Woolgoolga to Ballina Pacific Highway Upgrade

Moonimba Borrow Site

Noise Impact Assessment

Report Number 610.16962.00000.0650-R01

25 July 2017

Pacific Complete
21 Prince Street,
Grafton
NSW 2460

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Moonimba Borrow Site

Noise Impact Assessment

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Table of Contents

1 INTRODUCTION

Pacific Complete on behalf of Roads and Maritime Services (RMS) is preparing a modification report for the Woolgoolga to Ballina Pacific Highway Upgrade Project (W2B) for the use of the Moonimba Quarry, known to the project as Moonimba Borrow Site, situated in Bungawalbin, NSW ('the facility'). This noise assessment has been prepared by SLR Consulting Pty Ltd (SLR) and will form part of the modification report.

Pacific Complete is proposing to intensify the extraction rate at the site to one million tonnes (1,000,000 tonnes), which is equivalent to 400,000 m^3 of aggregate per annum to provide sufficient material to complete the W2B project. The purpose of this assessment is to address potential noise impacts from the increased extraction rate on the surrounding community. Matters addressed in this assessment are:

- Airborne noise from extraction processes on the site
- Airborne noise impacts from haulage vehicles travelling on the public road network

The Moonimba Borrow Site is situated approximately 16km south-west of Woodburn. It resides to the west of Portion C of the W2B project. Split between two pits, the site will operate with a total excavation area of 21 hectares.

2 PROJECT OVERVIEW

2.1 Project locality

The project site is situated in the Northern Rivers region of north-eastern New South Wales, located about 10 km south west of Woodburn and 5km south of the Richmond River at Swan Bay. The site is accessed from the north via Boggy Creek Road. Excavation pits are located on top of a plateau, above the Moonimba Ridge and is the main topographical high point in the localised area, situating the borrow site above neighbouring residents. **Figure 1** illustrates the location of the project site.

Land use in the vicinity of the project site is primarily large agricultural holdings, mainly grazing and cropping.

Figure 1 Location of the project site

2.2 Project description

Pacific Complete is proposing to intensify the extraction rate at the site to 400,000 m^3 per annum for two years to provide sufficient material to complete the W2B project. The project site consists of two pits i.e. the Eastern Pit and the Western Pit.

The operations on the project site will generally involve:

- Clearing of Vegetation
- Removal and stockpiling of topsoil and overburden;
- Offsite transport of overburden;
- Crushing and screening of raw material in mobile processing plants and stockpile products;
- Importation of fill for use in rehabilitation of the borrow site.

It is proposed to extract a total of 800,000 m^3 of aggregate in two years. In order to achieve this, it is proposed to open 21 hectares of land (total area of the two pits) and commence quarrying in the two pits. As such, mobile processing plants will be used on site and stockpiling of overburden and product will be carried out at various locations within the two pits.

The project site is accessed from Boggy Creek Road via a 1.6 km dedicated paved road which has been constructed to Council's requirements pursuant to consent 127/95. The paved road ends at the boundary of the project site, from which point an unpaved access road continues south for 1.4 km to a fork from which one road heads to the Eastern Pit, and the other to the Western Pit.

A description of the activities for the first and second year of operation at the project site is presented in **Table 1**. **Figure 2** illustrates the layout of the project site.

Table 1 Description of proposed operations

Description	Year 1	Year 2
Process	Removal of topsoil Placement of topsoil Removal of overburden Removal of raw material Processing of raw material in mobile screening and crushing plants Loading of product and overburden to trucks for off-site transportation	Removal of raw material Drilling and Blasting Processing of raw material in mobile screening and crushing plants Loading of product and overburden to trucks for off-site transportation
Operating hours	7 am to 6 pm Monday to Friday 8 am to 5 pm Saturday	7 am to 6 pm Monday to Friday 8 am to 5 pm Saturday
On-site transportation	Dump trucks	--
Off-site transportation	B-Doubles	B-Doubles

Figure 2 Project site layout

2.3 Current operational approvals

The existing borrow site operates under Development Consent 127/1995 with a maximum extraction of 30,000 m^3 per annum. A more recent development consent (DA2015.0069) has been given consent by Richmond Valley Council for the extraction of 90,000m^3, however this consent has not been activated at this time. The borrow site operation extracts sand and sandstone by blasting and excavation. The Noise Impact Assessment submitted as part of the application to work under this extract rate has been reviewed by SLR in developing this assessment (document reference: "*Noise Impact Assessment – Extension of Moonimba Quarry Bungawalbin*", Greg Alderson & Associates Report No. 06139_NIA_Rev B dated 23/09/2014 herein referred to as the 'existing approval noise assessment'). Where necessary, for example in establishing operational noise emission criteria, SLR's assessment makes reference to this report.

The existing approval assessment is based upon compliance with the NSW EPA "*Industrial Noise Policy*" for on-site operational noise sources.

In relation to noise emission the existing Consent Conditions list the following:

- The use shall not interfere with the amenity of the locality by reason of emission of noise (…)
- The development shall meet noise emission criteria (…) as specified by the Environmental Protection Authority
- The noise activities required by the operation of the quarry should not create, generate or emit offensive noise so as to be heard at the nearest affected residence. Offensive noise means noise that by reason of its level, nature, character or quality or the time at which it is made or any other circumstances is likely:
  - To be harmful to,
  - To be offensive to, or
  - To interfere unreasonably with the comfort or response of a person.

2.3.1 Summary of 2015 Noise Assessment

The approved 2015 assessment (DA2015.0069) was assessed to an extraction rate of 193,000 tonnes per annum using the following equipment:

- Excavator
- Loader
- Crusher
- Screener

In addition to this, material was assessed to be taken off site using HGV trucks. There are no proposed changes to the type of vehicles or haulage route used to remove material from the site.

The assessment undertaken for the 2015 approval allowed for one (1) item of each of the proposed equipment, operating simultaneously in both the East and the West pits. Predictions were made at the then current pit level of 4-10m below relative ground level representing commencement of operations.

The 2015 assessment was undertaken using the SoundPlan software package. The calculation algorithm used is not stated within the assessment. However, the following meteorological assumptions were used:

- 50% humidity,
- Ambient temperature of 25ºC,
- Receiver height of 2m, and a worst case
- Wind speed of 5m/s.

The 2015 assessment showed compliance with the established criteria for all on-site operational noise sources, however a number of 'best practice' management measures were recommended to limit overall noise emissions. Minor (<2dB) exceedances to the criteria were reported for off-site vehicle movements and, as a result, mitigation was recommended in the form of reduced vehicle speeds on public roads.

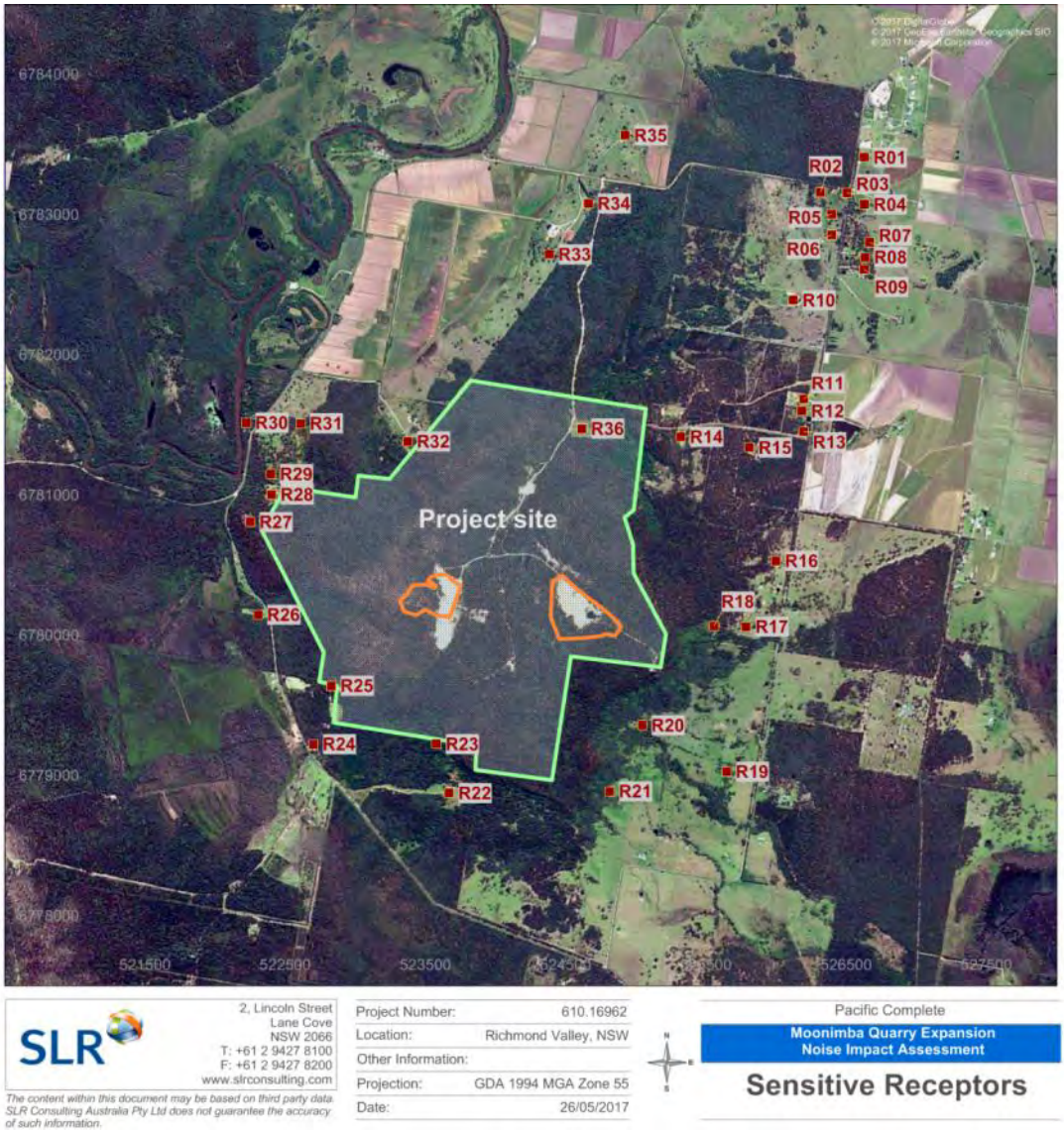
3 PROJECT SETTING

3.1 Sensitive receivers

The site is situated in a rural environment surrounded by farming properties and nature reserves. A number of non-project related residential dwellings are situated in the area surrounding the project site. A list of existing sensitive receptor points identified in the immediate vicinity of the project site is provided in **Table 2** along with the respective distances of each of these receptor points to the site boundary and the proposed extraction boundary.

Figure 3 illustrates the location of the surrounding receptors in relation to the project site. The numbering used in the SLR AQIA 2017 (SLR report *610.16962-AQIA-R01-v0.1*) has been used in this assessment in order to facilitate comparison between the two reports. Note that Receiver R36 is within the boundary of the borrow site, as this is the residence of the borrow site owner.

Figure 3 Location of the Identified Sensitive Receptors



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Project Number:	610.16962
Location:	Richmond Valley, NSW
Other Information:	
Projection:	GDA 1994 MGA Zone 55
Date:	26/05/2017

Pacific Complete
Moonimba Quarry Expansion
Noise Impact Assessment
Sensitive Receptors

Table 2 Details of identified sensitive receivers

Receptor ID	Location (m, UTM)		Distance (m) from nearest proposed extraction boundary	Elevation (m, AHD)
	Easting	Northing		
R1	526,627	6,783,408	3,660 / NE	27
R2	526,316	6,783,160	3,285 / NE	26
R3	526,504	6,783,156	3,400 / NE	30
R4	526,627	6,783,073	3,400 / NE	19
R5	526,392	6,783,005	3,220 / NE	17
R6	526,394	6,782,855	3,090 / NE	11
R7	526,664	6,782,802	3,210 / NE	18
R8	526,631	6,782,697	3,120 / NE	18
R9	526,625	6,782,609	3,040 / NE	18
R10	526,121	6,782,390	2,550 / NE	9
R11	526,197	6,781,687	2,050 / NE	13
R12	526,183	6,781,599	2,000 / NE	12
R13	526,195	6,781,452	1,900 / NE	14
R14	525,319	6,781,416	1,290 / NE	65
R15	525,808	6,781,339	1,550 / NE	28
R16	525,997	6,780,531	1,200 / E	33
R17	525,785	6,780,062	885 / E	39
R18	525,555	6,780,067	660 / E	66
R19	525,645	6,779,028	1,250 / SE	40
R20	525,044	6,779,358	666 / SE	73
R21	524,812	6,778,888	1,100 / S	80
R22	523,667	6,778,875	1,230 / S	58
R23	523,577	6,779,225	885 / S	92
R24	522,700	6,779,224	1,140 / SW	27
R25	522,827	6,779,641	715 / SW	43
R26	522,303	6,780,147	1,005 / W	17
R27	522,248	6,780,808	1,185 / NW	45
R28	522,399	6,781,005	1,180 / NW	31
R29	522,394	6,781,150	1,270 / NW	30
R30	522,219	6,781,517	1,650 / NW	16
R31	522,607	6,781,512	1,410 / NW	7
R32	523,371	6,781,383	980 / N	26
R33	524,380	6,782,717	2,280 / N	11
R34	524,659	6,783,080	2,660 / N	15
R35	524,921	6,783,566	3,150 / N	13
R36*	524,613	6,781,474	1,050 / N	97

*Note R36 is the borrow site owner

4 EXISTING ACOUSTICAL ENVIRONMENT

Background noise measurements were undertaken by Greg Alderson & Associates in 2014 and documented in their report *Noise Impact Assessment – Extension of Moonimba Quarry Bungawalbin (ref 06193_NIA_RevB).*

Unattended measurements were conducted at 4 locations surrounding the project site, with daytime Rating Background Levels (RBL) close to or below 30 dBA. Measurements presented in the existing approval noise assessment report are representative of a quiet rural environment with limited influences from local traffic or industrial sources.

In addition to the background monitoring conducted for receivers close to the project site, the existing approval noise assessment report conducted two measurements at locations close to the road to establish existing noise levels from local traffic. Results from these measurements have been used to assess the impact from haulage vehicles on local roads and is presented in **Section 7.2** of this report.

The monitoring conducted in the existing approval noise assessment report is considered valid and representative of the local ambient environment. At this stage no further monitoring has been undertaken for this assessment.

5 NOISE CRITERIA

The following policies have been used in this assessment:

- On-site noise sources from extraction process: NSW EPA "*Industrial Noise Policy*" (INP)
- Off-site road traffic sources: NSW RMS "*Road Noise Policy*" (RNP)

5.1 Operational noise: NSW Industrial Noise Policy

The NSW Industrial Noise Policy (INP), dated January 2000, provides a framework and process for deriving noise criteria for consents and licences that enables the EPA to regulate premises that are scheduled under the Protection of the Environment Operations Act 1997.

The specific policy objectives are to:

- Establish noise criteria that would protect the community from excessive intrusive noise and preserve the amenity for specific land uses;
- Use the criteria as the basis for deriving project specific noise levels;
- Promote uniform methods to estimate and measure noise impacts, including a procedure for evaluating meteorological effects;
- Outline a range of mitigation measures that could be used to minimise noise impacts;
- Provide a formal process to guide the determination of feasible and reasonable noise limits for consents or licences that reconcile noise impacts with the economic, social and environmental considerations of the industrial development; and
- Carry out functions relating to the prevention, minimisation and control of noise from the premises scheduled under the Act.

5.1.1 Intrusiveness criteria

For assessing intrusiveness, the background noise generally needs to be measured. The intrusiveness criterion essentially means that the equivalent continuous noise level (L_{eq}) of the source should not be more than 5dBA above the measured (or default) Rating Background Level (RBL).

In relation to the default RBL, if a minimum background noise level of 30dBA is assumed as the RBL and the assessment shows no impact, then there is no need for background noise monitoring, as this represents a conservative and limiting case.

5.1.2 Amenity criteria

The amenity assessment is based on noise criteria specific to the land use and associated activities. The criteria relate only to industrial-type noise and does not include road, rail or community noise. If present, the existing noise level from industry is generally measured. If it approaches the criterion value, then noise levels from new industries need to be designed so that the cumulative effect does not produce noise levels that would significantly exceed the criterion. For high-traffic areas there is a separate amenity criterion. The cumulative effect of noise from industrial sources also needs to be considered in assessing the impact.

The Amenity Criteria for 'Rural Residential' receivers such as those surrounding the Moonimba Borrow Site are shown in **Table 3**.

Table 3 - INP amenity criteria

Type of receiver	Time of day	Recommended $L_{eq,t}$ Noise Level, dBA	
		Acceptable	*Maximum*
Residential - Rural	Day	50	55
	Evening	45	50
	Night	40	45

5.1.3 Project specific criteria

The Project Specific criteria are the more onerous of either the Intrusiveness or Amenity criteria for a given receiver.

Site measurements and assessment in accordance with INP methodology was undertaken as part of the existing approval noise assessment. All receivers showed a background noise level represented by (or below) 30 dBA L_{90} in all periods. As a result, a consistent Project Specific noise criteria of **35 dBA $L_{eq,t}$** was applied to all receivers at all times of day, evening and night. This is based on the 'Intrusiveness Criteria' of the INP.

5.2 Off-site road traffic: NSW Road Noise Policy

While light and heavy vehicle movements within the site are classified as part of the site noise, once they move off the site and onto public roads they are assessed under the *NSW Road Noise Policy* (RNP).

One of the objectives of the RNP is to apply relevant permissible noise increase criteria to protect sensitive receivers against excessive decreases in amenity as a result of the project. In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.

On this basis, construction traffic NMLs set at 2 dB above the existing road traffic noise levels during the daytime and night-time periods are considered appropriate to identify the onset of potential noise impacts. Where the road traffic noise levels are predicted to increase by more than 2 dB as a result of construction traffic, consideration would be given to applying feasible and reasonable noise mitigation measures to reduce the potential noise impacts and preserve acoustic amenity.

In considering feasible and reasonable mitigation measures where the relevant noise increase is greater than 2 dB, consideration would also be given to the actual noise levels associated with construction traffic and whether or not these levels comply with the following road traffic noise criteria in the RNP:

- 60 dB $L_{Aeq(15hour)}$ daytime and 55 dB $L_{Aeq(9hour)}$ night-time for existing freeway / arterial / sub-arterial roads.
- 55 dB $L_{Aeq(1hour)}$ daytime and 50 dB $L_{Aeq(1hour)}$ night-time for existing local roads.

An increase of greater than 2 dB requires an increase in overall traffic volumes on the road of approximately 60% or higher.

The following roads may experience increased traffic due to the proposed increased extraction from the facility:

- Public areas of the borrow site Access Road
- Boggy Creek Road (East of access road)
- Reardons Lane (North of Boggy Creek Road)

- Woodburn-Coraki Road (East of Reardons Lane)

The existing approval noise assessment identified these sections of roads as a 'principal haulage route' confirmed by Richmond Valley Council. As a result, in accordance with Section 2.2.2 of the RNP, the noise criteria for Arterial / Sub-Arterial roads stated in the RNP are to be used. That is:

- **Day (07.00 – 22.00): 60 dB $L_{Aeq(15hour)}$**
- **Night (22.00 – 07.00): 55 dB $L_{Aeq(9hour)}$**

6 ASSESSMENT OF ON-SITE OPERATIONAL NOISE EMISSIONS

6.1 Calculation

This section describes the calculations undertaken and presents the results for operational noise predictions from the extraction process.

6.1.1 Methodology

In order to predict the noise emissions from the plant and equipment operating on-site to extract materials, a computer noise prediction model using the CONCAWE algorithms was developed using SoundPLAN 7.1 software.

Local terrain has been digitised in the noise model to develop a three-dimensional representation of the construction sites and surrounding environment. The noise modelling takes into account source sound level emissions and locations, screening effects, receiver locations, meteorological effects, ground topography and noise attenuation due to spherical spreading and atmospheric absorption.

6.1.1.1 Concawe

The SoundPLAN model utilised noise propagation calculation algorithms in accordance with CONCAWE prediction method. The CONCAWE method was developed for large open air industrial facilities and incorporates the influence of wind and atmospheric stability on propagation.

6.1.1.2 Meteorological conditions for modelling

One of the objectives of the noise assessment is to consider the effects of relevant meteorological conditions (wind, temperature, humidity and temperature inversions) on noise propagation from the project area. The meteorological conditions used for the noise modelling have been determined in accordance the guidelines presented in the NSW *Industrial Noise Policy* (NSW Department of Environment and Climate Change & Water (DECCW), 2000).

SLR has prepared an air quality assessment for the project and as part of that study a detailed analysis was undertaken to characterise prevailing weather conditions at the project site (refer to report *610.16962-AQIA-R01-v0.1*)

Year 2016 annual meteorological data (the most recent available) was analysed by SLR using the CALMET meteorological model to determine prevailing wind and atmospheric conditions and to determine whether noise modelling should account for enhanced propagation conditions (SLR Consulting Australia, 2016).

6.1.1.3 Wind effects

Wind has the potential to increase noise at a receiver when wind is light and stable, and blows from the direction of the source of noise to the receiver. At higher wind speeds, the noise produced by the wind can obscure noise generated from industrial and transport sources.

Wind effects need to be considered where wind is a feature of the project area. The INP states that where wind blows from the source to the receiver at speeds up to 3 m/s for more than 30 per cent of the daytime, evening or night-time in any season, then wind is considered to be a feature of the area and noise level predictions must be made under these conditions.

The weather data was analysed to determine the frequency of occurrence of winds speeds up to 3 m/s during the operating period of the project site (daytime). The results of the wind analysis for the daytime periods are presented in **Table 4**. The table presents the direction and percentage of occurrence where wind is found to occur for greater than 30 per cent of the time. Where wind is found not to occur 30 per cent of more for a given seasonal period, the most dominant wind direction is presented.

Table 4 Seasonal Frequency of occurrence wind speed intervals – Daytime

Period	Calm (<0.5 m/s)	Wind Direction ±45°	Wind Speed[1]		
			0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Annual	2.1%	SE	23.6%	6.1%	29.6%
Summer	0.4%	NNE	11.6%	18.9%	30.5%
		NE	14.7%	16.2%	30.9%
		ESE	20.3%	10.1%	30.4%
		SE	23.3%	12.3%	35.6%
		SSE	24.7%	12.8%	37.6%
		S	21.4%	10.7%	32.1%
Autumn	4.3%	E	33.2%	1.5%	34.7%
		ESE	38.4%	2.1%	40.6%
		SE	37.9%	3.1%	41.0%
		SSE	32.8%	4.1%	36.9%
Winter	2.6%	SSE	21.9%	3.3%	25.2%
Spring	1.1%	NNE	15.2%	17.0%	32.2%
		NE	16.1%	17.6%	33.7%
		ENE	15.9%	14.2%	30.1%

Note 1: Shading represents wind direction occurrences of greater than 30%

The above analysis of prevailing wind conditions indicates that during the daytime period, winds of up to 3 m/s exceed the 30% threshold during most seasons.

Based on the prevailing wind analysis, assessment of adverse weather from wind influence during the daytime is required.

6.1.1.4 Temperature inversion

Temperature inversions have the ability to increase noise levels by focusing sound waves towards sensitive receivers. Temperature inversions occur predominantly at night-time when the atmosphere is stable and temperatures are cooler. For a temperature inversion to be a significant characteristic of the area, the INP defines that it needs to occur for approximately 30% of the total night-time during winter.

The Pasquill-Gifford assignment scheme identifies seven Stability Classes – A to G – to categorise the degree of atmospheric stability, as shown in **Table 5**. Atmospheric Stability Class F represents the conditions in which temperature inversion are likely to occur. Class D represents neutral conditions, where temperature inversions are unlikely to occur.

Table 5 Description of Atmospheric Stability Classes

Atmospheric Stability Class	Category Description
A	Extremely unstable
B	Moderately unstable
C	Slightly unstable
D	Neutral
E	Slightly stable
F	Moderately stable
G	Extremely stable

As site operations are limited to daytime hours only, temperature inversions have not been considered. The atmospheric stability class “D” has been used for all .

6.1.1.5 Modelled meteorological parameters

As per the findings of the meteorological data analysis detailed above, enhanced propagation conditions have been modelled based on local wind conditions. This atmospheric and wind speed class triggers CONCAWE meteorological category 6 which provides for the most enhanced (worst case) propagation conditions from source to receiver.

Selected temperature and humidity conditions are based on indicative average values for the day period at the project area (refer to SLR air quality assessment report *610.16962-AQIA-R01-v0.1*) **Table 6** summaries the meteorological modelling parameters used within this assessment.

Table 6 Modelled meteorological parameters

Weather conditions	Neutral weather	Enhanced weather
Temperature	25°C	25°C
Humidity	50%	50%
Atmospheric stability class	D	D
Wind speed	0 m/s	3 m/s
Wind direction	N/A	Downwind
Temperature inversion	No	No

6.1.2 Modelled scenarios

Work activities will be undertaken in three (3) operating scenarios

- Scenario 1 - Site establishment
- Scenario 2 - Extraction, crushing and loading operations in the existing excavation area (typical RL 90 m western pit and RL120 m eastern pit)
- Scenario 3 - Extraction ,crushing and loading operations in the worst case highest works elevation (typical RL 109 m western pit and RL 145 m eastern pit)

Figure 4 indicates the general locations within the site of each scenario.

6.1.3 Equipment list and equipment locations

The list of equipment provided to SLR for each operational scenario above is presented in **Table 7**.

Figure 4 Modelled operation scenario locations

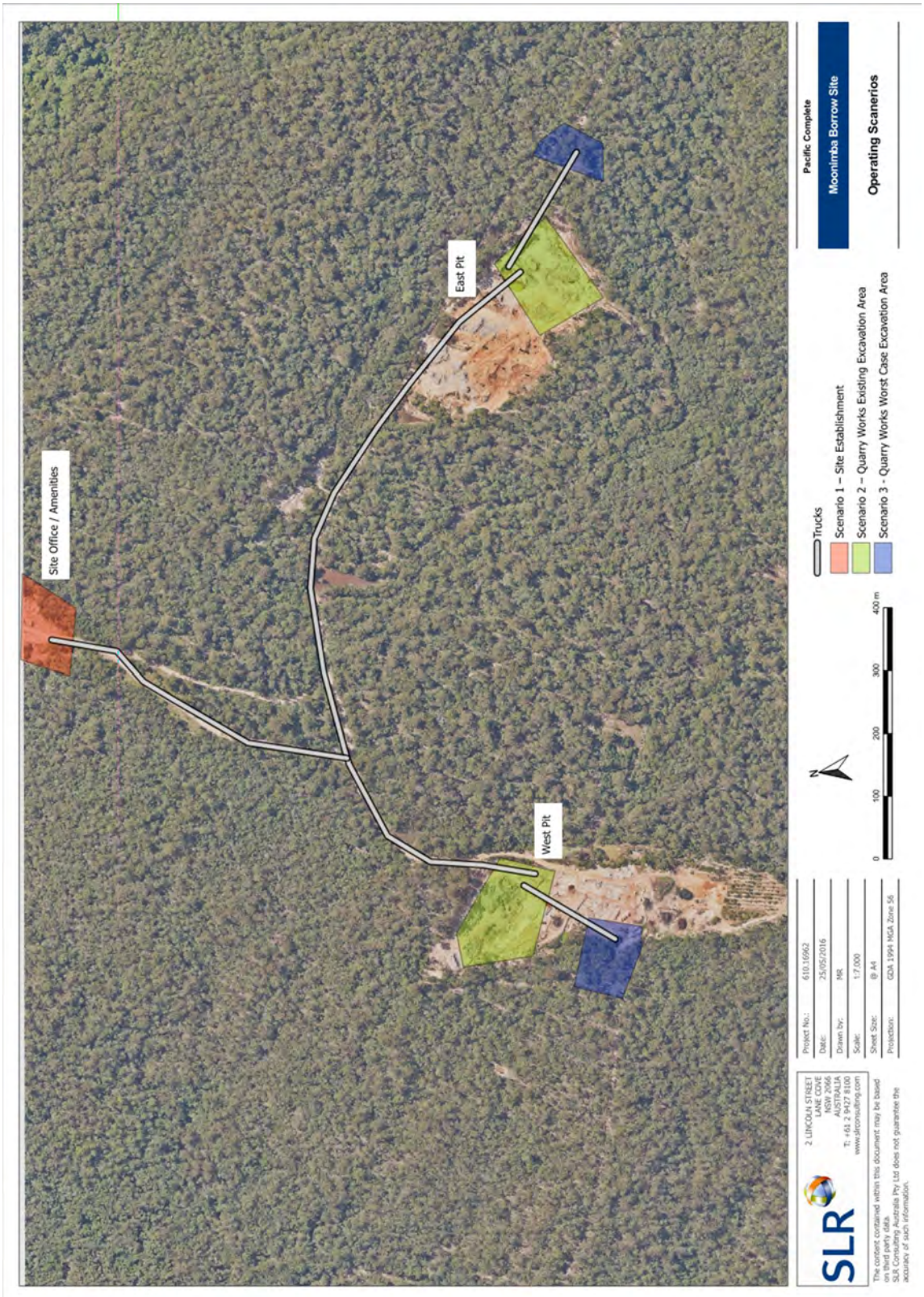

Table 7 - Equipment list for operational scenarios

	Description of works	Hours	Plant (total plant items operating)
Scenario 1: Site establishment/ decommissioning (site office/amenities)	**Site Establishment** - works required to prepare the site for extraction operations	7am-6pm (Mon - Fri), 8am-5pm Saturday	3x Semi trailers and other delivery trucks 1x Small mobile crane 1x Grader 1x 13T Padfoot roller 1x 13T Smooth drum roller 1x 23T Excavator, 5 x LVs 1x Watercart
Operational scenarios 2 and 3	**Extraction Operations** – Modelled operating within each pit	7am-6pm (Mon - Fri), 8am-5pm Saturday	1x Excavator 1x Bulldozer 3x Articulated dump truck 1x Water cart 1x Smooth drum roller 2x Light vehicles
	Crushing, screening, stockpiling Modelled operating within each pit	7am-6pm (Mon - Fri), 8am-5pm Saturday	1x Metso 1213 S Impact crusher screen 1x Excavator 1x Front end loader, 1x Watercart, 2x Light vehicles
	Crushing, screening, stockpiling with jaw crusher Modelled operating within each pit	7am-6pm (Mon - Fri), 8am-5pm Saturday	1x Additional Metso LT106 Jaw crusher 1x McCloskey R155 reclaimer screen 1x Excavator 1x Front end loader 1x Watercart 2x Light vehicles
	Loading Modelled operating within each pit	7am-6pm (Mon - Fri), 8am-5pm Saturday	Trucks (14 movements per 15 minutes) Front end loader

The fixed plant and mobile equipment noise levels used in the noise model have been obtained from the existing SLR database. **Table 8** presents overall maximum A weighted sound power level (SWL) for each item of significant noise emitting equipment which Pacific Complete has indicated will be used at the borrow site.

Table 8 SWLs of Fixed Plant and Mobile Equipment

Operational Scenario	Equipment	SWL L_{Aeq} (dBA)
Site Establishment	Semi-trailers	108
	Mobile crane	108
	Grader	114
	Padfoot roler	102
	Smooth drum roller	102
	Excavator	108
	Light vehicles	101
	Watercart	116
Extraction Operations	Excavator	110
	Bulldozer	121
	Dump truck	108
	Watercart	116
	Smooth drum roller	102
	Light vehicles	101
Crushing, screening, stockpiling	Metso 1213 S Impact crusher screen	124
	Excavator	110
	front end loader,	114
	watercart,	116
	Light vehicles	101
Crushing, screening, stockpiling with jaw crusher	Additional Metso LT106 Jaw crusher	124
	McCloskey R155 reclaimer screen	117
	Excavator	110
	Front end loader	114
	Watercart	116
	Light vehicles	101

It should be noted that the sound power level given for each item of mobile equipment does not include noise emissions which emanate from reversing alarms.

6.1.4 Modifying factors

'Modifying factors' in accordance with the NSW INP for noise sources identified in **Table 8** have been considered for appropriateness within this assessment.

- Tonal noise: The only equipment that will contain tonal characteristics are reversing beepers on vehicles and machinery. As these operate for short durations within any 15minute period and are unlikely to be loud enough to be audible at the surrounding noise sensitive receivers, no correction factor is to be applied. Further discussion on reversing beepers is included in **Section 6.5**.
- Low frequency noise: Assessment was undertaken as part of the previous noise impact assessment for the 2015 Development Application. Based on measurements of the equipment on the site no low-frequency correction was required to be applied. Noise spectra from manufacturer data for all equipment used in SLR's assessment have also shown that no low frequency noise correction should be applied.
- Impulsive noise: No sources are impulsive in nature as described by the INP.
- Intermittent noise: No sources are intermittent in nature as described by the INP.

As a result, no modifying factors have been applied in SLR's calculations.

6.2 Results

The following tables, **Table 9, Table 10** and

Table 11 present the predicted LAeq(15minute) noise level contributions from the proposed borrow site operations together with the respective criteria at each sensitive receiver.

Colouring presented within the following tables indicates the range of predicted worst case exceedances:

- Blue: 1-5 dBA
- Yellow: 6-10 dBA
- Orange 11-20 dBA
- Red: > 20 dBA

Table 9 Noise Level Impact Assessment - Scenario 1

Reciever Name (ID)	LAeq(15minute) Criterion	Site Establishment	
		Neutral Weather	Enhanced Weather
R01	35	<20	22
R02	35	<20	24
R03	35	<20	23
R04	35	<20	23
R05	35	<20	24
R06	35	<20	25
R07	35	<20	24
R08	35	<20	24
R09	35	<20	25
R10	35	22	28
R11	35	<20	<20
R12	35	<20	<20
R13	35	<20	<20
R14	35	<20	<20
R15	35	<20	<20
R16	35	<20	<20
R17	35	<20	<20
R18	35	<20	<20
R19	35	<20	<20
R20	35	<20	<20
R21	35	<20	<20
R22	35	<20	<20
R23	35	<20	<20
R24	35	<20	<20
R25	35	26	31
R26	35	26	32
R27	35	28	33
R28	35	28	34
R29	35	28	33
R30	35	26	32
R31	35	28	34
R32	35	34	39
R33	35	25	31
R34	35	23	29
R35	35	20	26
R36	35	27	32

Table 10 Noise Level Impact Assessment - Scenario 2

Receiver Name (ID)	LAeq(15minute) Criterion	Crushing East		Crushing West		Extraction East		Extraction West		JAW Crushing East		JAW Crushing West		Loading East		Loading West	
		Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather
R01	35	<20	25	<20	<20	<20	22	20	25	24	28	<20	22	<20	<20	<20	<20
R02	35	21	26	<20	20	<20	22	20	26	25	29	20	24	<20	<20	<20	<20
R03	35	21	26	<20	<20	<20	22	<20	25	25	29	<20	23	<20	<20	<20	<20
R04	35	20	25	<20	<20	<20	20	<20	25	24	28	<20	23	<20	<20	<20	<20
R05	35	<20	24	<20	20	<20	20	21	26	25	28	20	24	<20	<20	<20	<20
R06	35	<20	23	<20	21	<20	<20	21	26	24	27	20	24	<20	<20	<20	<20
R07	35	<20	22	<20	<20	<20	<20	20	25	23	26	<20	23	<20	<20	<20	<20
R08	35	<20	22	<20	20	<20	<20	21	26	23	26	<20	23	<20	<20	<20	<20
R09	35	<20	22	<20	20	<20	<20	21	26	23	26	<20	23	<20	<20	<20	<20
R10	35	20	24	<20	23	<20	<20	23	28	26	28	22	26	<20	21	<20	21
R11	35	<20	23	<20	<20	<20	<20	<20	20	25	27	<20	<20	<20	<20	<20	<20
R12	35	<20	23	<20	<20	<20	<20	<20	<20	25	27	<20	<20	<20	<20	<20	<20
R13	35	<20	23	<20	<20	<20	<20	<20	<20	25	28	<20	<20	<20	<20	<20	<20
R14	35	23	27	<20	<20	<20	<20	<20	<20	28	31	<20	<20	<20	<20	<20	<20
R15	35	<20	20	<20	<20	<20	<20	<20	<20	24	26	<20	<20	<20	<20	<20	<20
R16	35	<20	22	<20	<20	<20	<20	<20	<20	23	26	<20	<20	<20	<20	<20	<20
R17	35	<20	<20	<20	<20	<20	<20	<20	<20	21	24	<20	<20	<20	<20	<20	<20
R18	35	<20	21	<20	<20	<20	<20	<20	<20	24	27	<20	<20	<20	<20	<20	<20
R19	35	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
R20	35	29	33	<20	<20	<20	23	<20	<20	28	31	<20	20	<20	20	<20	<20
R21	35	<20	21	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
R22	35	<20	20	<20	<20	<20	<20	<20	<20	25	28	<20	<20	<20	<20	<20	<20
R23	35	<20	<20	<20	<20	<20	<20	<20	<20	26	29	<20	<20	<20	<20	<20	<20
R24	35	<20	<20	21	25	<20	<20	26	30	20	23	25	27	<20	<20	<20	<20
R25	35	<20	22	38	42	<20	23	40	45	24	27	37	40	<20	24	25	30
R26	35	21	25	36	41	21	26	37	42	26	29	39	42	<20	23	23	28
R27	35	31	36	37	41	27	32	37	42	33	37	40	43	22	28	28	33
R28	35	30	36	40	45	26	32	38	43	33	37	41	45	23	28	28	34
R29	35	30	35	40	45	26	31	37	42	33	37	41	45	22	28	28	33
R30	35	28	34	37	42	24	30	34	39	31	35	39	43	20	26	25	30
R31	35	31	36	39	44	27	32	36	41	33	37	42	45	22	28	26	32
R32	35	29	33	44	48	24	29	42	46	33	36	46	49	23	28	32	37
R33	35	29	35	26	31	26	31	29	34	32	36	30	33	22	28	20	26
R34	35	27	33	23	28	23	29	26	31	30	34	27	31	<20	26	<20	23
R35	35	23	28	20	25	21	26	24	29	27	30	24	28	<20	23	<20	20
R36	35	38	43	28	33	35	40	34	38	43	46	37	40	44	46	44	46

Table 11 Noise Level Impact Assessment - Scenario 3

Receiver Name (ID)	LAeq(15minute) Criterion	Crushing East		Crushing West		Extraction East		Extraction West		JAW Crushing East		JAW Crushing West		Loading East		Loading West	
		Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather
R01	35	25	30	23	28	<20	24	<20	24	29	32	27	31	<20	<20	<20	<20
R02	35	25	31	24	30	21	26	21	26	27	32	28	32	<20	21	<20	21
R03	35	25	31	24	29	<20	25	20	25	28	32	27	31	<20	<20	<20	21
R04	35	25	30	23	29	<20	23	<20	25	27	31	26	30	<20	<20	<20	<20
R05	35	24	29	24	30	<20	22	21	26	27	31	28	31	<20	<20	<20	21
R06	35	22	27	25	30	<20	21	21	26	27	30	28	31	<20	<20	<20	21
R07	35	21	26	23	29	<20	21	20	26	26	29	26	30	<20	<20	<20	<20
R08	35	21	25	23	29	<20	20	21	26	26	29	26	30	<20	<20	<20	20
R09	35	21	25	23	28	<20	20	21	26	26	29	26	30	<20	<20	<20	20
R10	35	22	26	27	32	<20	21	23	29	27	30	29	33	<20	21	<20	23
R11	35	23	27	<20	24	<20	22	<20	<20	29	32	25	28	<20	<20	<20	<20
R12	35	23	27	<20	22	<20	22	<20	<20	29	32	24	27	<20	<20	<20	<20
R13	35	23	27	<20	21	<20	22	<20	<20	29	32	23	25	<20	<20	<20	<20
R14	35	24	27	<20	21	<20	24	<20	<20	30	32	22	25	<20	<20	<20	<20
R15	35	25	29	<20	22	<20	23	<20	<20	31	34	24	26	<20	<20	<20	<20
R16	35	21	24	<20	<20	<20	<20	<20	<20	27	29	<20	<20	<20	<20	<20	<20
R17	35	23	27	<20	<20	<20	21	<20	<20	28	30	<20	21	<20	<20	<20	<20
R18	35	26	30	<20	21	21	25	<20	<20	31	33	<20	23	<20	<20	<20	<20
R19	35	<20	24	<20	<20	<20	22	<20	<20	25	28	<20	21	<20	<20	<20	<20
R20	35	29	33	<20	20	26	30	<20	20	33	36	<20	23	<20	21	<20	21
R21	35	<20	23	<20	<20	<20	<20	<20	<20	23	26	<20	22	<20	<20	<20	<20
R22	35	<20	<20	<20	<20	<20	<20	<20	<20	21	23	<20	<20	<20	<20	<20	<20
R23	35	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
R24	35	<20	23	33	37	<20	<20	29	33	25	28	39	41	<20	<20	<20	23
R25	35	22	26	47	52	<20	23	44	48	28	31	51	54	<20	24	35	39
R26	35	33	39	44	49	29	34	40	45	35	39	47	50	21	27	31	36
R27	35	34	39	42	47	31	36	38	43	37	41	45	48	23	28	30	35
R28	35	33	39	42	47	30	35	39	43	37	40	45	49	22	28	30	35
R29	35	33	38	41	46	30	35	38	42	37	40	44	48	22	28	29	34
R30	35	31	36	37	43	28	33	34	39	35	38	41	44	20	26	26	31
R31	35	33	39	40	45	30	35	36	41	37	40	43	47	22	28	28	33
R32	35	34	39	44	49	29	34	41	46	37	40	47	51	24	29	32	38
R33	35	31	36	32	37	27	32	29	34	34	38	36	39	22	27	23	28
R34	35	29	34	30	35	25	30	27	32	33	36	33	37	<20	25	20	26
R35	35	27	32	27	32	23	28	24	29	30	34	31	34	<20	22	<20	23
R36	35	38	43	37	42	35	40	33	38	42	45	40	44	44	46	44	46

6.3 Discussion

Table 12 presents a summary of the results in **Section 6.2** (under the 'Enhanced Weather' modelling scenarios). Note that the worst case exceedance is reported for each receiver.

Table 12 - Summary of predicted exceedances

Scenario	Number of receivers exceeding criteria within range			
	1-5 dBA	**6-10 dBA**	**11-20 dBA**	**> 20dBA**
Scenario 1	1	0	0	0
Scenario 2	1	7	1	0
Scenario 3	3	2	7	0

The above summary has not included results at Receiver 36. This on-site residential receiver is the owner of the borrow site and is hence considered to be reasonably impacted by operations of the facility.

The results from Scenario 3 show higher exceedances than Scenario 2 due to the work being undertaken at higher ground elevation levels, and hence there is less topographical screening between the source of the noise and the receiver positions. This demonstrates the sensitivity of noise emissions to the location of work on the site. As a result, the Scenario 2 results are representative of the likely noise emissions when appropriate screening is in place.

Whilst the Scenario 2 predicted levels are in excess of the INP recommended targets to limit intrusiveness at the identified receivers, in all instances the absolute levels of noise predicted are not considered to be excessive for the proposed hours of operations, and are below the INP 'Amenity' criteria of 50 dBA $L_{eq,t}$ during daytime periods for rural residential properties. The reason for the exceedance in the intrusiveness criteria is due to exceptionally low existing daytime background noise levels in the area. It is believed that the purpose of the Intrusiveness criteria in the INP is to manage the long-term impact of permanent industrial noise sources. The proposed increase in extraction at the facility is for a limited two year period to meet construction material requirements for the W2B project and as such would not be a permanent operation.

Results detailed in **Table 9** to **Table 11** indicate that works conducted within the eastern pit are predicted to result in a lower level of noise impact at nearby sensitive receivers when compared to works conducted in the western pit. This is due to the intervening topographical features which provide shielding to nearby receivers from works being conducted in the eastern pit.

This noise assessment is necessarily high level in nature as there is no set operational plan for the facility, and as a result several worst-case assumptions have been made in predicting the noise emissions. A detailed operations plan is recommended to be implemented once an operator for the facility is appointed. Should this plan follow the recommendations in **Section 6.5**, it is believed that noise emissions from the facility can be controlled to a level in accordance with the INP 'Amenity' criteria. In addition, noise impacts are restricted to daytime periods only as no night operations are proposed for the facility. As a result, it is considered that this is likely to be deemed acceptable given the short-term (two year) nature of the increased extraction rate from the facility.

6.4 Cumulative impacts

Concurrent noise impacts warrant assessment where more than one activity operates at the same time resulting in the same receiver(s) potentially being impacted by noise from more than one works.

A cumulative impact assessment has been included for activities identified to have the potential to operate concurrently near to similar groupings of receivers. It is important to note that quarrying activities generally move around the site which would result in the worst case impacts at any given receiver being likely to be variable in duration.

The activities that have been identified as having potential for concurrent operations are noted below in **Table 13**.

Table 13 Cumulative works scenarios

Cumulative Activity No.	Eastern Pit	Western Pit
1	Crushing Scenario 2	Extraction Scenario 2
2	Crushing Scenario 2	Loading Scenario 2
3	Jaw Crushing Scenario 2	Extraction Scenario 2
4	Jaw Crushing Scenario 2	Loading Scenario 2
5	Crushing Scenario 3	Extraction Scenario 3
6	Crushing Scenario 3	Loading Scenario 3
7	Jaw Crushing Scenario 3	Extraction Scenario 3
8	Jaw Crushing Scenario 3	Loading Scenario 3
9	Extraction Scenario 2	Crushing Scenario 2
10	Loading Scenario 2	Crushing Scenario 2
11	Extraction Scenario 2	Jaw Crushing Scenario 2
12	Loading Scenario 2	Jaw Crushing Scenario 2
13	Extraction Scenario 3	Crushing Scenario 3
14	Loading Scenario 3	Crushing Scenario 3
15	Extraction Scenario 3	Jaw Crushing Scenario 3
16	Loading Scenario 3	Jaw Crushing Scenario 3

Table 14 and

Table 15 present the worst case predicted noise level for each cumulative activity together with the number of receivers predicted to exceed the noise criteria in 5 dB increments.

Table 14 Cumulative assessment – neutral weather conditions

	Cumulative Scenario (East / West)	Highest Predicted Nosie level LAeq dBA (Receptor No.)	The number of receivers predicted to exceed 35 dBA				
			1 to 5 dBA	6 to 10 dBA	11 to 15 dBA	16 to 20 dBA	>20 dBA
1	Crushing Scenario 2 / Extraction Scenario 2	42 (R32)	6	2	-	-	-
2	Crushing Scenario 2 / Loading Scenario 2	45 (R36)	-	1	-	-	-
3	Jaw Crushing Scenario 2 / Crushing Extraction Scenario 2	44 (R36)	6	3	-	-	-
4	Jaw Crushing Scenario 2 / Loading Scenario 2	47 (R36)	1	-	1	-	-
5	Crushing Scenario 3 / Extraction Scenario 3	44 (R25)	6	3	-	-	-
6	Crushing Scenario 3 / Loading Scenario 3	45 (R36)	2	1	-	-	-
7	Jaw Crushing Scenario 3 / Extraction Scenario 3	44 (R25)	2	7	-	-	-
8	Jaw Crushing Scenario 3 / Loading Scenario 3	46 (R36)	8	-	1	-	-
9	Extraction Scenario 2 / Crushing Scenario 2	44 (R32)	6	3	-	-	-
10	Loading Scenario 2 / Crushing Scenario 2	44 (R36)	5	4	-	-	-
11	Extraction Scenario 2 / Jaw Crushing Scenario 2	46 (R32)	4	4	1	-	-

	Cumulative Scenario (East / West)	Highest Predicted Nosie level LAeq dBA (Receptor No.)	The number of receivers predicted to exceed 35 dBA				
			1 to 5 dBA	6 to 10 dBA	11 to 15 dBA	16 to 20 dBA	>20 dBA
12	Loading Scenario 2 / Jaw Crushing Scenario 2	46 (R32)	3	5	1	-	-
13	Extraction Scenario 3 / Crushing Scenario 3	47 (R25)	2	6	1	-	-
14	Loading Scenario 3 / Crushing Scenario 3	47 (R25)	1	7	1	-	-
15	Extraction Scenario 3 / Jaw Crushing Scenario 3	51 (R25)	2	4	4	1	-
16	Loading Scenario 3 / Jaw Crushing Scenario 3	51 (R25)	2	3	5	1	-

Table 15 Cumulative assessment – enhanced weather conditions

	Cumulative Scenario (East / West)	Highest Predicted Nosie level LAeq dBA (Receptor No.)	The number of receivers predicted to exceed 35 dBA				
			1 to 5 dBA	6 to 10 dBA	11 to 15 dBA	16 to 20 dBA	>20 dBA
1	Crushing Scenario 2 / Extraction Scenario 2	46 (R32)	1	7	2	-	-
2	Crushing Scenario 2 / Loading Scenario 2	48 (R36)	7	-	1	-	-
3	Jaw Crushing Scenario 2 / Crushing Extraction Scenario 2	47 (R36)	2	6	3	-	-
4	Jaw Crushing Scenario 2 / Loading Scenario 2	49 (R36)	7	-	1	-	-
5	Crushing Scenario 3 / Extraction Scenario 3	48 (R25)	2	6	3	-	-
6	Crushing Scenario 3 / Loading Scenario 3	48 (R36)	5	4	1	-	-
7	Jaw Crushing Scenario 3 / Extraction Scenario 3	48 (R25)	3	4	5	-	-
8	Jaw Crushing Scenario 3 / Loading Scenario 3	49 (R36)	5	6	1	-	-
9	Extraction Scenario 2 / Crushing Scenario 2	48 (R32)	-	6	3	-	-
10	Loading Scenario 2 / Crushing Scenario 2	48 (R32)	-	5	4	-	-
11	Extraction Scenario 2 / Jaw Crushing Scenario 2	49 (R32)	-	5	4	-	-
12	Loading Scenario 2 / Jaw Crushing Scenario 2	49 (R32)	-	4	5	-	-
13	Extraction Scenario 3 / Crushing Scenario 3	52 (R25)	3	2	6	1	-
14	Loading Scenario 3 / Crushing Scenario 3	52 (R25)	3	1	7	1	-
15	Extraction Scenario 3 / Jaw Crushing Scenario 3	54 (R25)	2	2	5	3	-
16	Loading Scenario 3 / Jaw Crushing Scenario 3	54 (R25)	2	2	5	3	-

Table 14 and **Table 15** indicate that all cumulative activities are predicted to exceed the intrusive criteria (L_{Aeq} 35 dBA) at at least one sensitive receiver. It is important to note that a cumulative assessment represents a worst case scenario which includes all plant and equipment operating at 100% for total assessment duration. This situation is unlikely to occur as plant and equipment will move around within the quarry resulting in variable noise emissions levels.

6.5 Recommendations

Due to the necessarily high level nature of this assessment, it is recommended that the following measures are undertaken in order to limit the noise impact of the increased extraction rates from the facility on the surrounding residential receptors:

1. A program of regular noise monitoring is established. As a minimum, noise monitoring should be undertaken:

    a. Upon commencement for the first time of any new or altered operations on the facility to meet the increased extraction rate (with the exception of Site Establishment works)

    b. Any time equipment changes are made.

    c. Any time operations are commenced concurrently for the first time.

    d. Where operations move to a new location within the approved work area.

    e. As a result of a valid complaint from a surrounding noise sensitive receptor.

    It is recommended that this monitoring be undertaken in full time attendance by suitably qualified acoustic consultant (such as an appropriate employee of a member firm of the Association of Australasian Acoustical Consultants). Attended monitoring is necessary as the predicted noise levels at residences are low in absolute terms and hence may be impacted by sources other than noise emissions from the facility.

    Noise shall be monitored concurrently at any impacted residence (identified in **Table 9** - **Table 11**) with a position closer to the facility in order to ascertain the contribution that site operations is making to the overall measured noise levels at the residence.

2. Where any exceedances in the agreed criteria are measured, the operator of the facility is to implement all reasonable and feasible measures to achieve the agreed criteria. Such measures may include:

    a. Forming noise barriers or screening around activities which are found to cause exceedances in the agreed criteria. Depending on the surrounding topography, localised screening around equipment may reduce noise emissions by 10-15 dBA.

    b. Performing all high-noise activity such as crushing and/or screening at deep excavation areas in existing pits, irrespective of extraction location

    c. Management surrounding the selection of activities that are undertaken concurrently in order to meet noise emission criteria. This may alter in each geographical section of the site due to topographical screening and distance to the surrounding receivers (i.e., in certain areas more work may be permissible concurrently than when the same work is undertaken on a different part of the site)

    d. In the event that reversing alarm noise is considered to be a source of disturbance, the alarm noise level should be checked against the appropriate regulatory and health and safety requirements and the necessary mitigating action taken to achieve an acceptable noise reduction without compromising safety standards.

    e. In the event that rumble grid noise is considered to be a source of disturbance, mitigation applied in the form of lower posted speeds at the grids or localised screening to be installed if appropriate.

3. Engage with the local community in order to ensure that they are kept informed as to the reasons for the short-term increase in noise from the facility. Provide ongoing updates and a suitable means of contact (such as a phone number) for residents to make enquiries. Produce a complaints management procedure in the event that complaints are made with respect to noise.

4. The CNVMP for the Approved Woolgoolga to Ballina project outlines a range of environmental requirements and control measures to minimise noise and vibration impacts associated with the project. The strategies are designed to minimise, to the fullest extent practicable, noise and vibration during construction and should be considered where reasonable and feasible for these works. This document shall be consulted when further exploring mitigation or management measures.

7 OFF-SITE ROAD TRAFFIC

Haulage trucks would generally proceed from the site along the private road access route heading north. This road is considered to be part of the project site and is not assessable as road traffic. Once the vehicles join the Boggy Creek Road noise generated from vehicle movements must be assessed in accordance with the NSW Environment Protections Authority's (EPA) Road Noise Policy (RNP).

7.1 Methodology

In accordance with the traffic impact assessment undertaken for the borrow site, heavy vehicles from the borrow site would enter public roads at Boggy Creek Road, heading east. Reaching Reardons Lane they would travel north onto Woodburn Coraki Road. Woodburn Coraki Road is an arterial road which carries vehicles between Casino and the Pacific Highway at North Woodburn. At this point heavy vehicles from Coraki and other quarries and developments in the area would also utilise the route and therefore noise generated from heavy vehicle movements would not be attributed just with the development and are therefore not required to be assessed.

The Moonimba Borrow Site proposes an average of 208 truck movements per day of material haulage from the site. In addition to these movements, material would be imported to the site for stockpiling. A total of (on average) 236 movements per day are expected.

Truck movements are likely to increase during peak periods. A peak of 300 truck movements per day is expected. While site activities would generally occur between 7 am and 6 pm, truck movements will be restricted to outside school bus times. As such the peak 300 movements would be distributed over a total of nine hours, resulting in an average of 33 truck movements per hour.

7.2 Results and discussion

7.2.1 Reardon Lane and Boggy Creek Road

Traffic modelling figures are provided in the previous noise assessment undertaken for this development assessed by Greg Alderson & Associates in 2014 and documented in their report *Noise Impact Assessment – Extension of Moonimba Quarry Bungawalbin (ref 06193_NIA_RevB)*.

Existing traffic figures are provided below in **Table 16**.

Table 16 Existing daily traffic movements

Location	Total daytime traffic movements	Heavy vehicle percentage (%)
Boggy Creek Road	240	62
Reardons Lane	220	70
Woodburn-Coraki Road	1397	30

Calculations of the road traffic noise levels with and without the project have been undertaken using the Calculation of Road Traffic Noise algorithm. Provided in **Table 17** is a summary of the predicted noise criteria and predicted noise levels.

Table 17 Predicted noise levels

Address	Sound Pressure Level LAeq(15hour), dB			
	Criteria	Existing	With development	Increase
165 Reardons Lane	60	56	60	4
18 Casuarina Drive	60	50	55	5
201 Reardons Lane	60	50	54	4
203 Reardons Lane	60	51	56	5
205 Reardons Lane	60	52	57	5
240 Reardons Lane	60	56	61	5
259 Boggy Creek Road	60	58	63	5
75 Boggy Creek Road	60	42	47	5

The results provided above in **Table 17** indicate that two buildings at the address of 240 Reardons Lane are predicted to exceed the daytime noise criteria and increase by more than 2 dBA. These buildings are situated on the corner of Boggy Creek Road and Reardons Lane. The exceedances are generated from the acceleration and deceleration of vehicles associated with the intersection.

7.2.2 Woodburn-Coraki Road

The Woodburn-Coraki road has an existing 1397 vehicle trips a day, of which heavy vehicles constitute 30per cent. The additional 300 movements per day will increase the total movements to 1697 with a heavy vehicle percentage of 42%. This represents an approximate increase in noise of 1.9 dB, compliant with the RNP relative increase noise criteria of 2.0 dB.

The receivers located on Woodburn-Coraki Road are not considered to be significantly affected by the additional truck movements. Further consideration of noise impacts is not required.

7.2.3 Pacific Highway and Woodburn Community

Due to the large number of vehicles that travel on the Pacific Highway, the additional movements from this project would increase noise levels by less than 1 dB. An increase of 2 dB or less is generally considered to be indiscernible. The impact by the project at these locations is not considered to be significant and further consideration of noise mitigation measures is not required.

7.3 Recommendations

7.3.1 Reardon Lane and Boggy Creek Road

The 2015 Development Application consent requires a noise wall to be built adjacent to 240 Reardons Lane. Although details of the noise wall are not available, a standard construction wall would break line-of-sight with the road and provide a reduction in noise of at least 5 dB. This reduction would be sufficient to ensure compliance with the applicable noise criteria. Considering details of the wall are not available, further consideration of this property should be given once the noise wall is built. An inspection of the noise wall and attended noise measurements should be undertaken to ensure that sufficient noise reduction is provided.

8 CONCLUSION

A noise assessment in accordance with relevant regulatory policies has been undertaken in order to address:

- Airborne noise from extraction processes on the site
- Cumulative airborne noise from extraction processes on the site
- Airborne noise impacts from haulage vehicles travelling on the public road network

The assessment has shown that without mitigation, exceedances are predicted for both elements addressed.

Regarding operational airborne noise from on-site operations, SLR has recommended a number of mitigation and management measures including a regular monitoring program. With mitigation in place it is considered likely that compliance with the INP Amenity criteria can be achieved at all receivers, however compliance with the NSW INP Intrusiveness criteria is not likely to be achieved at a number of the worst impacted receivers. Due to the short-term (two year) nature of the increased extraction works, the daytime-only operating hours and the State Significant nature of the need for the material (being linked to the Woolgoolga to Ballina Pacific Highway Upgrade Project) - this outcome may be considered acceptable by the regulatory body.

Regarding noise impacts from vehicles on public roads, exceedances were found to two buildings situated on the corner of Boggy Creek Road and Reardons Lane. The 2015 Development Application consent requires a noise wall to be built adjacent to 240 Reardons Lane. Although details of the noise wall are not available, a standard construction wall would break line-of-sight with the road and provide a reduction in noise of at least 5 dB. This reduction would be sufficient to ensure compliance with the applicable noise criteria. Considering details of the wall are not available, further consideration of this property should be given once the noise wall is built.