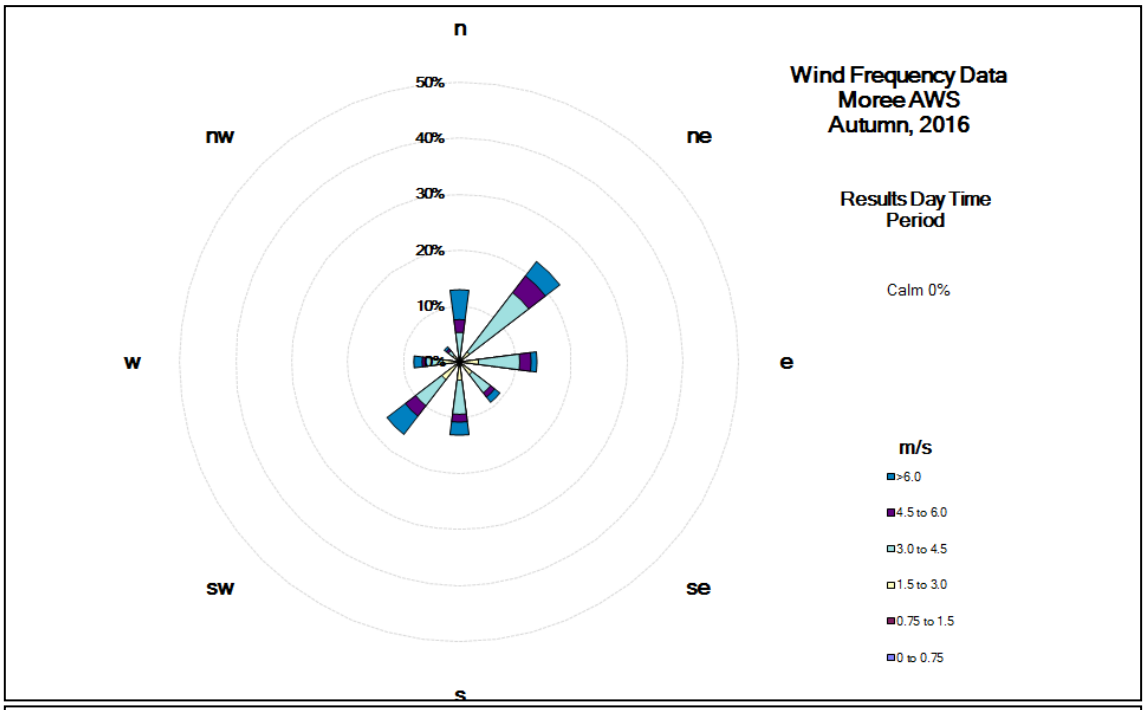
Road construction noise is expected to cause noise impacts at one receiver near Manamoi Rd, all receivers near Boo Boo Rd, and all receivers in Gurley Township. During construction, it is recommended that appropriate mitigation measures should be applied to minimise these impacts as far as possible.

14. REFERENCES

The following information was used in the preparation of this report:

1. Australia and New Zealand Environment Council (1990), *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration*, Australia and New Zealand Environment Council.
2. AS1055:2018 Acoustics – *Description and measurement of environmental noise General Procedures.*
3. AS 2436 *Guide to noise and vibration control on construction, demolition and maintenance sites.*
4. AS2187.2-2006 Explosives – *Storage and Use Part 2: Use of Explosives.*
5. ARTC NSW Inland Rail Programme, *Narrabri to North Star Project, Technical Report 5: Noise & Vibration Assessment*, report dated October, 2017.
6. AS 1055.1-1997: Acoustics – *Description and measurement of environmental noise General procedures.*
7. Bies, DA & Hansen, CH (2009). Engineering Noise Control: Theory and Practice (4th Edition), Spon Press.
8. NSW Environment Protection Authority (2000). *NSW Industrial Noise Policy*, NSW Environment Protection Authority, Sydney.
9. NSW Environment Protection Authority (2006). *Assessing Vibration: a technical guideline*, NSW Environment Protection Authority, Sydney.
10. NSW Environment Protection Authority (2008). *Interim Construction Noise Guideline*, NSW Environment Protection Authority, Sydney.
11. NSW Environment Protection Authority (2011). *Road Noise Policy*, NSW Environment Protection Authority, Sydney.
12. NSW Environment Protection Authority (2017). *NSW Noise Policy for Industry*, NSW Environment Protection Authority, Sydney.
13. UK Department of Environment, Food and Rural Affairs (2005), *Update of noise database for prediction of noise on construction and open sites,* UK Department of Environment, Food and Rural Affairs, Norwich.

Appendix I Seasonal Wind Roses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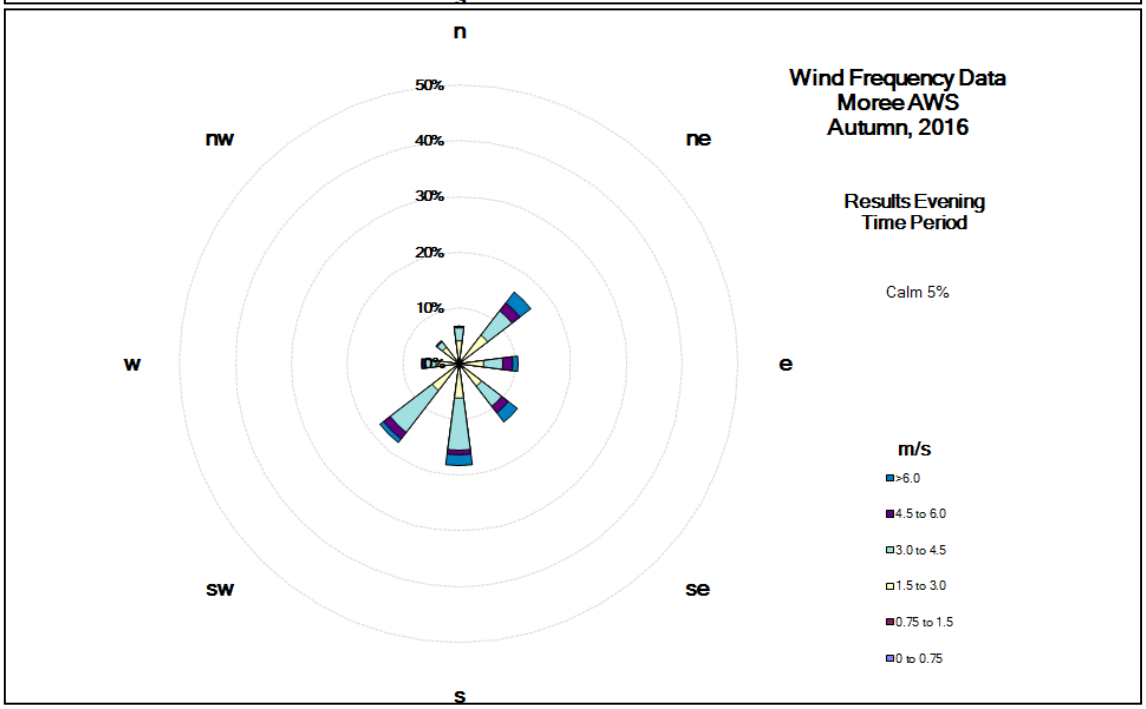
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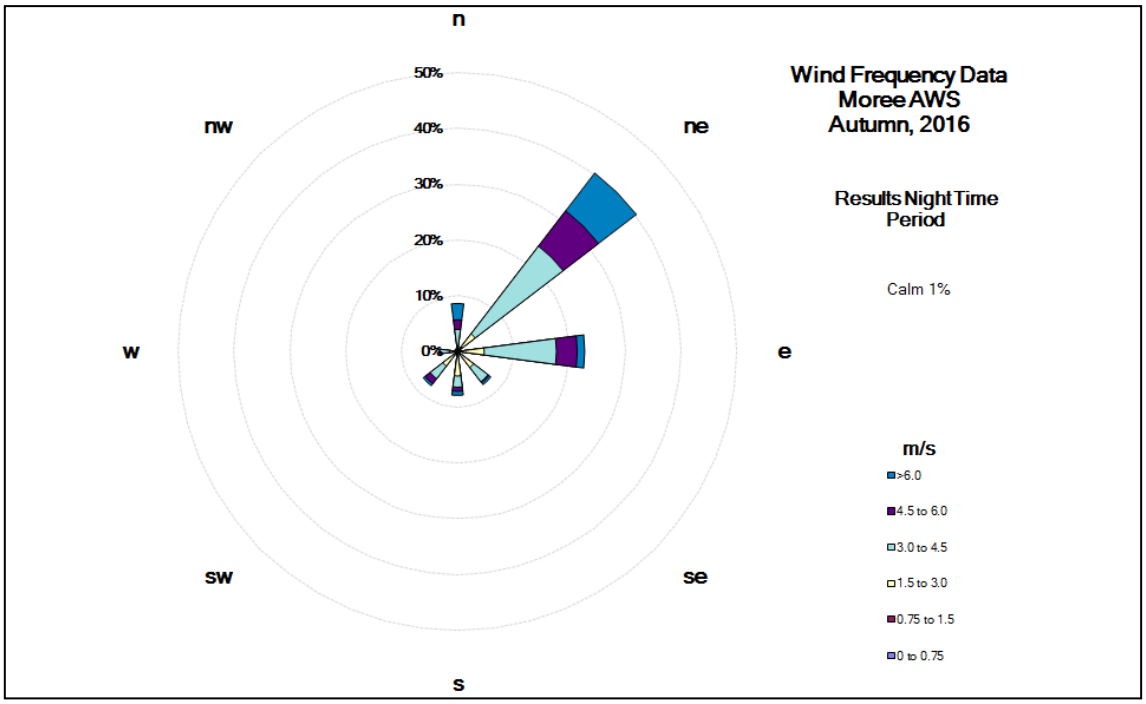
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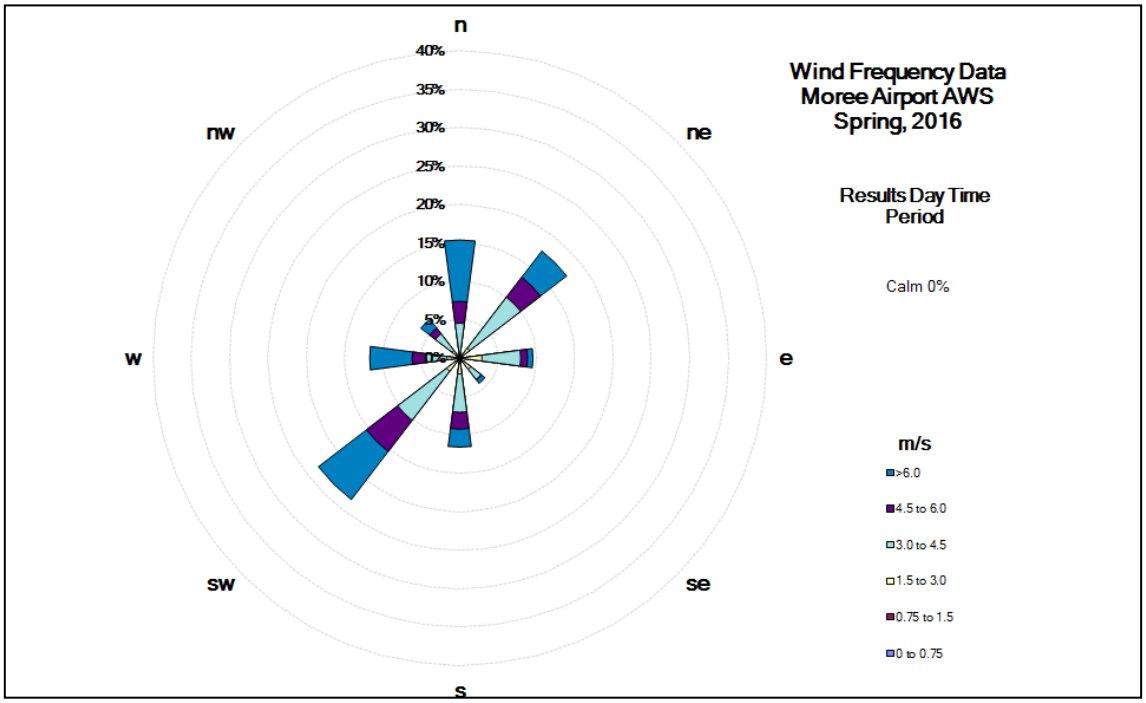
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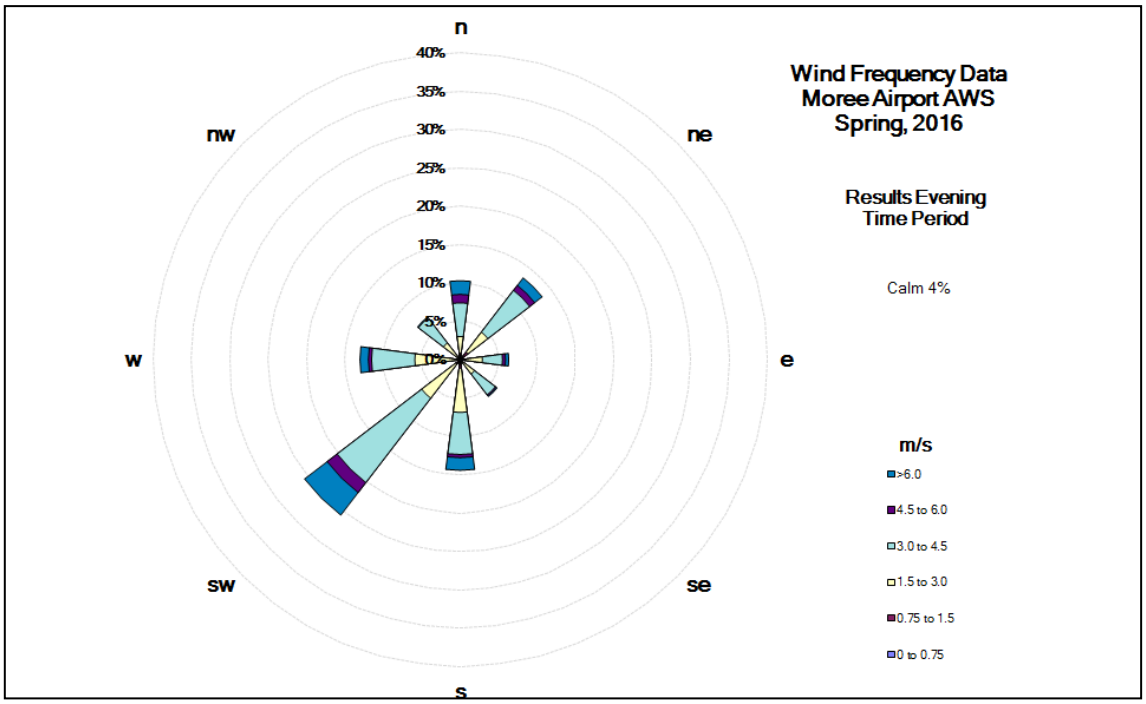
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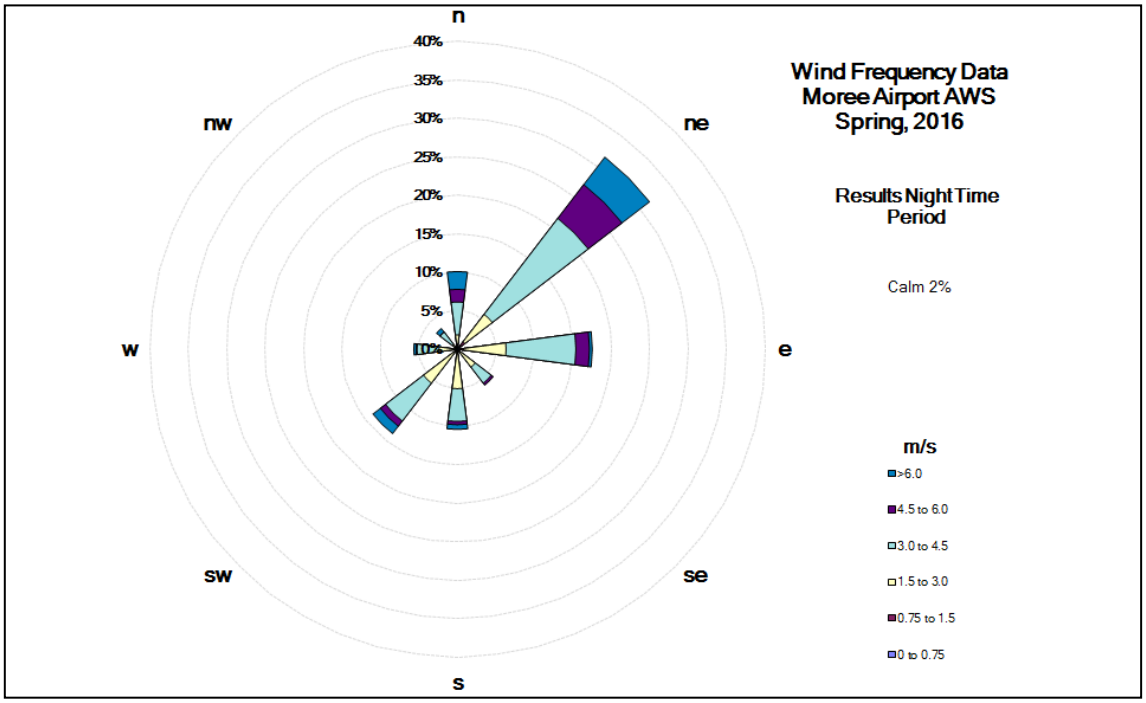
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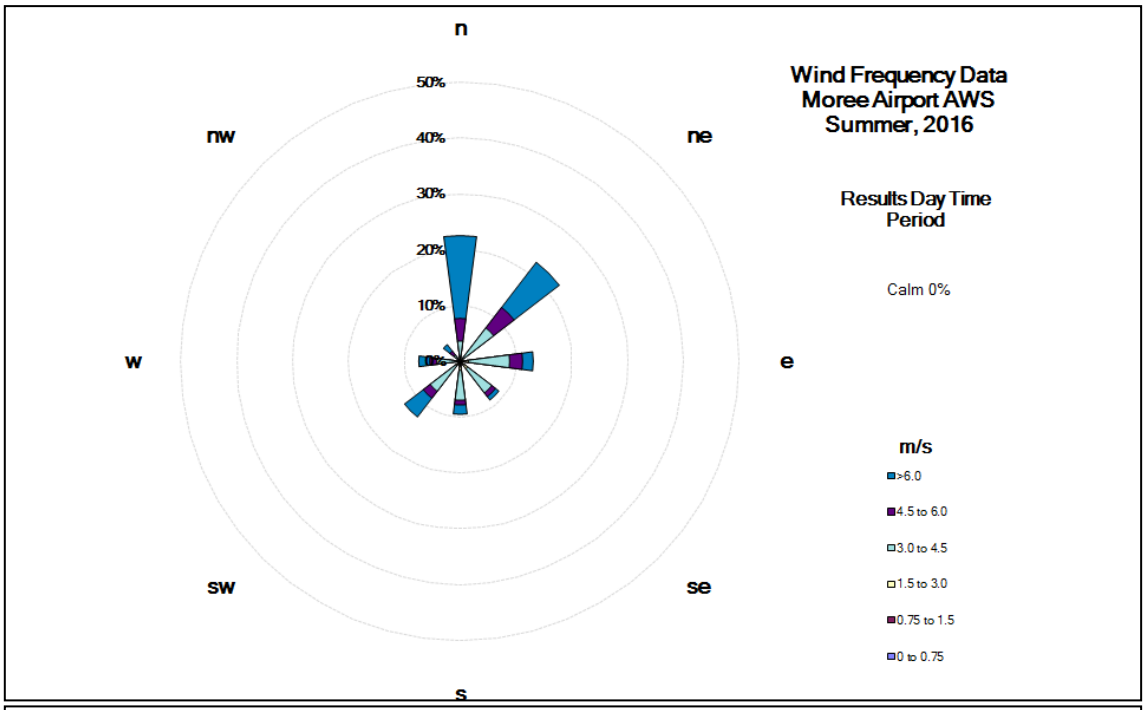
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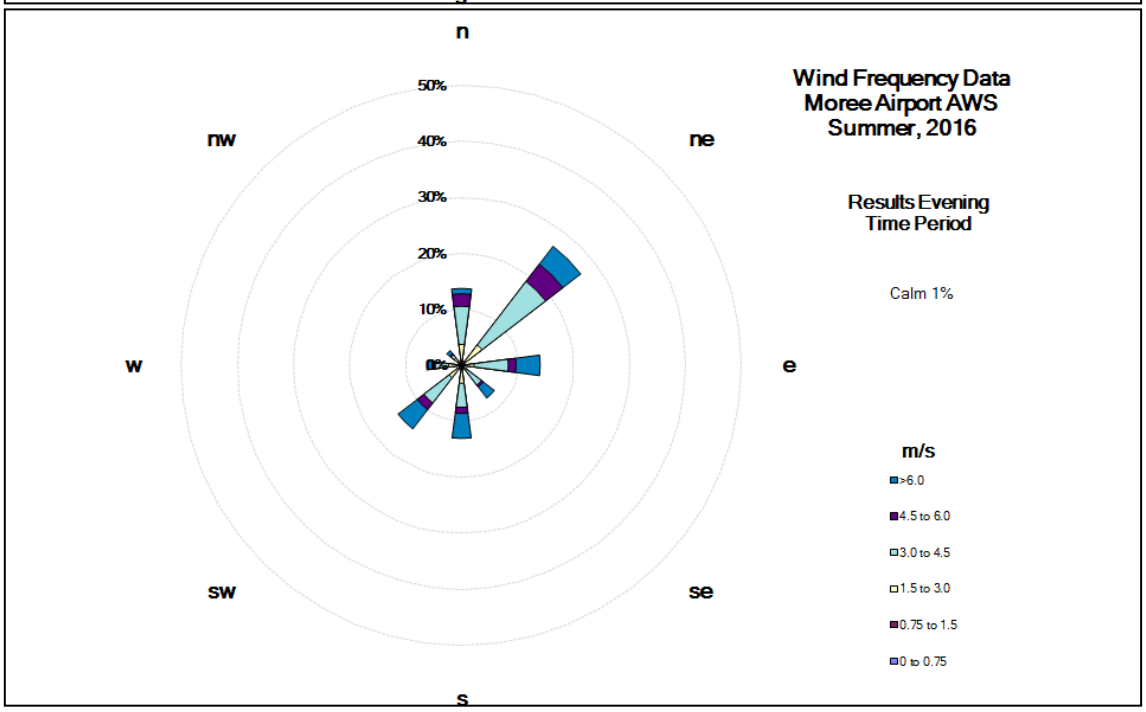
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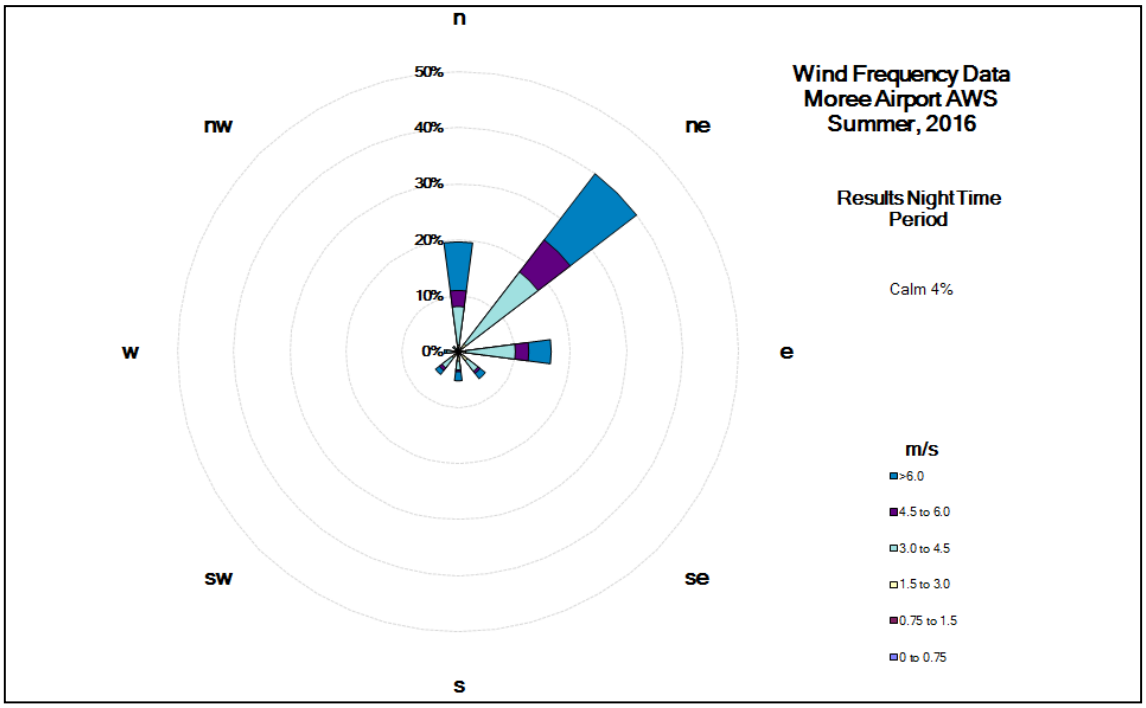
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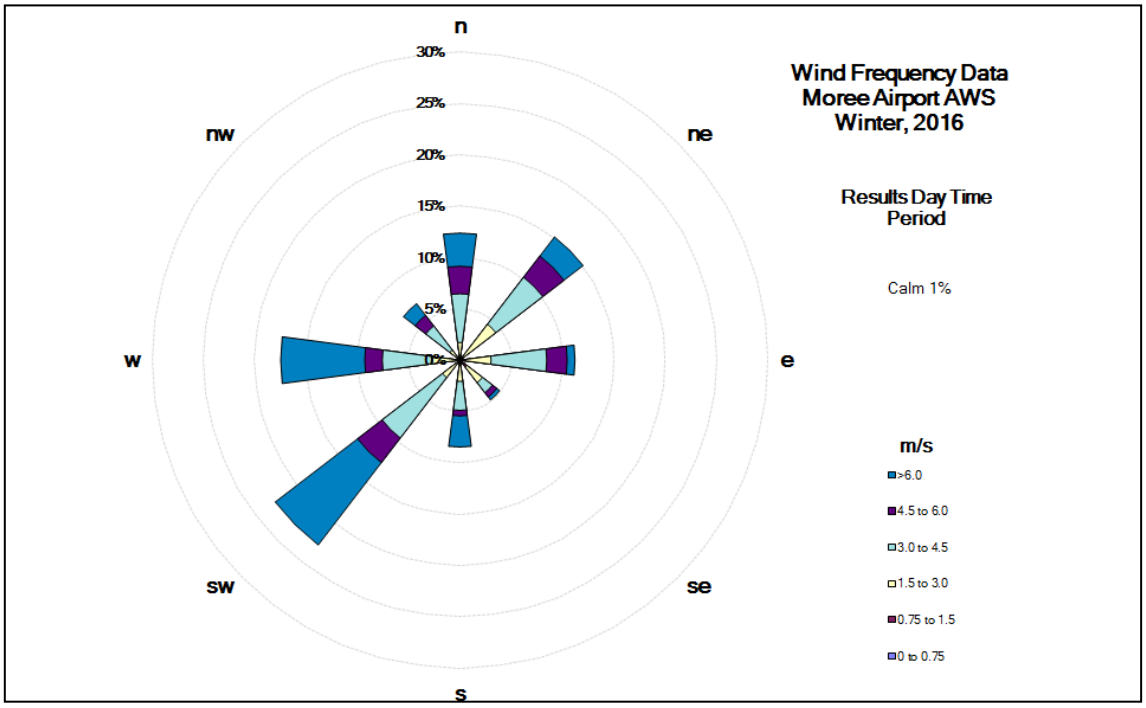
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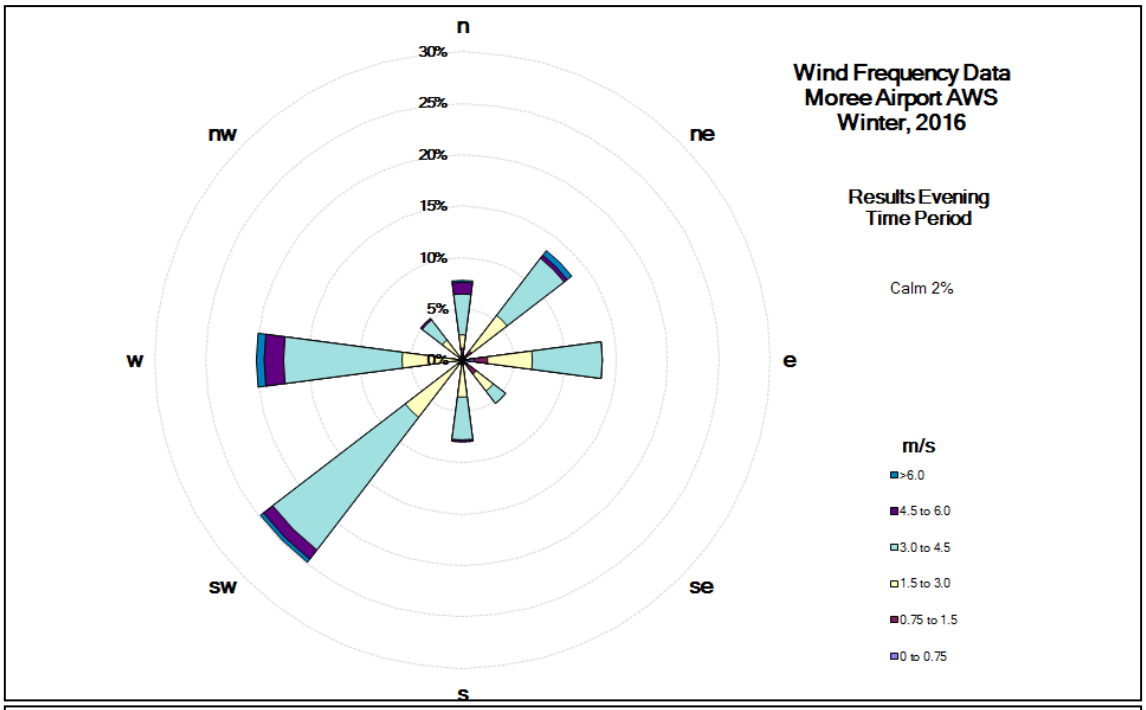
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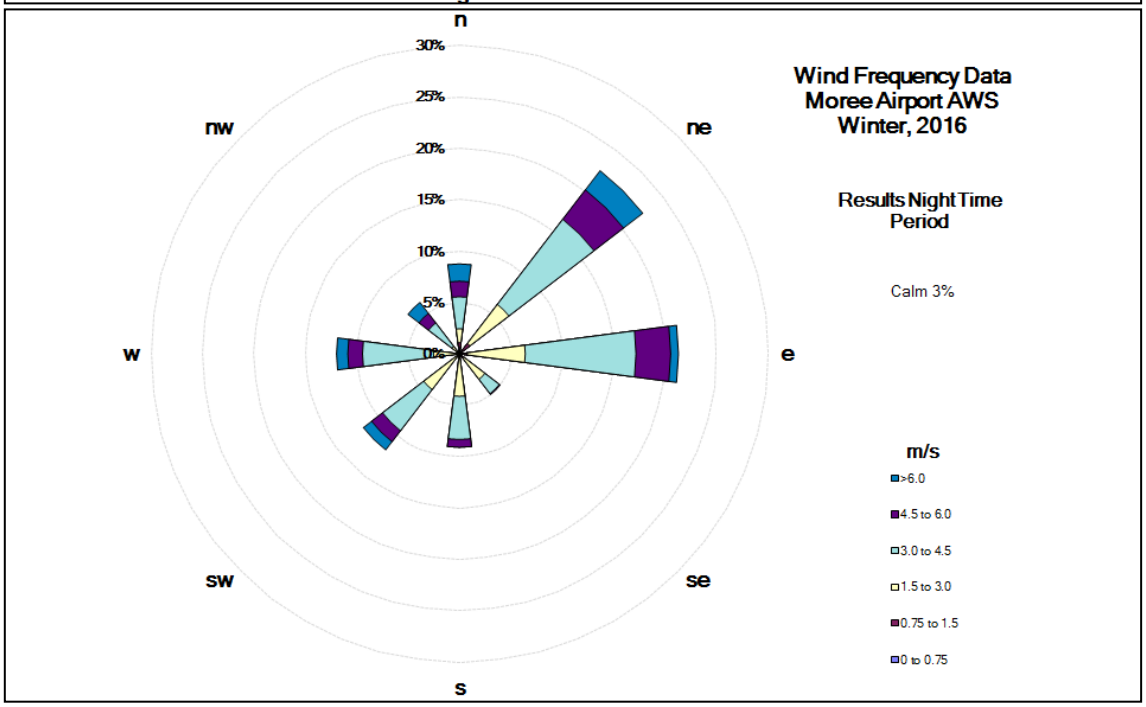
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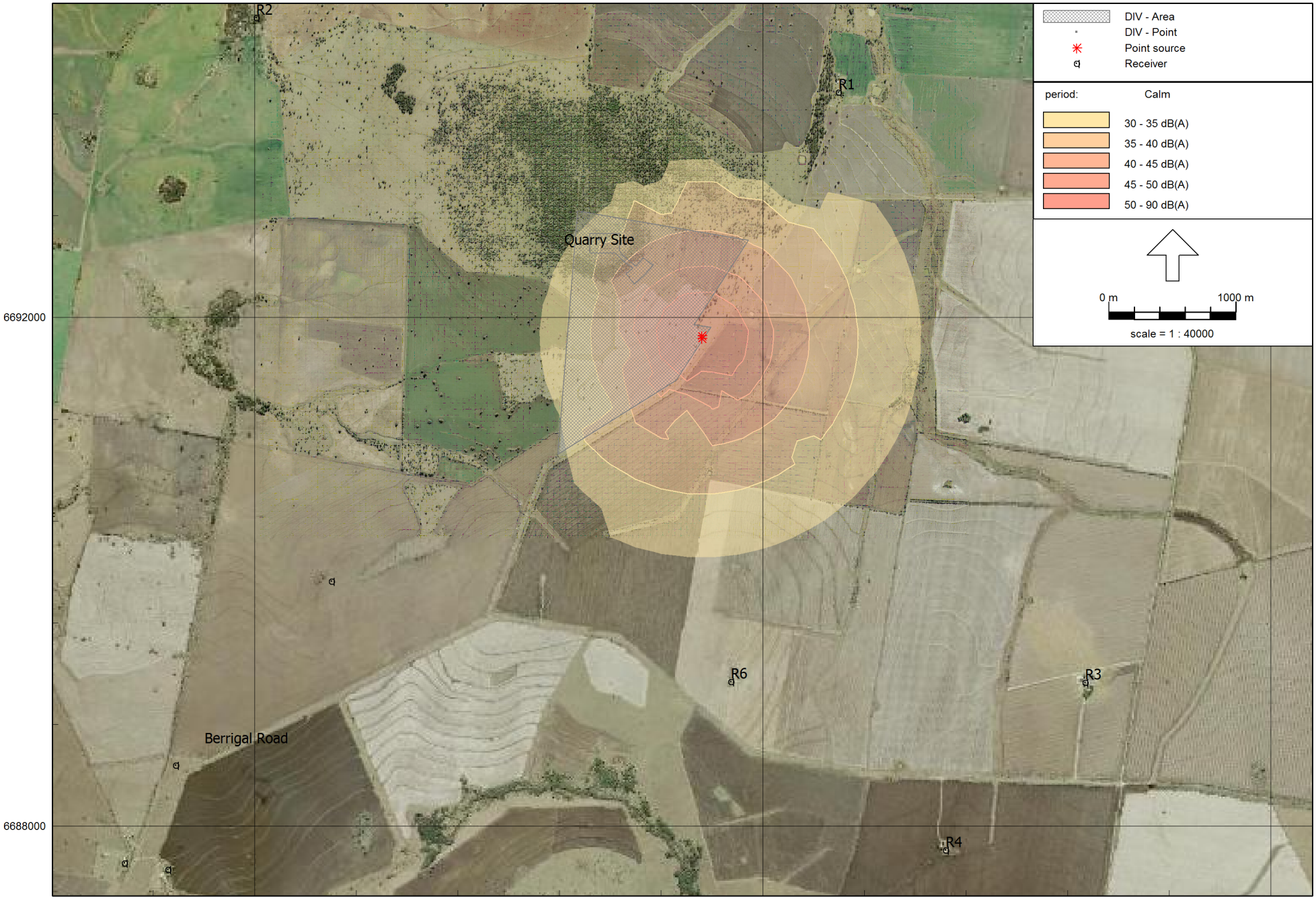
Appendix II Noise Contour Maps



Construction Phase (Site Access)
Calm, SE, SSE NW at 0.5m/s

Advitech Pty Ltd

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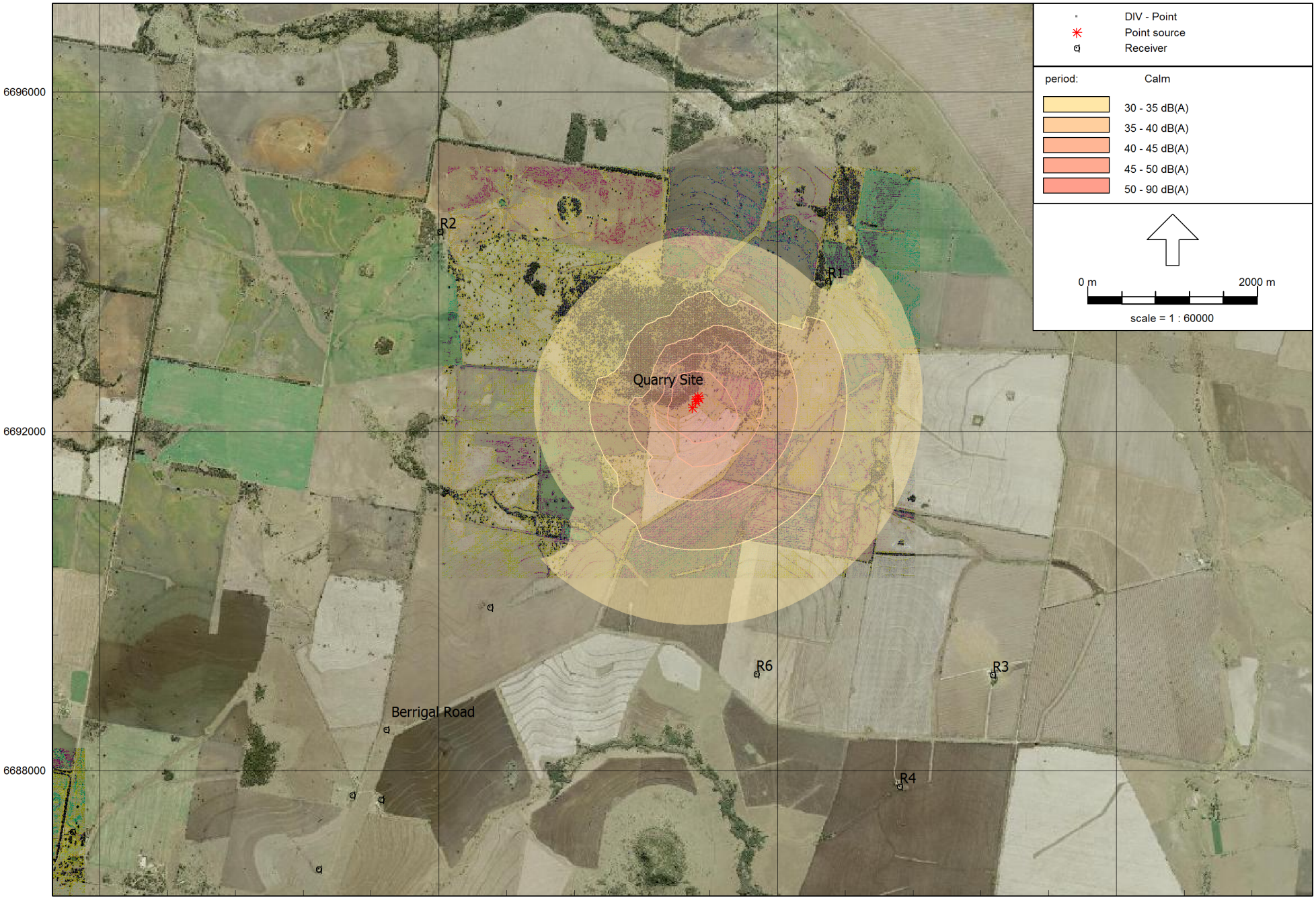

Construction Phase (Stockpile Pad)
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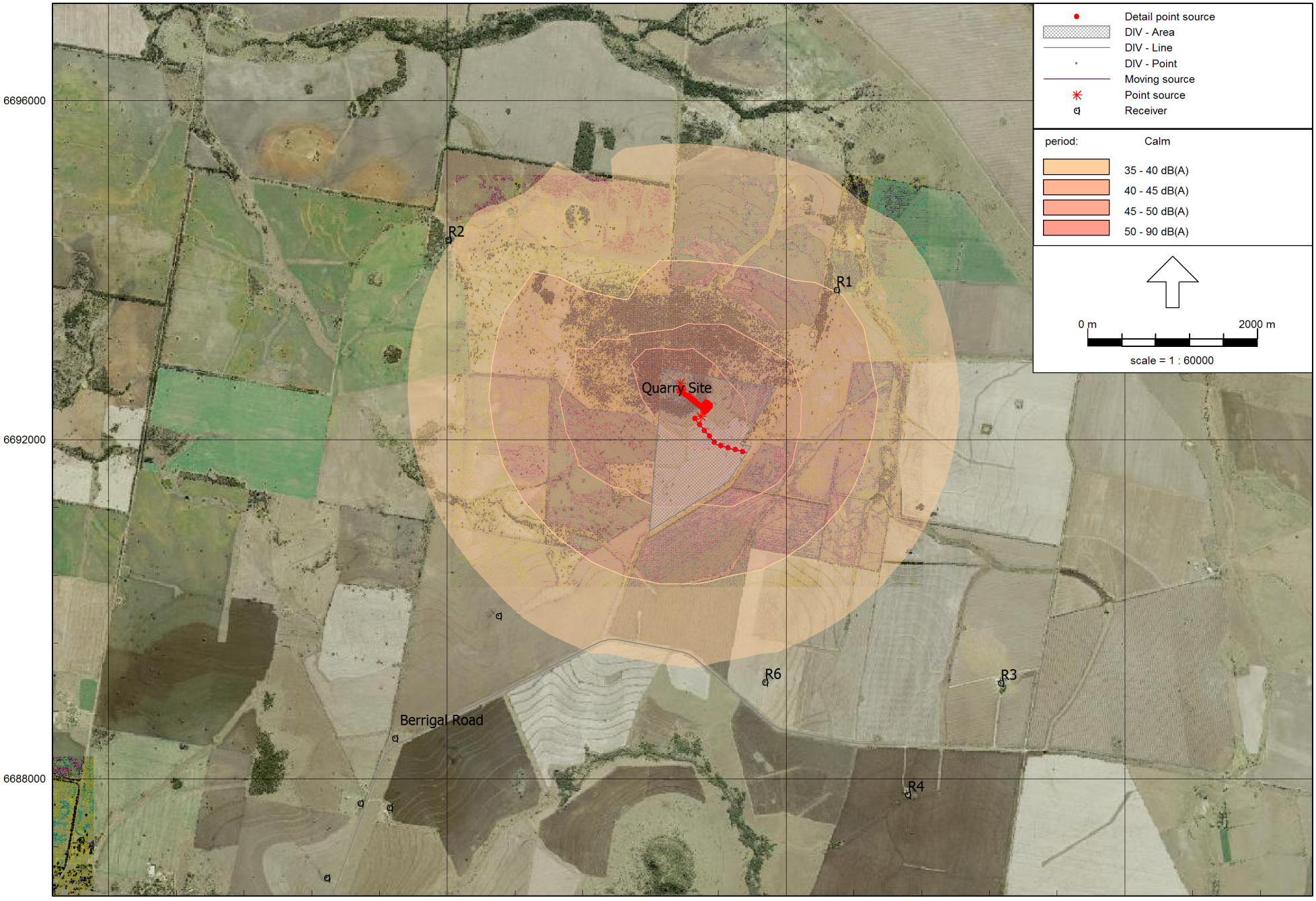

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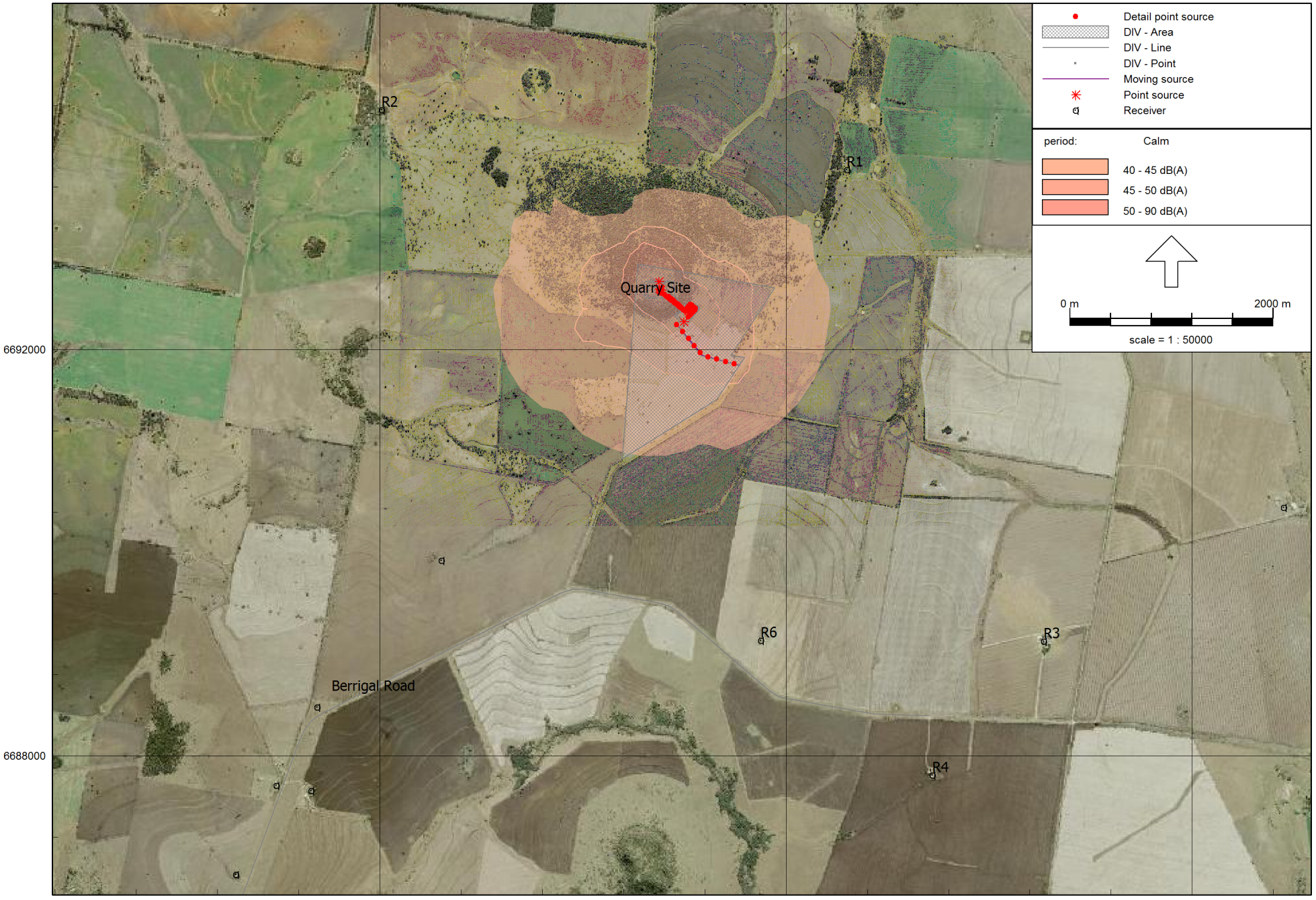
Operations Phase (Night, Adverse)

Advitech Pty Ltd



Operation Phase (Day, Non-adverse)

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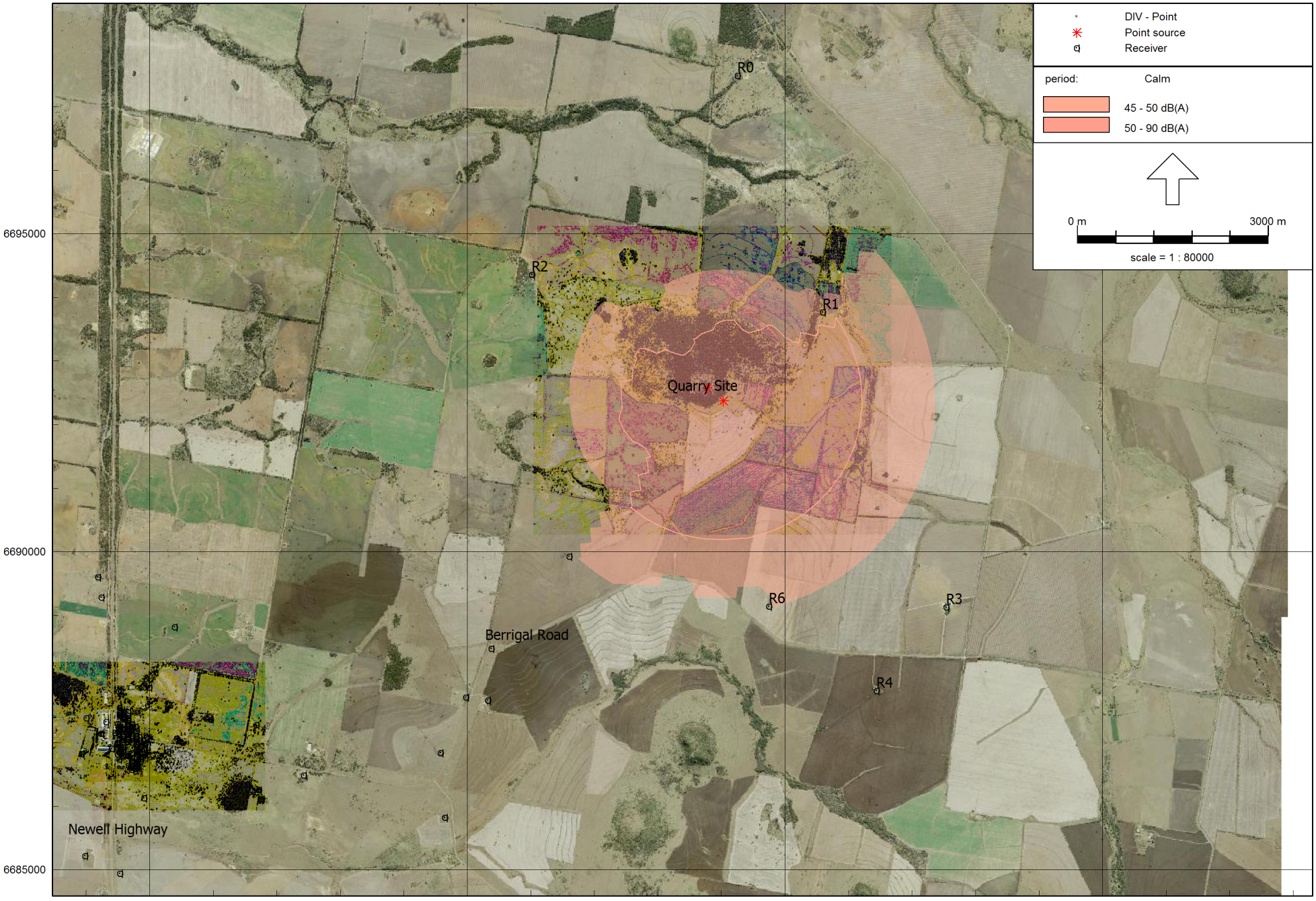

Operations Phase (LAMax)
Calm, SE, SSE, NW at 0.5m/s

Advitech Pty Ltd

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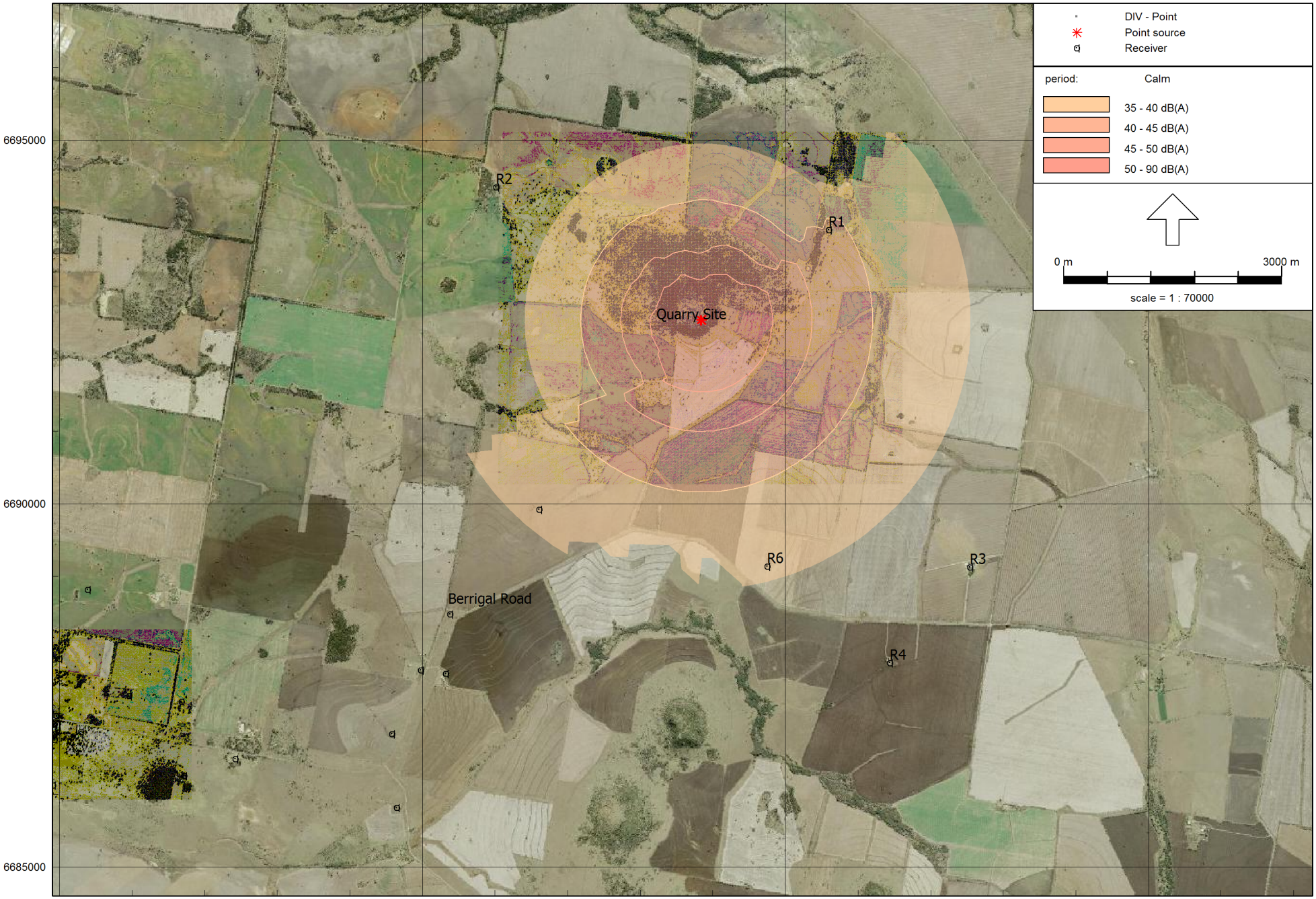

Construction Phase (Quarry Development)
Calm, SE, SSE, NW at 0.5m/s

Industrial noise - ISO 9613.1/2 (1/3 Octave), [RevisedWorking - Construction Phase (Quarry)] , Predictor V8.11

Advitech Pty Ltd

Appendix III Annoying Noise Assessment

AIII.1. INTRODUCTION

The Noise Policy for Industry (NPfI) acknowledges that there is evidence to suggest that noise containing certain characteristics (such as tonality, intermittency, irregularity or dominant low-frequency content) can cause greater annoyance than other noise at the same noise level. The NPfI establishes that the presence of these characteristics would attract a penalty as part of the assessment of noise impacts.

The Policy also acknowledges that some sources may cause less annoyance where only a single event occurs for a limited duration. Quantitively analysis methods that may be used to evaluate whether these characters are present in a noise emission are provided in Appendix C of the NPfI. This appendix also established how penalties (or other modifications to the assessment of noise impacts) should be applied.

Following a direction from the NSW EPA in correspondence dated 24 December 2020, assessment of noise emissions from the proposed development is undertaken with regards these characteristics.

AIII.2. METHODOLOGY

AIII.2.1. Noise with Intermittent Characters

The NPfI indicates that noise may be perceived as more annoying where emissions are intermittent or contain significant time-varying characteristics. The intermittent passage of trains or aircraft represent typical examples of intermittent noise. In an industrial noise setting, intermittency may be associated with trains entering and departing a rail terminal, or cycling noise emissions associated with some manufacturing process (e.g. load cycling of pump farms).

Appendix C of the NPfI establishes that penalties of up to +5dB (above measured source contributions) may be applicable where noise levels vary by 'more than 5dB and are clearly audible at the receiver'. Table C1 indicates that adjustments for intermittency are applicable only during the night period.

AIII.2.2. Noise of Limited Duration

Adjustments for limited duration events are applied to the noise limit (rather than the assessed level) in recognition that higher noise levels may be more acceptable where they occur only for a limited duration. Table C1 of the NPfI indicates that duration adjustments may be applicable where the duration of a single event is in the range 1.5 minute to 2.5 hours.

With the exception of blasting (which is assessed via alternate guidelines and sits outside the scope of the NPfI), the operation is not expected to include any short duration / high-level noise events. On this basis, potentially annoying noise characteristics associated this characteristic not considered further in this assessment.

AIII.2.3. Tonal Noise

Tonal noise includes emissions with a prominent frequency and may be characterised by a definite pitch. Common examples of tonal noise include reversing alarms on mobile plant, or insect noise. Quantitative tests for tonality typically require emissions in a 1/3 octave (or narrower) band to be emergent relative to side-bands.

Table C1 of the NPfI establishes that tonality may become annoying where the level of 1/3 octave band exceeds the level of the adjacent bands on both sides by:
5dB or more if the centre frequency of the band containing the tone is in the range 500Hz to 10kHz;
8 dB or more is the centre frequency of the band containing the tone is the in the range 160 to 400Hz;
15 dB or more is the centre frequency of the band containing the tone is the in the range 25 to 125Hz.

The NPfI also dictates that analysis should be applied to unweighted (or Z-weighted) 1/3 octave band measurement data. Review of existing NIA for this project indicates:
Section 7 of the NIA presents Sound Power Level (SWL) data for noise generating plant in terms of Total A-weighted levels;
the underlying noise model (utilising the ISO9613 calculation methodology) references 1/1 octave band SWL spectra.

Neither of these data are suitable for the assessment of tonal characters, which requires 1/3 octave spectra. Indeed, review of a range of publicly available NIA (via the NSW Major Projects Portal) indicates that assumptions relating to equipment SWL are overwhelming presented as 1/1 octave band levels; this prevents any assessment based on comparable quarry operations previously undertaken in NSW.

The paucity of publicly available SWL data in 1/3 octave reinforces the requirement for assessment of tonal characters on the basis of measurement data. Given the NIA considers a proposed greenfield quarry development, any measurement of the actual plant associated with the project is not possible so archived data from previous project work was reviewed in an effort to locate historical examples of 1/3 octave measurement data that may be representative of the plant proposed for this development.

Once a range of suitable data were identified, spectra were scaled to ensure total levels were equal to the assumed SWL for noise sources reported for this project. The range of potential spectra were then reviewed to eliminate any obvious outliers, and a median spectra representative of each of the noise sources outlined in Section 7 of the NIA calculated.

Given the analysis for tonality is applicable to the spectra received at off-site sensitive receptors (as opposed to that emitted by the source), further calculations were required to account for losses and changes to spectral composition associated with geometrical spreading and atmospheric absorption. These calculations were manually performed (using Microsoft Excel) on 1/3 octave band data in accordance with methodologies established in ISO9613. This allows the received 1/3 octave spectra to be assessed for potential tonal characters.

AIII.2.4. Low Frequency Noise

The NPfI identifies that noise with an unbalanced spectrum and containing major components in the low-frequency range (10 to 160Hz) may also be a source of potential annoyance. Appendix C of the NPfI establishes the following quantitative tests for LFN dominance:
Measure/assess source contribution C-and A-weighted $L_{eq,T}$ levels over same time period. Correction to be applied where the C minus A level is 15dB or more and:

- *where any of the one-third octave noise levels in Table C2 are exceeded by up to and including 5dB and cannot be mitigated, a 2dB(A) positive adjustment to the measured / predicted A-weighted levels applies for the evening / night period;*
- *where any of the one-third octave noise levels in Table C2 are exceeded by more than 5dB and cannot be mitigated, a 5dB(A) positive adjustment to the measured / predicted A-weighted levels applies for the evening / night period and a 2dB(A) positive adjustment applies for the day period.*

Table 31: One-third octave LFN thresholds (reproduced from Table C2 of the NPfI)

One-third octave band LZeq,15minute threshold level													
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

As with the assessment of tonal noise, this analysis requires access to 1/3 octave spectral data. It is worth noting that this test additionally requires data in the range less than 50Hz. Representative data in these frequency ranges may be difficult to locate as:
the ISO9613 calculation method establishes a lower frequency threshold at the 50Hz 1/1 octave band. This means that data in the range 10 to 50Hz may not be available where analysis relies upon SWL data used for common environmental noise modelling methods;
standard methods for the evaluation of SWL for noise sources (such as ISO2012, ISO6395) establish lower frequency thresholds at the 25Hz 1/3 octave band. While instrumentation may observe these data, analysis following standard methods may result in data <25Hz being discarded;
measurement at frequencies less than 20Hz typically requires special care and / or methods and instrumentation not typically considered for 'routine' environmental noise monitoring.

Advitech has specific experience in the measurement and assessment of LFN from ore and bulk materials processing activities (Sparke, 2015), and considers it unlikely that the proposed quarry operation would emit significant noise in the range <25Hz. As with the tests for tonal noise characters, review of historical and archived measurement data was relied upon to identify typical 1/3 octave spectra for analysis of potential LFN characteristics.

AIII.3. RESULTS

AIII.3.1. Intermittent Noise

Review of the proposed quarry operations indicates an emissions profile comprised of sources (or noise generating activities) that would typically operate continuously over the course of a day; emissions from processes within the quarry are unlikely to occur only intermittently or cycle significantly during an assessment period.

While some modulation of noise levels (i.e. increases and decreases in noise levels associated with (for example) loads on processing plants) may occur, typical operations are unlikely to result in intermittent noise emissions of the type referred to in Fact Sheet C of the NPfI. Notwithstanding, review of time-varying noise emissions typical of hard rock quarrying operations was carried out in order to evaluate the potential for this activity to generate intermittent-like characters.

Analysis in **Table 32** presents results of noise monitoring previously undertaken by Advitech at a range of hard-rock quarrying projects across NSW. These results indicate typically continuous noise levels, with emissions typically only varying by 2dB about the median level.

Table 32: Assessment of typical time varying characters of hard rock quarries

Description of Quarry	Measurement Location	Measured Levels Quarry Operations	Time Varying Characters
Hard Rock Quarry with Crushing (Primary and Secondary) Screening and Processing, NW NSW (2016)	Adjacent to processing area, approx. 50m from plant (15-minute measurement duration x 2 replicates)	L10 = 79dB(A) Median = 77 B(A) L90 = 75dB(A)	+/- 2dB(A) around median (4dBA total variance)
Hard Rock Quarry with Crushing (Primary and Secondary) and Screening, Hunter Valley 2019	Within processing area, approx. 80m from primary crusher (2-hour measurement duration)	L10 = 68dB(A) Median = 66dB(A) L90 = 64dB(A)	+/- 2dB(A) around median (4dBA total variance)
Hard Rock Quarry with Crushing (Primary and Secondary) and Screening, Southern Highlands 2013	Offsite sensitive receiver, approximately 900m from processing plant (15 min measurement duration)	L10 = 36dB(A) Median = 34B(A) L90 = 33dB(A)	+/- 2dB(A) around median (4dBA total variance)

Historical measurement data from a range of typical quarrying operations suggests that emissions from this type of industrial process are unlikely to have significant time-varying characters and thus present low risk of intermittent noise emissions.

AIII.3.2. Tonal Noise and Low Frequency Dominance

Review of previous project work and historical monitoring data held by Advitech was undertaken to identify 1/3 octave spectra representative of equipment proposed as part of the Meppem Quarry. As part of this review, spectral data were sourced from:
measurement data (as Sound Pressure Levels) from mining, quarrying and other bulk materials projects (e.g. concrete batching plants);
reported Sound Power Level data, obtained through equipment testing carried out (or reports held) by Advitech.

The objective of this review was to understand the relative shape of the emissions spectra rather than absolute levels, so all spectra were scaled to SWL equal to the total A-wt levels presented in Section 7 of the NIA. A summary of 1/3 octave spectral data is provided in **Table 33, Figure 4** and **Figure 4**.

Table 33: Review of historical monitoring data to derive 1/3 spectra

Source	Data Type	No Spectra	Types of Equipment / Activities Referenced	Comment
Grader	Evaluated SWL	16	CAT140M, CAT14H, CAT16M, CAT16H and CAT24M	Likely larger plant that will be utilised by project, should conservatively represent potential LFN issues
Crushing and Screening Plant	Mix of SWL and SPL	7	Aggregate spectra representative of hard rock crushing and screening plant from 2 quarries in northern NSW	Impractical to isolate spectra for individual items of plant (i.e. crushing, screening, sizing plant). This plant tends not to run in isolation of each other so aggregate spectra should be representative of typical emissions profile
Dozer	Evaluated SWL	17	CATD6, CAT D7, CAT D8 and CAT D10	Mix of dynamic and static SWL spectra
Front End Loader	Evaluated SWL	26	CAT980, CAT988, and CAT992	Mix of dynamic and static SWL spectra under controlled test conditions and from different operations
Drill	Measured SPL	7	Rock Pilot Drill	Measurements around perimeter of machine capture variation in spectra due to directionality
Road Trucks	Measured SPL	7	Range of Truck and Dog	Manoeuvring around stockpiles and yards, pulling through weighbridge
Haul Truck	Evaluated SWL	8	CAT777 & CAT785	Likely larger plant than will be utilised by project, should conservatively represent potential LFN issues
Excavator	Evaluated SWL	11	CAT336, CAT349 and CAT374	Similar size to that assumed by NIA

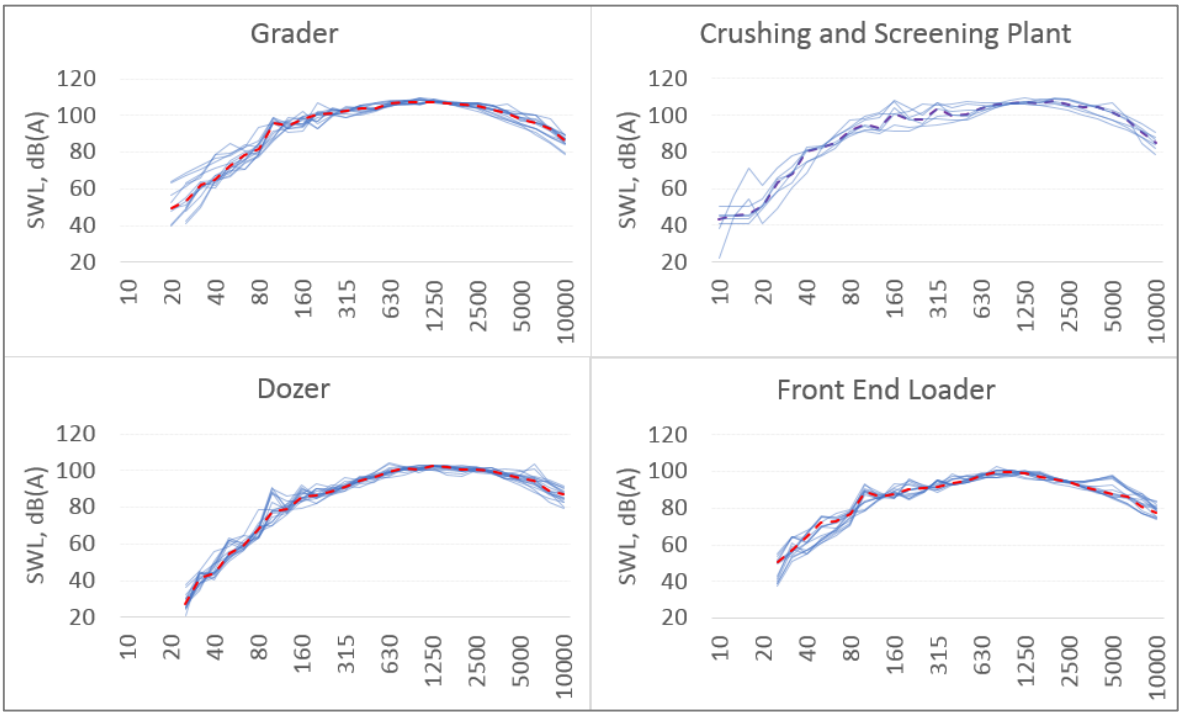

Figure 3: Representative spectra for significant noise generating plant (grader, quarry plant, dozer and front end loader)

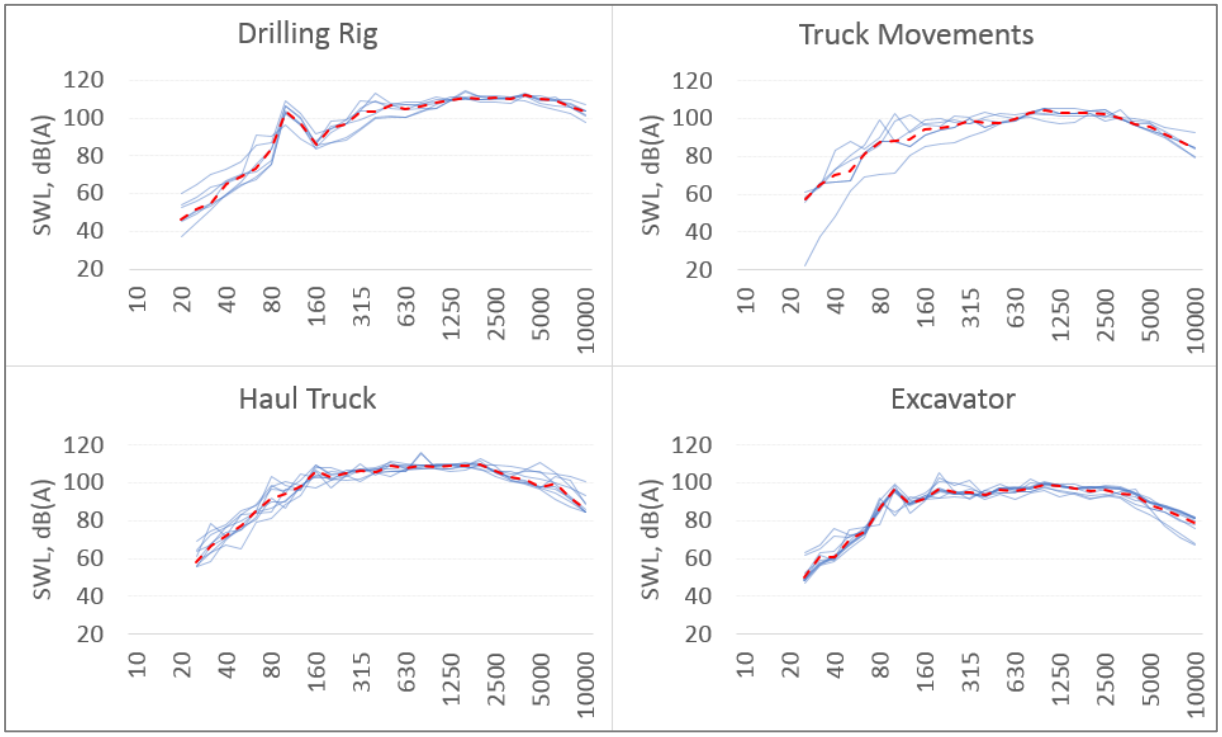

Figure 4: Representative spectra for significant noise generating plant (drilling, road truck movements, haul trucks in quarry and excavator)

These indicative 1/3 octave SWL spectra were then used to evaluate a received 1/3 octave spectrum at each of the sensitive receivers adjacent to the proposed development. Calculations were performed for each source-receiver pairing and accounted for loss over distance and attenuation in each 1/3 octave band due to atmospheric absorption. This enabled assessment of received spectra for individual noise sources, ensuring that:

any potentially annoying spectral characters were not masked via aggregation of emissions from all noise sources;

modifications could be applied (if required) to the source of the annoying noise (e.g. drilling noise) rather than a blanket penalty of the entire project emission.

Analysis in **Figure 5** and **Figure 6** provides a examples the evaluated spectra indicative of a receiver location approximately 2000m from the development site. The received spectra for each source-receiver pairing were then assessed using the quantitative analysis tests for Tonality and LFN dominance established in Appendix C of the NPfI. The results of this assessment are summarised in **Table 34**, **Table 35**, **Table 36**, **Table 37**, and **Table 38**.

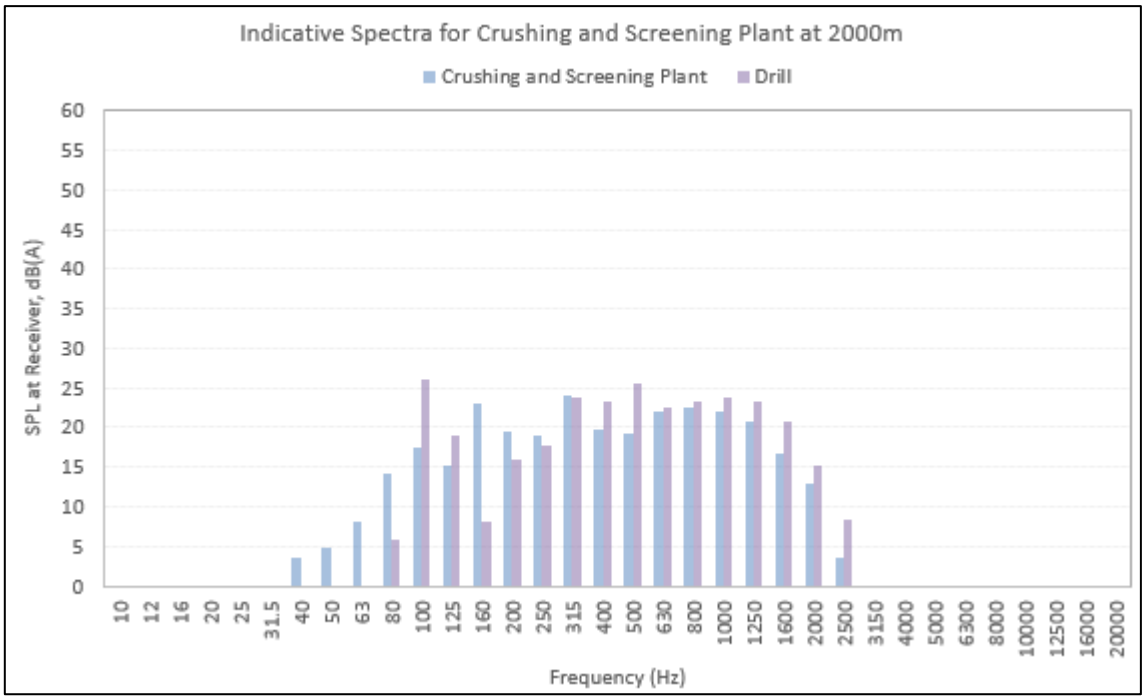

Figure 5: Indicative received spectra at receiver 2000m from quarry (analysis of potential tonality)

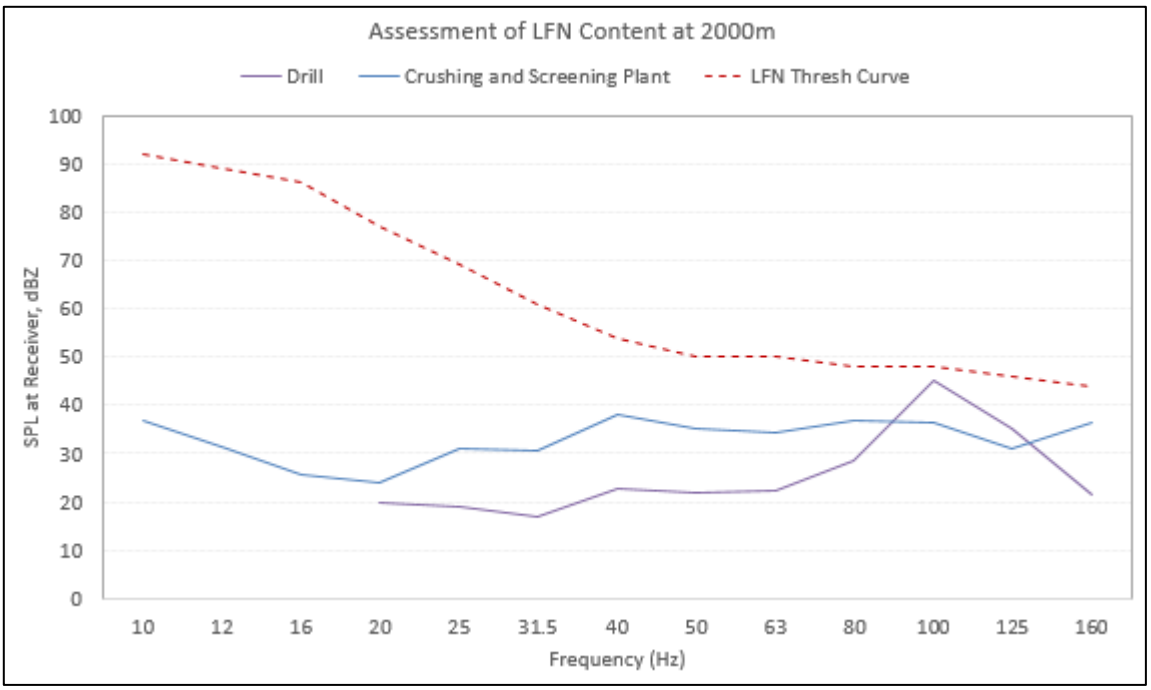

Figure 6: Indicative spectra at receiver 2000m from quarry against LFN threshold curve

Table 34: Tests for tonal and low frequency characters, R0 (5000m to North)

Noise Source	Tonality Detected?	C-wt minus A-wt (dB)	Exceed Appendix C LFN Thresh Curve?
Grader	No	12	No
Crushing and Screening Plant	No	16	No
Dozer	No	8	No
FEL	No	14	No
Drill	No	16	No
Trucks	No	15	No
Excavator	No	16	No
Haul Truck	No	13	No

Table 35: Tests for tonal and low frequency characters, R1 (2000m to North-east)

Noise Source	Tonality Detected?	C-wt minus A-wt (dB)	Exceed Appendix C LFN Thresh Curve?
Grader	No	9	No
Crushing and Screening Plant	No	12	No
Dozer	No	4	No
FEL	No	10	No
Drill	No	12	No
Trucks	No	11	No
Excavator	No	14	No
Haul Truck	No	10	No

Table 36: Tests for tonal and low frequency characters, R2 (3000m to North-west)

Noise Source	Tonality Detected?	C-wt minus A-wt (dB)	Exceed Appendix C LFN Thresh Curve?
Grader	No	10	No
Crushing and Screening Plant	No	14	No
Dozer	No	6	No
FEL	No	12	No
Drill	No	14	No
Trucks	No	12	No
Excavator	No	15	No
Haul Truck	No	11	No

Table 37: Tests for tonal and low frequency characters, R3 (5000m to south-east)

Noise Source	Tonality Detected?	C-wt minus A-wt (dB)	Exceed Appendix C LFN Thresh Curve?
Grader	No	12	No
Crushing and Screening Plant	No	16	No
Dozer	No	8	No
FEL	No	14	No
Drill	No	16	No
Trucks	No	15	No
Excavator	No	16	No
Haul Truck	No	13	No

Table 38: Tests for tonal and low frequency characters, R6 (3200m to South-south-east)

Noise Source	Tonality Detected?	C-wt minus A-wt (dB)	Exceed Appendix C LFN Thresh Curve?
Grader	No	11	No
Crushing and Screening Plant	No	14	No
Dozer	No	6	No
FEL	No	12	No
Drill	No	14	No
Trucks	No	13	No
Excavator	No	15	No
Haul Truck	No	11	No

Results of quantitative testing carried out in accordance with the provisions of Appendix C of the NPfI indicate that potentially annoying tonal or low frequency noise characters are not expected at any sensitive receivers adjacent to the proposed development. It is noted that the differential between A-weighted and C-weighted noise levels does exceed the 15dB screening threshold established in Table C1 of the NPfI, in some instances. However, previous work (Parnell, 2015) indicates that this often a relic of differential attenuation via atmospheric absorption, rather than a skew towards low frequency emissions driven purely by source characteristics. In no instance did the noise levels at the receivers exceed the low frequency noise threshold curve.

Appendix IV Road Traffic Noise Receiver Analysis

A1: Road traffic noise receivers assessed under the day period criteria

Receiver	Catchment	Criteria Level dB(A) ($L_{Aeq,15hour}$)	Existing Level dB(A)	Receiver Currently Exceeding Criteria?	Predicted Level (Build option) dB(A)	Receiver Exceeding Criteria as a Result of Build?	Relative Increase dB(A)
1 Gurley Street	Bellata Township	60	53	No	53	No	0.1
10 Wilga Street	Bellata Township	60	55	No	55	No	0.2
10 Yarren Street	Bellata Township	60	54	No	54	No	0.2
11 Gurley Street	Bellata Township	60	53	No	53	No	0.2
11 Millie Road	Bellata Township	60	58	No	59	No	0.2
11 Yarren Street	Bellata Township	60	55	No	55	No	0.1
12 Temi Street	Bellata Township	60	56	No	56	No	0.2
12 Yarren Street	Bellata Township	60	54	No	54	No	0.2
13 Wilga Street	Bellata Township	60	55	No	55	No	0.2
14 Railway Parade	Bellata Township	60	60	No	60	No	0.1
14 Temi Street	Bellata Township	60	55	No	55	No	0.2
14 Yarren Street	Bellata Township	60	54	No	54	No	0.2
15 Belar Street	Bellata Township	60	57	No	57	No	0.1
15 Gurley Street	Bellata Township	60	53	No	53	No	0.2
15 Yarren Street	Bellata Township	60	55	No	55	No	0.2
16 Gurley Street	Bellata Township	60	52	No	52	No	0.2
16 Temi Street	Bellata Township	60	55	No	55	No	0.1
16 Wilga Street	Bellata Township	60	54	No	54	No	0.1
16 Yarren Street	Bellata Township	60	54	No	54	No	0.2
16-20 Yarren Street	Bellata Township	60	54	No	54	No	0.2
16696 Newell Highway	Bellata Township	60	51	No	52	No	0.3
16716 Newell Highway	Bellata Township	60	63	Yes	64	No	0.1
16a Belar Street	Bellata Township	60	55	No	56	No	0.2
17 Gurley Street	Bellata Township	60	53	No	53	No	0.2
17 Wilga Street	Bellata Township	60	54	No	54	No	0.2
17 Yarren Street	Bellata Township	60	54	No	55	No	0.2
18 Belar Street	Bellata Township	60	56	No	56	No	0.2
18 North Street	Bellata Township	60	54	No	54	No	0.2
18 Railway Parade	Bellata Township	60	62	Yes	62	No	0.2
18 Temi Street	Bellata Township	60	54	No	54	No	0.2
18 Yarren Street	Bellata Township	60	54	No	54	No	0.2
19 Belar Street	Bellata Township	60	57	No	57	No	0.2
19 Gurley Street	Bellata Township	60	53	No	53	No	0.2

20 North Street	Bellata Township	60	53	No	53	No	0.1
20 Railway Parade	Bellata Township	60	60	No	60	Yes	0.2
20 Temi Street	Bellata Township	60	54	No	54	No	0.1
20 Yarren Street	Bellata Township	60	54	No	54	No	0.2
20a Yarren Street	Bellata Township	60	54	No	54	No	0.2
21 Belar Street	Bellata Township	60	57	No	57	No	0.2
21 Gurley Street	Bellata Township	60	53	No	53	No	0.2
22 Railway Parade (Fire Station)	Bellata Township	-[3]	64	-[3]	64	-[3]	0.2
23 Belar Street	Bellata Township	60	57	No	57	No	0.2
23 Gurley Street	Bellata Township	60	53	No	53	No	0.2
24 Railway Parade (Police Station)	Bellata Township	-[3]	64	-[3]	64	-[3]	0.2
24 Yarren Street	Bellata Township	60	53	No	53	No	0.1
25 Wilga Street	Bellata Township	60	52	No	53	No	0.1
25 Yarren Street	Bellata Township	60	54	No	54	No	0.1
26 Railway Parade	Bellata Township	60	64	Yes	65	No	0.3
26 Yarren Street	Bellata Township	60	53	No	53	No	0.2
27 Belar Street	Bellata Township	60	57	No	57	No	0.2
27 Gurley Street	Bellata Township	60	52	No	53	No	0.2
28 Belar Street	Bellata Township	60	55	No	55	No	0.1
28 Railway Parade (Post Office)	Bellata Township	-[3]	65	-[3]	65	-[3]	0.3
28 Yarren Street	Bellata Township	60	53	No	53	No	0.2
3 Gurley Street	Bellata Township	60	53	No	53	No	0.1
30 Yarren Street	Bellata Township	60	53	No	53	No	0.2
31 Belar Street	Bellata Township	60	57	No	57	No	0.3
32 Belar Street	Bellata Township	60	55	No	55	No	0.2
32 Railway Parade	Bellata Township	60	60	Yes	60	No	0.2
33 Belar Street	Bellata Township	60	57	No	57	No	0.2
34 Belar Street	Bellata Township	60	55	No	55	No	0.2
34 Yarren Street	Bellata Township	60	53	No	53	No	0.2
35 Belar Street	Bellata Township	60	57	No	57	No	0.2
35 Gurley Street	Bellata Township	60	52	No	52	No	0.2
35 Yarren Street	Bellata Township	60	54	No	54	No	0.2
36 Belar Street	Bellata Township	60	55	No	55	No	0.2
36 Yarren Street	Bellata Township	60	53	No	53	No	0.2
37 Belar Street	Bellata Township	60	57	No	57	No	0.2
37 Yarren Street	Bellata Township	60	54	No	54	No	0.2
38 Belar Street	Bellata Township	60	55	No	55	No	0.3

38 Railway Parade	Bellata Township	60	61	Yes	61	No	0.2
38 Yarren Street (Commercial)	Bellata Township	-[3]	53	-[3]	53	-[3]	0.2
39 Yarren Street	Bellata Township	60	54	No	54	No	0.3
40 Belar Street	Bellata Township	60	55	No	55	No	0.3
40 Railway Parade (Commercial)	Bellata Township	-[3]	65	-[3]	65	-[3]	0.2
42 Railway Parade	Bellata Township	60	62	Yes	62	No	0.2
43 Belar Street	Bellata Township	60	57	No	57	No	0.2
44 Railway Parade	Bellata Township	60	62	No	62	No	0.3
45 Belar Street	Bellata Township	60	57	No	57	No	0.3
45 Berrigal Road	Bellata Township	60	51	No	51	No	0.2
46 Belar Street	Bellata Township	60	55	No	55	No	0.3
46 Berrigal Road School	Bellata Township	40 (internal)[2]	42[2]	Yes	42[2]	No	0.2
46 Railway Parade	Bellata Township	60	62	Yes	63	No	0.2
47 Belar Street	Bellata Township	60	57	No	57	No	0.3
48 Belar Street	Bellata Township	50	55	Yes	55	No	0.3
48 Railway Parade	Bellata Township	60	64	Yes	64	No	0.2
49 Belar Street	Bellata Township	60	57	No	57	No	0.2
5 Gurley Street	Bellata Township	60	53	No	53	No	0.1
5 Yarren Street	Bellata Township	60	55	No	55	No	0.1
50 Belar Street	Bellata Township	60	55	No	55	No	0.3
51 Belar Street	Bellata Township	60	57	No	57	No	0.3
54 Railway Parade	Bellata Township	60	61	Yes	61	No	0.2
55 Belar Street	Bellata Township	60	57	No	57	No	0.4
6 Wilga Street	Bellata Township	60	57	No	58	No	0.2
6 Yarren Street	Bellata Township	60	54	No	54	No	0.2
60 Belar Street	Bellata Township	60	55	No	55	No	0.3
60 Railway Parade	Bellata Township	60	60	No	60	Yes	0.2
62 Railway Parade	Bellata Township	60	62	Yes	62	No	0.2
7 Gurley Street	Bellata Township	60	53	No	53	No	0.1
70 Railway Parade	Bellata Township	60	60	Yes	60	No	0.4
8 Wilga Street	Bellata Township	60	57	No	57	No	0.1
80 Berrigal Road	Bellata Township	60	49	No	49	No	0.2
9 Gurley Street	Bellata Township	60	53	No	53	No	0.1
9 Yarren Street	Bellata Township	60	55	No	55	No	0.1
Lot 10 Gurley Street	Bellata Township	60	53	No	53	No	0.1
291 Boo Boo Rd	Boo Boo Road	55[1]	32	No	44	No	13.9
74 Boo Boo Rd	Boo Boo Road	55[1]	29	No	41	No	14.0
17 Millie Street	Gurley Township	60	54	No	54	No	0.2

2 Bellata Street	Gurley Township	60	58	No	58	No	0.2
21 Gurley Street	Gurley Township	60	65	Yes	66	No	0.5
25 Gurley Street	Gurley Township	60	66	Yes	67	No	0.5
27 Keith Smith Place	Gurley Township	55	57	Yes	57	No	0.1
31 Gurley Street	Gurley Township	55	65	Yes	66	No	0.5
34 Bellata Street	Gurley Township	60	65	Yes	66	No	0.5
41 Gurley Street	Gurley Township	60	64	Yes	64	No	0.4
5 Gurley Street	Gurley Township	60	62	Yes	62	No	0.4
9 Millie Street	Gurley Township	60	56	No	56	No	0.3
Fire station - Bush	Gurley Township	-[3]	53	-[3]	53	-[3]	0.2
Post Office	Gurley Township	-[3]	66	-[3]	67	-[3]	0.6
Sherwood Homestead 27 Keith St	Gurley Township	60	56	No	57	No	0.2
Wyndella Homestead 18583 Newell Hwy	Gurley Township	60	54	No	55	No	0.2
16430 Newell Highway	Newell Highway	60	61	Yes	62	No	0.1
16451 Newell Highway	Newell Highway	60	53	No	54	No	0.1
16831 Newell Highway	Newell Highway	60	57	No	57	No	0.2
16833 Newell Highway	Newell Highway	60	55	No	55	No	0.2

Note 1: Boo Boo Road is identified as local road and is assessed under $L_{Aeq\ 1hour}$ for both Day and Night period.

Note 2: screening external noise criteria of internal + 10dB adopted in order to evaluate potential impacts based on external noise levels. A 10dB difference between internal and external noise levels was adopted based on guidance provided in Section 2.5.4 of the RNP.

Note 3: Commercial facilities not assessed against criteria in accordance with Table 4 of the RNP.

A2: Road traffic noise receivers assessed under the night period criteria

Receiver	Catchment	Criteria Level dB(A) ($L_{Aeq,9hour}$)	Existing Level dB(A)	Receivers Currently Exceeding Criteria?	Predicted Level (Build option) dB(A)	Receiver Exceeding Criteria as a Result of Build?	Relative Increase dB(A)
1 Gurley Street	Bellata Township	55	49	No	49	No	0.1
10 Wilga Street	Bellata Township	55	51	No	51	No	0.1
10 Yarren Street	Bellata Township	55	50	No	50	No	0.0
11 Gurley Street	Bellata Township	55	49	No	49	No	0.1
11 Millie Road	Bellata Township	55	55	No	55	No	0.1
11 Yarren Street	Bellata Township	55	51	No	51	No	0.0
12 Temi Street	Bellata Township	55	52	No	52	No	0.0
12 Yarren Street	Bellata Township	55	50	No	50	No	0.1
13 Wilga Street	Bellata Township	55	51	No	51	No	0.1
14 Railway Parade	Bellata Township	55	56	Yes	56	No	0.1
14 Temi Street	Bellata Township	55	51	No	51	No	0.1
14 Yarren Street	Bellata Township	55	50	No	50	No	0.1
15 Belar Street	Bellata Township	55	54	No	54	No	0.1
15 Gurley Street	Bellata Township	55	49	No	49	No	0.1
15 Yarren Street	Bellata Township	55	51	No	51	No	0.1
16 Gurley Street	Bellata Township	55	48	No	48	No	0.1
16 Temi Street	Bellata Township	55	51	No	51	No	0.0
16 Wilga Street	Bellata Township	55	50	No	50	No	0.1
16 Yarren Street	Bellata Township	55	50	No	50	No	0.1
16-20 Yarren Street	Bellata Township	55	50	No	50	No	0.1
16696 Newell Highway	Bellata Township	55	48	No	48	No	0.2
16716 Newell Highway	Bellata Township	55	60	Yes	60	No	0.0
16a Belar Street	Bellata Township	55	52	No	52	No	0.0
17 Gurley Street	Bellata Township	55	49	No	49	No	0.0
17 Wilga Street	Bellata Township	55	50	No	50	No	0.1
17 Yarren Street	Bellata Township	55	51	No	51	No	0.1
18 Belar Street	Bellata Township	55	52	No	52	No	0.1
18 North Street	Bellata Township	55	50	No	50	No	0.1
18 Railway Parade	Bellata Township	55	58	Yes	58	No	0.1
18 Temi Street	Bellata Township	55	50	No	50	No	0.0
18 Yarren Street	Bellata Township	55	50	No	50	No	0.1
19 Belar Street	Bellata Township	55	54	No	54	No	0.1
19 Gurley Street	Bellata Township	55	49	No	49	No	0.1
20 North Street	Bellata Township	55	50	No	50	No	0.1

20 Railway Parade	Bellata Township	55	56	Yes	56	No	0.1
20 Temi Street	Bellata Township	55	50	No	50	No	0.0
20 Yarren Street	Bellata Township	55	50	No	50	No	0.1
20a Yarren Street	Bellata Township	55	50	No	50	No	0.1
21 Belar Street	Bellata Township	55	53	No	53	No	0.1
21 Gurley Street	Bellata Township	55	49	No	49	No	0.0
22 Railway Parade (Fire Station)	Bellata Township	-[3]	58	-[3]	58	-[3]	0.1
23 Belar Street	Bellata Township	55	53	No	53	No	0.1
23 Gurley Street	Bellata Township	55	49	No	49	No	0.1
24 Railway Parade (Police Station)	Bellata Township	-[3]	58	-[3]	58	-[3]	0.1
24 Yarren Street	Bellata Township	55	50	No	50	No	0.1
25 Wilga Street	Bellata Township	55	49	No	49	No	0.1
25 Yarren Street	Bellata Township	55	50	No	50	No	0.1
26 Railway Parade	Bellata Township	55	58	Yes	58	No	0.2
26 Yarren Street	Bellata Township	55	49	No	49	No	0.1
27 Belar Street	Bellata Township	55	53	No	53	No	0.1
27 Gurley Street	Bellata Township	55	49	No	49	No	0.1
28 Belar Street	Bellata Township	55	51	No	51	No	0.1
28 Railway Parade (Post Office)	Bellata Township	-[3]	58	-[3]	58	-[3]	0.2
28 Yarren Street	Bellata Township	55	49	No	49	No	0.1
3 Gurley Street	Bellata Township	55	49	No	49	No	0.1
30 Yarren Street	Bellata Township	55	49	No	49	No	0.1
31 Belar Street	Bellata Township	55	53	No	53	No	0.1
32 Belar Street	Bellata Township	55	51	No	51	No	0.1
32 Railway Parade	Bellata Township	55	56	Yes	56	No	0.1
33 Belar Street	Bellata Township	55	53	No	53	No	0.1
34 Belar Street	Bellata Township	55	51	No	51	No	0.1
34 Yarren Street	Bellata Township	55	49	No	49	No	0.1
35 Belar Street	Bellata Township	55	53	No	53	No	0.1
35 Gurley Street	Bellata Township	55	48	No	48	No	0.1
35 Yarren Street	Bellata Township	55	50	No	50	No	0.2
36 Belar Street	Bellata Township	55	51	No	51	No	0.1
36 Yarren Street	Bellata Township	55	49	No	49	No	0.1
37 Belar Street	Bellata Township	55	53	No	53	No	0.1
37 Yarren Street	Bellata Township	55	50	No	50	No	0.1
38 Belar Street	Bellata Township	55	51	No	51	No	0.2
38 Railway Parade	Bellata Township	55	57	Yes	57	No	0.1

38 Yarren Street (Commercial)	Bellata Township	-	49	No	49	No	0.1
39 Yarren Street	Bellata Township	55	50	No	50	No	0.1
40 Belar Street	Bellata Township	55	51	No	51	No	0.1
40 Railway Parade (Commercial)	Bellata Township	-[3]	58	-[3]	58	-[3]	0.2
42 Railway Parade	Bellata Township	55	58	Yes	58	No	0.1
43 Belar Street	Bellata Township	55	53	No	53	No	0.1
44 Railway Parade	Bellata Township	55	58	Yes	58	No	0.1
45 Belar Street	Bellata Township	55	53	No	53	No	0.1
45 Berrigal Road	Bellata Township	55	47	No	47	No	0.1
46 Belar Street	Bellata Township	55	51	No	51	No	0.1
46 Berrigal Road School	Bellata Township	-[2]	48	-[2]	48	-[2]	0.1
46 Railway Parade	Bellata Township	55	58	Yes	58	No	0.1
47 Belar Street	Bellata Township	55	53	No	53	No	0.2
48 Belar Street	Bellata Township	55	51	No	51	No	0.2
48 Railway Parade	Bellata Township	55	58	Yes	58	No	0.1
49 Belar Street	Bellata Township	55	53	No	53	No	0.2
5 Gurley Street	Bellata Township	55	49	No	49	No	0.1
5 Yarren Street	Bellata Township	55	51	No	51	No	0.1
50 Belar Street	Bellata Township	55	51	No	51	No	0.2
51 Belar Street	Bellata Township	55	53	No	53	No	0.2
54 Railway Parade	Bellata Township	55	57	Yes	57	No	0.2
55 Belar Street	Bellata Township	55	53	No	53	No	0.2
6 Wilga Street	Bellata Township	55	54	No	54	No	0.1
6 Yarren Street	Bellata Township	55	50	No	50	No	0.0
60 Belar Street	Bellata Township	55	52	No	52	No	0.3
60 Railway Parade	Bellata Township	55	56	Yes	56	No	0.1
62 Railway Parade	Bellata Township	55	58	Yes	58	No	0.2
7 Gurley Street	Bellata Township	55	49	No	49	No	0.1
70 Railway Parade	Bellata Township	55	56	Yes	56	No	0.3
8 Wilga Street	Bellata Township	55	53	No	53	No	0.1
80 Berrigal Road	Bellata Township	55	45	No	45	No	0.1
9 Gurley Street	Bellata Township	55	49	No	49	No	0.1
9 Yarren Street	Bellata Township	55	51	No	51	No	0.0
Lot 10 Gurley Street	Bellata Township	55	49	No	49	No	0.1
291 Boo Boo Rd	Boo Boo Road	50[1]	37	No	37	No	13.9
74 Boo Boo Rd	Boo Boo Road	50[1]	34	No	34	No	14.0
17 Millie Street	Gurley Township	55	50	No	50	No	0.1
2 Bellata Street	Gurley Township	55	54	No	54	No	0.1

21 Gurley Street	Gurley Township	55	59	Yes	59	No	0.2
25 Gurley Street	Gurley Township	55	59	Yes	59	No	0.3
27 Keith Smith Place	Gurley Township	50	53	Yes	53	No	0.1
31 Gurley Street	Gurley Township	50	59	Yes	59	No	0.2
34 Bellata Street	Gurley Township	55	59	Yes	59	No	0.3
41 Gurley Street	Gurley Township	55	58	Yes	58	No	0.2
5 Gurley Street	Gurley Township	55	58	Yes	58	No	0.1
9 Millie Street	Gurley Township	55	52	No	52	No	0.1
Fire station - Bush	Gurley Township	-[3]	49	-[3]	49	-[3]	0.1
Post Office	Gurley Township	-[3]	59	-[3]	59	-[3]	0.4
Sherwood Homestead 27 Keith St	Gurley Township	55	52	No	52	No	0.1
Wyndella Homestead 18583 Newell Hwy	Gurley Township	55	51	No	51	No	0.1
16430 Newell Highway	Newell Highway	55	58	Yes	58	No	0.1
16451 Newell Highway	Newell Highway	55	49	No	49	No	0.0
16831 Newell Highway	Newell Highway	55	53	No	53	No	0.0
16833 Newell Highway	Newell Highway	55	51	No	51	No	0.1
Receiver R0	Boo Boo Rd	50[1]	28	No	41	No	12.7
Receiver R1	Manamoi Rd	50[1]	24	No	37	No	13.0
Receiver R3	Manamoi Rd	50[1]	16	No	29	No	13.2
Receiver R6	Manamoi Rd	50[1]	14	No	27	No	12.8

Note 1: Manamoi Road and Boo Boo Road are identified as local road and is assessed under $L_{Aeq\ 1hour}$ for both Day and Night period.

Note 2: School receiver not assessable during the night period based on guidance provided in Section 2.5.4 of the RNP.

Note 3: Commercial facilities not assessed against criteria in accordance with Table 4 of the RNP.

Appendix V Road Construction Noise Receiver Analysis

Table 39: Additional mitigation measures (see CNVG for further information)

Abbreviation	Name	Description
N	Notification	Advanced warning of works and potential disruptions – may consist of a letterbox drop (or equivalent)
SN	Specific Notifications	Additional information supplied to receivers who will receive higher impacts
PC	Phone Calls	Phone calls detailing relevant information, providing a chance to give individualised advice and for receivers to provide comment
IB	Individual Briefings	In-person meetings with receivers to discuss potentially disturbing construction activities
RO	Respite Offer	Offer affected receivers an altered work schedule with respite periods incorporated
R1	Respite Period 1	Restriction on consecutive working days for OOHW1
R2	Respite Period 2	Restriction on consecutive working days for OOHW2
DR	Duration Respite	Where a respite period would otherwise be applied, optionally consult receivers to determine whether they would prefer work to continue to shorten the disruption period
AA	Alternative Accommodation	Provide alternative accommodation options to residents
V	Verification	Conduct measurements of noise levels during construction

Table 40: Road Construction Impacts - Earthworks near 74 Boo Boo Road

Receiver Name	Received Level	Weekday (Mon-Fri)						Saturday								Sunday/Public Holiday					
		Day Standard		Evening OOHW1		Night OOHW2		Day Standard		Day OOHW1		Evening OOHW1		Night OOHW2		Day OOHW1		Evening OOHW2		Night OOHW2	
		Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation
Residential Receiver 2	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 6	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 3	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 1	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 0	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
17 Millie Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
2 Bellata Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
21 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
25 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
27 Keith Smith Place	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
31 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
34 Bellata Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
41 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
5 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
9 Millie Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Firestation - Bush	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Post Office	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
SHERWOOD Homestead 27 Keith St	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
WYNDELLA Homestead 18583 NEWELL Hwy	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
291 Boo Boo Rd	39	Quiet	nil	Noticeable	nil	Noticeable	nil	Quiet	nil	Quiet	nil	Noticeable	nil	Noticeable	nil	Quiet	nil	Noticeable	nil	Noticeable	nil
74 Boo Boo Rd	59	Moderately Intrusive	N, V	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR	Moderately Intrusive	N, V	Moderately Intrusive	N, V	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR	Moderately Intrusive	N, V	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR

Table 41: Road Construction Impacts - Earthworks near 291 Boo Boo Road

Receiver Name	Received Level	Weekday (Mon-Fri)						Saturday								Sunday/Public Holiday					
		Day Standard		Evening OOHW1		Night OOHW2		Day Standard		Day OOHW1		Evening OOHW1		Night OOHW2		Day OOHW1		Evening OOHW2		Night OOHW2	
		Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation
Residential Receiver 2	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 6	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 3	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 1	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 0	26	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
17 Millie Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
2 Bellata Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
21 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
25 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
27 Keith Smith Place	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
31 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
34 Bellata Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
41 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
5 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
9 Millie Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Firestation - Bush	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Post Office	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
SHERWOOD Homestead 27 Keith St	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
WYNDELLA Homestead 18583 NEWELL Hwy	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
291 Boo Boo Rd	64	Moderately Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Moderately Intrusive	N, V	Moderately Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Moderately Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR
74 Boo Boo Rd	29	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil

Table 42: Road Construction Impacts - Earthworks near Gurley Township

Receiver Name	Received Level	Weekday (Mon-Fri)						Saturday								Sunday/Public Holiday					
		Day Standard		Evening OOHW1		Night OOHW2		Day Standard		Day OOHW1		Evening OOHW1		Night OOHW2		Day OOHW1		Evening OOHW2		Night OOHW2	
		Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation
Residential Receiver 2	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 6	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 3	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 1	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 0	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
17 Millie Street	48	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Clearly Audible	nil	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR
2 Bellata Street	48	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Clearly Audible	nil	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR
21 Gurley Street	65	Moderately Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Moderately Intrusive	N, V	Moderately Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Moderately Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR
25 Gurley Street	67	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR
27 Keith Smith Place	60	Moderately Intrusive	N, V	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR	Moderately Intrusive	N, V	Moderately Intrusive	N, V	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR	Moderately Intrusive	N, V	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR
31 Gurley Street	71	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR
34 Bellata Street	76	Highly Intrusive/Highly Affected	N, V, PC, RO	Highly Intrusive/Highly Affected	V, IB, N, R1, DR, PC, SN, RO	Highly Intrusive/Highly Affected	AA, V, IB, N, PC, SN, R2, DR, RO	Highly Intrusive/Highly Affected	N, V, PC, RO	Highly Intrusive/Highly Affected	N, V, PC, RO	Highly Intrusive/Highly Affected	V, IB, N, R1, DR, PC, SN, RO	Highly Intrusive/Highly Affected	AA, V, IB, N, PC, SN, R2, DR, RO	Highly Intrusive/Highly Affected	N, V, PC, RO	Highly Intrusive/Highly Affected	V, IB, N, R1, DR, PC, SN, RO	Highly Intrusive/Highly Affected	AA, V, IB, N, PC, SN, R2, DR, RO
41 Gurley Street	73	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR
5 Gurley Street	52	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR	Clearly Audible	nil	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR
9 Millie Street	51	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR	Clearly Audible	nil	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR
Firestation - Bush	46	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Clearly Audible	nil	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR
Post Office	69	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR
SHERWOOD Homestead 27 Keith St	42	Noticeable	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Noticeable	nil	Noticeable	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Noticeable	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR
WYNDELLA Homestead 18583 NEWELL Hwy	37	Quiet	nil	Noticeable	nil	Noticeable	nil	Quiet	nil	Quiet	nil	Noticeable	nil	Noticeable	nil	Quiet	nil	Noticeable	nil	Noticeable	nil
291 Boo Boo Rd	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
74 Boo Boo Rd	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil

Table 43: Road Construction Impacts – Earthworks on Manamoi Road

Receiver Name	Received Level	Weekday (Mon-Fri)						Saturday								Sunday/Public Holiday					
		Day Standard		Evening OOHW1		Night OOHW2		Day Standard		Day OOHW1		Evening OOHW1		Night OOHW2		Day OOHW1		Evening OOHW2		Night OOHW2	
		Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation
Residential Receiver 2	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 6	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 3	27	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 1	43	Noticeable	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Noticeable	nil	Noticeable	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Noticeable	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR
Residential Receiver 0	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
17 Millie Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
2 Bellata Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
21 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
25 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
27 Keith Smith Place	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
31 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
34 Bellata Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
41 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
5 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
9 Millie Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Firestation - Bush	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Post Office	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
SHERWOOD Homestead 27 Keith St	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
WYNDELLA Homestead 18583 NEWELL Hwy	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
291 Boo Boo Rd	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
74 Boo Boo Rd	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil

Table 44: Road Construction Impacts - Paving near 74 Boo Boo Road

Receiver Name	Received Level	Weekday (Mon-Fri)						Saturday								Sunday/Public Holiday					
		Day Standard		Evening OOHW1		Night OOHW2		Day Standard		Day OOHW1		Evening OOHW1		Night OOHW2		Day OOHW1		Evening OOHW2		Night OOHW2	
		Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation
Residential Receiver 2	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 6	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 3	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 1	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 0	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
17 Millie Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
2 Bellata Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
21 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
25 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
27 Keith Smith Place	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
31 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
34 Bellata Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
41 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
5 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
9 Millie Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Firestation - Bush	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Post Office	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
SHERWOOD Homestead 27 Keith St	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
WYNDELLA Homestead 18583 NEWELL Hwy	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
291 Boo Boo Rd	42	Noticeable	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Noticeable	nil	Noticeable	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Noticeable	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR
74 Boo Boo Rd	62	Moderately Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Moderately Intrusive	N, V	Moderately Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Moderately Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR

Table 45: Road Construction Impacts - Paving near 291 Boo Boo Road

Receiver Name	Received Level	Weekday (Mon-Fri)						Saturday								Sunday/Public Holiday					
		Day Standard		Evening OOHW1		Night OOHW2		Day Standard		Day OOHW1		Evening OOHW1		Night OOHW2		Day OOHW1		Evening OOHW2		Night OOHW2	
		Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation
Residential Receiver 2	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 6	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 3	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 1	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 0	29	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
17 Millie Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
2 Bellata Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
21 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
25 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
27 Keith Smith Place	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
31 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
34 Bellata Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
41 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
5 Gurley Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
9 Millie Street	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Firestation - Bush	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Post Office	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
SHERWOOD Homestead 27 Keith St	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
WYNDELLA Homestead 18583 NEWELL Hwy	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
291 Boo Boo Rd	67	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR
74 Boo Boo Rd	31	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil

Table 46: Road Construction Impacts - Paving near Gurley Township

Receiver Name	Received Level	Weekday (Mon-Fri)						Saturday								Sunday/Public Holiday					
		Day Standard		Evening OOHW1		Night OOHW2		Day Standard		Day OOHW1		Evening OOHW1		Night OOHW2		Day OOHW1		Evening OOHW2		Night OOHW2	
		Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation	Mitigation Tier	Relevant Mitigation
Residential Receiver 2	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 6	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 3	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 1	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
Residential Receiver 0	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
17 Millie Street	51	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR	Clearly Audible	nil	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR
2 Bellata Street	50	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Clearly Audible	nil	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR
21 Gurley Street	67	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR
25 Gurley Street	70	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR
27 Keith Smith Place	62	Moderately Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Moderately Intrusive	N, V	Moderately Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Moderately Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR
31 Gurley Street	74	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR
34 Bellata Street	80	Highly Intrusive/Highly Affected	N, V, PC, RO	Highly Intrusive/Highly Affected	V, IB, N, R1, DR, PC, SN, RO	Highly Intrusive/Highly Affected	AA, V, IB, N, PC, SN, R2, DR, RO	Highly Intrusive/Highly Affected	N, V, PC, RO	Highly Intrusive/Highly Affected	N, V, PC, RO	Highly Intrusive/Highly Affected	V, IB, N, R1, DR, PC, SN, RO	Highly Intrusive/Highly Affected	AA, V, IB, N, PC, SN, R2, DR, RO	Highly Intrusive/Highly Affected	N, V, PC, RO	Highly Intrusive/Highly Affected	V, IB, N, R1, DR, PC, SN, RO	Highly Intrusive/Highly Affected	AA, V, IB, N, PC, SN, R2, DR, RO
41 Gurley Street	76	Highly Intrusive/Highly Affected	N, V, PC, RO	Highly Intrusive/Highly Affected	V, IB, N, R1, DR, PC, SN, RO	Highly Intrusive/Highly Affected	AA, V, IB, N, PC, SN, R2, DR, RO	Highly Intrusive/Highly Affected	N, V, PC, RO	Highly Intrusive/Highly Affected	N, V, PC, RO	Highly Intrusive/Highly Affected	V, IB, N, R1, DR, PC, SN, RO	Highly Intrusive/Highly Affected	AA, V, IB, N, PC, SN, R2, DR, RO	Highly Intrusive/Highly Affected	N, V, PC, RO	Highly Intrusive/Highly Affected	V, IB, N, R1, DR, PC, SN, RO	Highly Intrusive/Highly Affected	AA, V, IB, N, PC, SN, R2, DR, RO
5 Gurley Street	54	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR	Clearly Audible	nil	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR
9 Millie Street	53	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR	Clearly Audible	nil	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR	Clearly Audible	nil	Moderately Intrusive	V, N, R1, DR	Moderately Intrusive	V, IB, N, PC, SN, R2, DR
Firestation - Bush	49	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Clearly Audible	nil	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Clearly Audible	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR
Post Office	72	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR	Highly Intrusive	N, V	Highly Intrusive	V, IB, N, R1, DR, PC, SN	Highly Intrusive	AA, V, IB, N, PC, SN, R2, DR
SHERWOOD Homestead 27 Keith St	45	Noticeable	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Noticeable	nil	Noticeable	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR	Noticeable	nil	Clearly Audible	N, R1, DR	Clearly Audible	V, N, R2, DR
WYNDELLA Homestead 18583 NEWELL Hwy	39	Quiet	nil	Noticeable	nil	Noticeable	nil	Quiet	nil	Quiet	nil	Noticeable	nil	Noticeable	nil	Quiet	nil	Noticeable	nil	Noticeable	nil
291 Boo Boo Rd	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil
74 Boo Boo Rd	<25	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil	Quiet	nil