Appendix 10.3

Lumleys Hill Borrow Site Management Plan

Woolgoolga to Ballina (sections 3 to 11)

Pacific Highway Upgrade

SEPTEMBER 2017

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Pacific Complete Sustainability and Environment Manager	Pacific Complete Project Director	Roads and Maritime General Manager Pacific Highway

Revision history

Revision	Date	Description	Approval
0	22/09/16	Initial draft for internal review	Andrea Zambolt
1	04/11/16	Draft for initial RMS review	Chris Greenaway
2	03/04/17	Draft for final RMS review	Chris Greenaway
3	4/04/17	Submission to DPE	Chris Greenaway
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5	26/06/17	Final submission to DPE	Chris Greenaway
6	19/07/17	Final submission to DPE (2)	Chris Greenaway
7	13/09/17	DPE approval letter update	Chris Greenaway

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Glossary / Abbreviations

AHD	Australian Height Datum
BSMP	Borrow Site Management Plan
CEMP	Construction Environmental Management Plan
CAQMP	Construction Air Quality Management Plan
CNVMP	Construction Noise and Vibration Management Plan
CSWMP	Construction Soil and Water Quality Management Plan
CWREMP	Construction Waste, Resource and Energy Management Plan
dBA	Decibels
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
ESCP	Erosion and Sediment Control Plan
EWMS	Environmental Work Method Statements
MCoA	Minister's Condition of Approval
NCA	Noise catchment area
NML	Noise management level
NPW Act	*National Parks and Wildlife Act 1974*
OEH	Office of Environment and Heritage
Project, the	The Woolgoolga to Ballina Project
RBL	Rating background level
Secretary	Secretary of the Department of Planning and Environment
SPIR	Submissions/ Preferred Infrastructure Report
RMS, Roads and Maritime	Roads and Maritime Services
UZF material	UZF material sits below the two top layers of roads, known as base and sub base layers. UZF consist of select material, utilised for its high strength properties, and the layer below the select material, often known as the capping layer.

1 Introduction

1.1 Context

This Borrow Site Management Plan (BSMP) for the Lumleys Hill Borrow Site forms part of the Construction Environmental Management Plan (CEMP) for construction of sections 3 to 11 of the Woolgoolga to Ballina Pacific Highway Upgrade.

This BSMP has been prepared to address the requirements of the Minister's Conditions of Approval (MCoA), specifically MCoA D22, the mitigation measures listed in the Pacific Highway Upgrade: Woolgoolga to Ballina Submissions / Preferred Infrastructure Report November 2013 (SPIR) and all applicable legislation.

The EIS indicates that if nearby road projects and quarries cannot supply the material required for the project, other material sources near the project would be investigated. The EIS also advised that any material sourced would need to be:

- More than 40 metres from waterways
- Of low ecological and heritage value
- Greater than 100 metres from the closest receiver (unless a negotiated agreement is in place).

1.2 Background

On behalf of the Australian and NSW governments, NSW Roads and Maritime Services (Roads and Maritime) is progressively upgrading the Pacific Highway to dual carriageway between the Hunter and NSW/Queensland border.

The Woolgoolga to Ballina Pacific Highway Upgrade involves upgrading approximately 155 kilometres (km) of highway to four-lane dual-carriageway road between Woolgoolga (north of Coffs Harbour) and Ballina (near the NSW/Queensland border) on the NSW north coast. The project bypasses the towns of Grafton, South Grafton, Ulmarra, Woodburn, Broadwater and Wardell. The project will include road duplication, alignment modification and new road sections. Once complete, the project will create a four-lane divided road, with two lanes in each direction. It would also allow for the road's upgrade in the future to a six-lane divided highway.

The Woolgoolga to Ballina Project was declared critical State significant infrastructure under section 115V of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and was assessed under Part 5.1 of the EP&A Act. Following preparation and exhibition of the environmental impact statement (EIS) and response to submissions (SPIR) the project was approved by the NSW Government on 24 June 2014.

The Woolgoolga to Ballina project has also been subject to approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Woolgoolga to Ballina Project was declared by the Commonwealth Minister for Sustainability, Environment, Water, Populations and Communities to be a controlled action under this Act on 20 June 2012. Approval was granted on 14 August 2014.

The Woolgoolga to Ballina project has been staged with Sections 1 and 2 delivered separately. This document covers Sections 3-11 of the Woolgoolga to Ballina upgrade (the project). The project will be delivered by the Pacific Complete, appointed as the Delivery Partner of Roads and Maritime. Pacific Complete comprises Laing O'Rourke Australia Construction Pty Ltd and Parsons Brinckerhoff Australia Pty Limited working in close collaboration with Roads and Maritime Services (Roads and Maritime).

1.3 Environmental management system overview

The Pacific Complete CEMP (sections 3 to 11) describes the overall system for environmental management of the project being delivered by Pacific Complete in partnership with Roads and Maritime.

As outlined in Section 4.2.3 of the approved Pacific Complete CEMP, contractors will be required to develop project specific environmental management documentation to address the operational control requirements outlined in the Pacific Complete CEMP. This includes the development of a Contractor's Construction Environmental Management Plan (CCEMP) that will be reviewed by Pacific Complete to ensure its compliance with the relevant requirements of the Pacific Complete CEMP.

Management measures identified in this borrow site management plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.

Contractor EWMS will be developed and signed off by the PC Environment Manager prior to commencement of works and construction personnel will be required to undertake works in accordance with the identified mitigation and management measures.

Additionally an online GIS system of mapping (PCMap) has been developed for the project and this includes all of the sensitive environmental issues identified during the environmental assessment process for the project. Used together, the CEMP, PCMap, strategies, procedures and EWMS form a management system that clearly identifies required environmental management actions for reference by project personnel and contractors.

The review and document control processes for this plan are described in Chapters 9 and 10 of the CEMP.

1.3.1 Pacific Complete Environment Protection Licence (EPL)

Lumleys Hill Borrow Site is located within the project boundary and is therefore included in the EPL boundary for the project (EPL number 20713). The activities at the site will be carried out in accordance with the EPL.

1.4 Purpose

The purpose of this plan is to describe how Pacific Complete will manage the establishment, operation and rehabilitation of the Lumleys Hill Borrow Site which will be used for the construction of the Woolgoolga to Ballina Pacific Highway Project (sections 3 to 11).

1.5 Objectives

The key objectives of this BSMP are to ensure that impacts caused by the borrow site are minimised within the scope permitted by the planning approval. To achieve this, the following will be undertaken:

- Ensure appropriate measures are implemented to address the relevant MCoA outlined in Table 2.2 and the safeguards detailed in the EIS and SPIR
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Section 2.1 of this plan.
- Ensure appropriate measures are implemented to avoid damage to threatened species, aboriginal and non-aboriginal sites and artefacts and sensitive ecosystems during the establishment, operation, decommissioning and rehabilitation of the site in accordance with the projects conditions of approval.
- Provide staff with an increased level of understanding and awareness of sensitive environmental issues within or adjacent to the borrow site and ensure effective communication is maintained with statutory authorities.

- Ensure consultation is carried out with sensitive receivers and stakeholders and address questions or concerns raised during consultation.
- Ensure that the site is rehabilitated to an acceptable level after the site is decommissioned.

2 Relevant legislation and guidelines

2.1 Legislation

Table 2-1 lists the principal legislation and regulation that apply to ancillary facilities management.

Table 2-1 Principal legislation and regulation relevant to ancillary facility management

Legislation and regulation	Relevance
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999	Provides for the protection of matters of national environmental significance including species, populations, communities and their habitat that could be impacted by the work.
National Greenhouse and Energy Report Act 2007	Provides the statutory basis for the National Greenhouse and Energy Reporting Scheme in relation to greenhouse gas emissions and energy consumption and production.
Native Title Act 1993	Provides a mechanism for the recognition and protecting of native title.
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	Protects objects and areas that are of particular significance to Aboriginal people.
State	
Environmental Planning and Assessment Act 1979 (EP&A Act)	Describes the processes for consenting development in NSW, managing land use and implementing environmental planning instruments. Describes certain permitting and licencing streaming and exclusion provisions that will apply to the work.
Protection of the Environment Operations Act 1997	Prescribes pollution control, incident notification, offence notices and the provision of Environment Protection Licences.
Noxious Weeds Act 1993	Provides for the management and control of noxious weeds to reduce the spread of weeds and minimise damage to the environment.
Threatened Species Conservation Act 1995	Provides a complete list of all endangered and vulnerable species and ecological communities in NSW listed under the Act.
Fisheries Management Act 1994	Governs the management of fish and their habitat in NSW.
Native Vegetation Act 2003	Stipulates the way native vegetation is managed in NSW by preventing largescale clearing, unless it improves or maintains environmental outcomes.
National Parks and Wildlife Act 1974	Provides statutory protection for native fauna and flora and Aboriginal places and objects throughout NSW.

Heritage Act 1997	Provides for the conservation of buildings, works, archaeological relics and places of heritage value.
Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Commonwealth)	Enacted to specifically protect Aboriginal and Torres Strait Islander heritage.
Water Act 1912	Provides for the protection of groundwater in the few areas in NSW where water-sharing plans have not come into effect.
Water Management Act 2000	Provides for the protection, enhancement and restoration of water sources and ecosystems, ecological processes and biological diversity.
Soil Conservation Act 1938	Establishes controls to prevent soil erosion and land degradation.
Contaminated Land Management Act 1997	Provides for the investigation and remediation of contaminated land considered to post a significant risk to human health of the environment.
Waste Avoidance and Resource Recovery Act 2001 (WARR Act)	Supplementary legislation aimed at reducing waste and resource consumption, defining the waste hierarchy and promoting its adoption across NSW.
Environmentally Hazardous Chemicals Act 1985	Controls the movement, storage, and disposal of chemical waste. Administered by EPA and the Hazardous Chemicals Advisory Committee.
Dangerous Goods (Roads and Rail Transport) Act 2008	Ensures that dangerous goods are transported in a safe manner.
Pesticides Act 1999	Controls and regulates the use of pesticides in NSW. It prohibits the misuse of pesticides that harms people, property, animals or plants. Under the Act the EPA can issue a person with a clean-up notice, prevention notice and compliance cost notice.

2.1.1 Guidelines

- NSW Road Noise Policy (RNP) (DECCW 2011)
- NSW Industrial Noise Policy (INP) (EPA 2000)
- RTA Environmental Noise Management Manual (ENMM) (RTA 2001)
- Interim Construction Noise Guideline (ICNG) (DECC 2009)
- Assessing Vibration: A Technical Guideline (DEC 2006)
- British Standard 7385: Part 2 ““Evaluation and measurement of vibration in buildings”
- *German DIN 4150: Part 3 – 1999 Effects of Vibration on Structure* (DIN 1999)
- Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (1990) Australian and New Zealand Environment and Conservation Council (ANZECC)
- Australian Standard AS2187.2-2006: “Explosives – Storage, Transport and Use”
- National Environment Protection Council’s (NEPC) – NEPM for Ambient Air Quality Guidelines

- Protection of the Environment Operations (Clean Air) Regulation, 2002
- AS 3580.1.1:2007 Methods for Sampling and Analysis of Ambient Air – Guide to Siting Air Quality Monitoring Equipment.
- AS 3580.10.1-2003 Methods of Sampling Analysis of Ambient Air
- Action for Air 2009 (NSW DEC)
- Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (DEC 2005)
- Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (DEC 2007)
- Air Quality Monitoring Criteria for Deposited Dust (DEC Guideline).

2.2 Minister's conditions of approval

The MCoA relevant to this plan are listed in Table 2-2. A cross reference is also included to indicate where the condition is addressed in this plan or other project management documents.

Table 2-2 Conditions of approval relevant to the Borrow Site Management Plan

MCoA No.	Condition Requirements	Document Reference
D22	The Applicant shall prepare and implement a **Borrow Sites Management Plan**, to manage the construction, operation and rehabilitation of the borrow sites used to source construction material for the SSI, prior to the commencement of construction at the borrow sites, or as otherwise agreed by the Secretary. The Plan shall be prepared in consultation with the EPA, OEH and DPI (Fisheries) and to the satisfaction of the Secretary, and shall include, but not necessarily be limited to:	
	(a) details of construction/extraction methods and activities carried out at the borrow site;	Section 4
	(b) management and mitigation measures to be used to minimise surface and groundwater impacts, Aboriginal and non-Aboriginal heritage, air quality, noise and vibration, biodiversity and visual impacts;	Section 6
	(c) consultation with sensitive receivers; and	Section 7
	(d) details of the rehabilitation of the borrow site, including future landform and use of the borrow site, landscaping and revegetation, and measures that would be implemented to minimise or manage the ongoing environmental effects of the site.	Section 8
	The Plan shall demonstrate that the construction and operation of the Lang Hill borrow site has no adverse impact on the known Oxleyan Pygmy Perch habitat waterway.	N/A
B79	The applicant shall ensure that material extracted from the borrow sites established for the SSI, is only used for the construction of the SSI subject to this approval, and no other sections of the Pacific Highway or other works.	Noted.

2.3 EIS borrow site criteria

The criteria outlined in the EIS for the location of borrow sites and a summary response is detailed in Table 2-3. A cross reference is also included to indicate where the criteria is addressed in more detail in this plan.

Table 2-3 EIS Criteria for borrow sites

Criteria	Summary response	Document Reference
More than 40 metres from waterways	The borrow site is located more than 40 metres from a major waterway.	Section 5.1
Of low ecological and heritage value	The footprint and immediate surroundings of the borrow site is predominately cleared rural residential and agricultural land and is considered to be of low ecological and heritage value. The general area has been identified as a koala hotspot therefore the site will be managed in accordance with the approved Koala Management Plan and Construction Flora and Fauna Management Plan (sections 3 to 11), Appendix B2 of the CEMP.	Section 5.3 and Section 5.5
Greater than 100 metres from the closest receiver (unless a negotiated agreement is in place).	One receiver is located within 100 metres of the borrow site. This receiver has been consulted with during the preparation of this management and will continue to be consulted with during the set up and operation of the site.	Section 5.4, Section 5.7 and Section 7

3 Borrow site description

The Lumleys Hill Borrow Site is located approximately 3 kilometres west of the township of Wardell. The site is located within the approved project boundary on the western side of the highway alignment, in Portion D of the Woolgoolga to Ballina Pacific Highway Upgrade (sections 3 to 11). The borrow site, consisting of an excavation area and associated infrastructure, is located within the approved project boundary. The site will be accessed via the existing driveway that leads to the borrow site and is located outside the approved project boundary. This driveway will be upgraded to form a new access road for the project. A separate consistency assessment will be prepared for the use of this access road.

Table 3-1 Site description

Item	Description
Chainage	152,200 to 152,700
Location	West of Wardell
Lot ID	Lot 158 DP755731 and Lot 3 DP707736
Size	8.4 hectares

The site is located on and adjacent to cleared agricultural land with remnant patches of vegetation. This remnant vegetation does not form part of an OEH biometric vegetation type. Section 4.4.17 of the SPIR discussed the presence of Stringybark (*Eucalyptus acmenoides*) and the invasive introduced Camphor Laurel (*Cinnamomum camphora*) species at the site. A number of hollow bearing trees and koala feed trees also exist within the site. The borrow site is located in the vicinity of the Wardell Road koala hotspot outlined in the Koala Management Plan (Sections 1-11) (RMS, 2016) that provides habitat for the Coolgardie-Bagotville koala population. There are no major waterways in the vicinity of the borrow site, however a small ephemeral drainage line runs along the western boundary of the site.

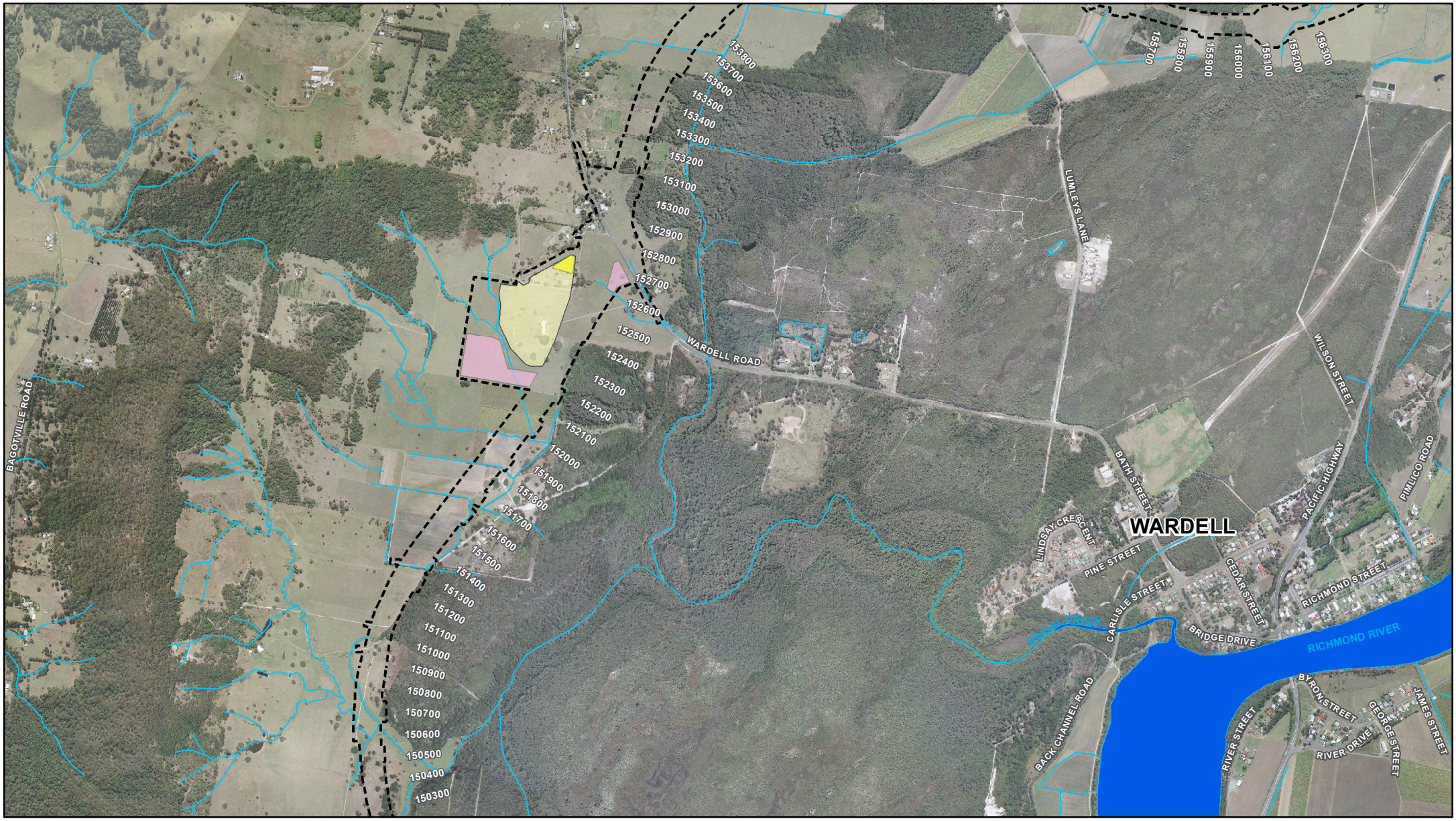
The borrow site was originally identified in the environmental impact statement (EIS) with an area covering approximately three hectares. The borrow site was then expanded in the SPIR to cover an area of approximately 8.4 hectares, with excavation depths of 20-23 metres. Pacific Complete proposes to extract 750,000m^3 from the borrow site within the same footprint and depth as proposed in the SPIR. The final depth of the borrow site will be dependent on the final mass haulage quantities for the project, however this will not exceed the 23 metres outlined in the SPIR.

Two ancillary facilities are proposed to be located in close proximity to the borrow site. A batch plant is proposed to be located to the south of the borrow site and a compound site to the east, on the opposite side of the project alignment. Figure 3-1 shows the location of the Lumleys Hill Borrow Site and Figure 3-2 provides an indicative site layout. The location of the two ancillary facilities are also shown in these figures.

3.1 Commissioning and decommissioning

Table 3-2 Indicative timeframes for borrow site activities

	2016				2017				2018				2019				2020	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Site establishment																		
Operation																		
Decommissioning																		
Rehabilitation																		



PACIFIC COMPLETE

PACIFIC HIGHWAY UPGRADE

Woolgoolga to Ballina

Lumleys Hill Borrow Site Location

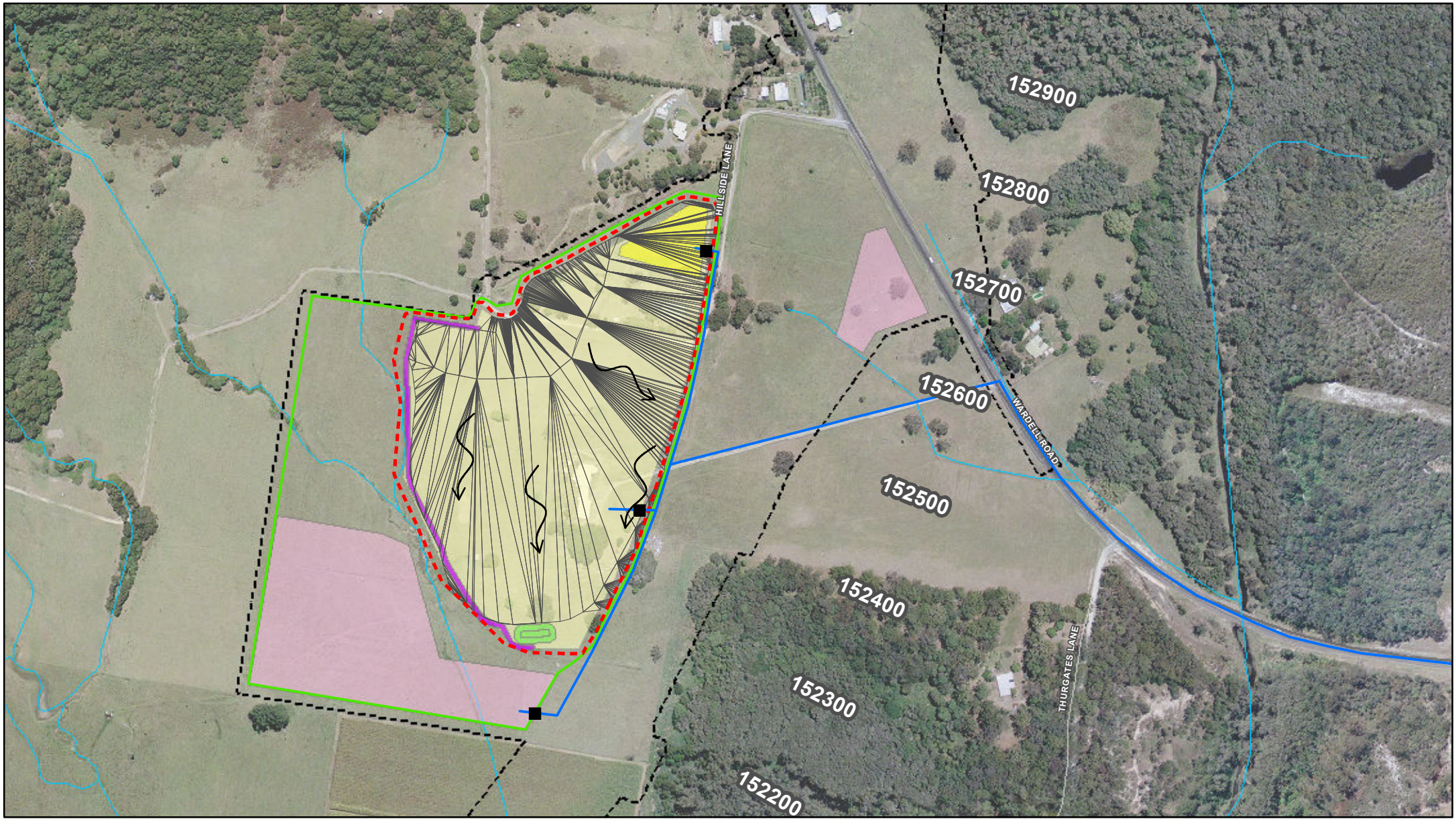
Figure 3-1

- Drainage
- Proposed ancillary facility
- Site office/staff amenities
- Lumleys Hill Borrow Site
- Approved Project Boundary Version 11 (June 2016)

1:20,000 at A4

0 100 200 400 600 800
Metres

Print Date:	31/10/2016
Author:	LABRUYEREA



PACIFIC COMPLETE

PACIFIC HIGHWAY UPGRADE

Woolgoolga to Ballina

Lumleys Hill Borrow Site Layout

Figure 3-2

- Koala grid
- Proposed site access
- Drainage
- Cut lines
- Erosion and sediment controls
- Direction of runoff
- Approved Project Boundary Version 11 (June 2016)
- Excavation area
- Proposed ancillary facilities
- Site office/staff amenities
- Sediment basin
- Water diversion bund
- Fauna (koala) exclusion fencing

1:5,000 at A4

0 25 50 100 150 200
Metres

Print Date:	20/12/2016
Author:	LABRUYEREA

4 Material extraction

4.1 Extraction description

It is estimated that 750,000m^3 of material will be extracted from the Lumleys Hill Borrow Site. The material to be extracted from the site consists of both soil and rock material. The material will be used predominately for general fill and material for upper zone formations (UZF). UZF material sits below the two top layers of roads, known as base and sub base layers. UZF consist of select material, utilised for its high strength properties, and the layer below the select material, often known as the capping layer.

4.2 Construction and extraction method

4.2.1 Construction method

The majority of vehicles will access the borrow site from Wardell Road, east of the borrow site, along the existing driveway to the property located at the site and along the construction corridor as shown in Figure 3-2. A section of the existing driveway is located outside the project boundary. This driveway will be upgraded to form a new access road for the project. A separate consistency assessment will be prepared for the use of this access road.

The site clearing limits will be demarcated and clearing of the scattered remnant vegetation will be undertaken. The topsoil will be stripped and stockpiled at either the borrow site or nearby ancillary facilities along the alignment. A sediment basin will be located on the southern end of the excavation area to capture diverted run off.

A site office / staff amenities will be established within the northern portion of the borrow site. This area falls within the extent of excavation area proposed. Excavations in this area will occur prior to the establishment of the facility. The site offices and amenities will also include parking for both light and heavy vehicles, material storage/ laydown area for construction materials and stockpiling and minor chemical storage. These uses will be positioned to assist in minimising noise, visual and air quality impacts to the sensitive receivers located to the north of the borrow site. Where feasible the site office and amenities will be located to create a buffer between site activities and sensitive receivers. Refer to Figure 3-2 for an indicative layout of the borrow site.

A number of activities at the borrow site will require access to water including dust suppression, crushing and screening and rehabilitation. It is anticipated that water will be supplied from sediment basins, nearby standpipes, or other nearby reservoirs. Potable water will also be required for the site office/amenities. This water will be trucked in and stored in onsite water tanks. The contractor will determine the amount of water required to operate the site and where the water is sourced. The contractor will be required to secure permits and approvals should extraction of water from external sources be required.

Power is available from the grid at the locations where the site office/ staff amenities will be located.

4.2.2 Extraction method

Conventional extraction methods will be used to extract the material including dozer ripping and possible hammering to fragment the material. Blasting is not currently proposed to be used at the borrow site. Should blasting be required, this plan will be reviewed an updated accordingly. The site is located on the crest of Lumleys Hill. The extraction will typically be progressed from top to bottom in benches. Diversion drains will be constructed to divert clean water around the site and runoff from the site into the sediment basin proposed at the southern, low point of the cutting. The size of the sediment basin will be determined in accordance with *Managing Urban Stormwater, Soils and Construction* (Landcom, 2004), known as the Blue Book, by the contractor's soil conservationist.

Once extracted, the material will be processed within the footprint of the borrow site. Processing techniques will include crushing, screening and stockpiling. All processing plant will be mobile and fitted with industry best practice misting sprays for dust suppression. Materials will be stockpiled at the borrow site until transported for use on the project.

4.3 Activities to be carried out at the facility

Activities that are anticipated to be carried out at the borrow site include:

- Site establishment/ mobilisation of the site:
  - Clearing of vegetation
  - Establishment of site access
  - Establishment of site office/amenities
  - Installation of security and exclusion fencing
  - Installation of plant and equipment
  - Establishment of sediment and erosion control measures
  - Stockpiling of topsoil/ overburden material.
- Mechanical excavation
- Material processing (crushing and screening)
- Short term stockpiling of material
- Material storage/ laydown of construction material at the site office
- Storage of chemicals and fuel
- Loading and haulage of material
- Monitoring and maintenance of environmental measures during the use of the site and demobilisation when extraction is complete.
- Rehabilitation.

As outlined in the project approval, the site will operate during the hours of:

Monday to Friday: 7am to 6pm.
Saturday: 8am to 5pm
Sunday and Public Holidays: no work.

Low noise impact activities and works as defined in the Minister's conditions of approval may also be carried out between Monday to Friday: 6am to 7am and 6pm to 7pm.

4.4 Plant and equipment

Table 4-1 outlines the plant and equipment anticipated to be used and stored at the site.

Table 4-1 Plant and equipment to be used and stored at the site

Plant	Equipment
Site establishment/ decommissioning (site office/amenities) • Semi-trailers and other delivery trucks • Small mobile crane • Grader • 13 tonne smooth drum roller • 13 tonne padfoot roller • Backhoe / 23 tonne excavator • Watercarts • Light vehicles x 5. **Extraction operations** • 35-50 tonne excavator x 3 • D6-9 bulldozer • 40-50 tonne articulated dump truck x 6	• Pumps • Generator • Fuel and chemical storage • Trailers • Shipping containers • Tools.

Plant	Equipment
• 631 scraper x 6 • Associated highway trucks (truck and dog) x 6 • Watercarts • 20 tonne smooth drum roller • 20 tonne padfoot roller • Light vehicles x 10. **Crushing operations** • 1 x jaw crusher • 1 x cone crusher • 1 x screen • 30 tonne excavator • Front end loader • Watercarts • Light vehicles x 5. **Rehabilitation works** • 25 tonne excavator • D6-9 bulldozer • 30-40 tonne articulated dump truck x 4 OR truck and dog x 4 • 13 tonne smooth drum roller • 13 tonne padfoot roller • 10 light vehicles.	

4.5 Chemical and fuel storage details

It is anticipated that there will be some fuel and chemicals stored at the borrow site to facilitate site operations. Fuel and chemicals and indicative quantities expected to be stored at the facility include:

- Diesel fuel – 1,000L
- Unleaded fuel –100L
- Oils – 100L
- Grease – 100 kg
- Other miscellaneous construction products.

5 Environmental impacts of the borrow site

An environmental assessment outlining the impacts of the Lumleys Hill Borrow Site was included in the Submissions/ Preferred Infrastructure Report (SPIR). A summary of this information, additional assessment and associated impacts of the works are discussed below. These impacts have also been assessed to determine whether they are consistent with the approved project.

5.1 Hydrology and Flooding

The Lumleys Hill Borrow Site is located above the 20 year and 100 year ARI flood levels for the area. As outlined in Section 4.7.17 of the SPIR, the site will not result in any impacts to flood impact, duration or velocity.

Hydrology and flooding impacts associated with the proposed borrow site are considered to be consistent with those assessed and approved under the EIS and SPIR. These impacts will be managed in accordance with this borrow site management plan.

As outlined in Section 4.2.3 of the approved Pacific Complete CEMP, contractors will be required to develop project specific environmental management documentation to address the operational control requirements outlined in the Pacific Complete CEMP. This includes the development of a Contractor's Construction Environmental Management Plan that will be reviewed by Pacific Complete to ensure its compliance with the relevant requirements of the Pacific Complete CEMP.

Management measures identified in this borrow site management plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.

5.2 Soils, sediment and water

The Clarence-Moreton Basin is an extensive sediment basin in north east New South Wales and southern Queensland and is the main geological feature in the region.

There are no major waterways in the vicinity of the borrow site. A small ephemeral drainage line runs adjacent to the site, as shown in Figure 3-2. An OEH identified wetland is located approximately 800 metres to the east of the borrow site on the opposite side of the project alignment. Diversion drains and erosion and sediment controls will be implemented in accordance with approved Pacific Complete Construction Soil and Water Quality Management Plan (sections 3 to 11) (CSWMP), Appendix B4 of the CEMP to manage the flow of water around the site.

The majority of the borrow site is located in an area that was identified in the EIS as having no known occurrence of acid sulfate soils. The southern portion of the site has been identified as having low probability of occurrence, therefore it is considered to be unlikely that acid sulfate soils will be encountered during the works at the site.

Clean water will be directed around the borrow site cutting. Groundwater seepage and/ or rainfall runoff will be captured within the borrow site footprint and diverted to the sediment basin at the southern end of the site using bunds and other erosion and sediment control measures in accordance with the Blue Book. An erosion and sediment control plan (ESCP) for the borrow site will be prepared by the contractor's soil conservationist prior to the works commencing in accordance with the Blue Book and the approved Pacific Complete Construction Soil and Water Quality Management Plan (Sections 3 to 11) (SWQMP), Appendix B4 of the CEMP. Water collected in the sediment basin will be managed and discharged to ephemeral drainage line at the southern end of the site in accordance with the Project EPL.

The borrow site is located at an elevation of approximately 30 metres AHD (Australian Height Datum). Two groundwater regimes are located within the vicinity of the borrow site. One

associated with the shallow alluvial sediments associated with the Richmond River Alluvium and Bingal Creek alluvium and a second within the bedrock of the Neranleigh Fernvale Beds underlying the alluvium. Two groundwater systems are sustained by the Neranleigh Fenvale Beds, located at the borrow site. These two systems consist of:

- A shallow perched groundwater system, anticipated to be located within 5 metres of the ground level, in the weathered material that overlays the bedrock.
- A deeper fractured bedrock aquifer groundwater system, likely to be located below the proposed excavation depth (approximately 6 metres AHD) and above the surrounding alluvium water table (approximately 1 metre AHD).

The shallow system is predominately sustained by direct rainfall and is anticipated to have a limited connection to the deeper bedrock system. The borehole data from the geotechnical investigations indicates that no groundwater was intercepted during drilling at three locations at the borrow site that went to depths ranging from 15.6 metres to 35 metres below ground level. It should be noted that this was not confirmed by subsequent water level measurements, and is only considered indicative. However, this does suggest that the regional groundwater table is not anticipated to be intercepted during the excavation works at the borrow site.

The borrow site is located on predominately cleared agricultural land. A patch of Swamp Sclerophyll Forest on Coastal Floodplain, listed as an endangered ecological community (EEC), is located to the east of borrow site, on the opposite side of the project alignment and within the SPIR vegetation clearing limit for the project. This vegetation is potentially sustained by shallow groundwater and surface water flooding associated with Bingal Creek. The excavation activities are unlikely to impact on sensitive local ecological communities if the ecological communities located in the area are sustained by the shallow perched groundwater system and the deep bedrock groundwater system is located below the proposed excavation depth.

Rainfall recharge to the deep bedrock groundwater system may be enhanced due to the excavation works at the borrow site and could cause mild mounding of the local groundwater table beneath the borrow site. The material at the site is anticipated to filter any suspended solids arising from the excavation activities, therefore the activities at the site are unlikely to adversely impact the water quality of the regional groundwater.

Fifteen (15) groundwater bores are located within a kilometre of the borrow site, comprising active groundwater users, monitoring bores and closed bores. It is anticipated that the excavation activities will have no meaningful impact on the bores due to the following:

- lack of hydraulic connectivity between the surface alluvium and the underlying bedrock
- the strong hydraulic connection between the surface waters of the Richmond River
- the underlying alluvium aquifer and the proposed excavation depth being above the water level of the alluvium aquifer.

Refer to Appendix A for a technical memo on groundwater within the vicinity of the Lumleys Hill Borrow Site.

Soil, sediment and water impacts associated with the borrow site are considered to be consistent with those assessed and approved under the EIS and SPIR. These impacts will be managed in accordance with this borrow site management plan.

As outlined in Section 4.2.3 of the approved Pacific Complete CEMP, contractors will be required to develop project specific environmental management documentation to address the operational control requirements outlined in the Pacific Complete CEMP. This includes the development of a Contractor's Construction Environmental Management Plan that will be reviewed by Pacific Complete to ensure its compliance with the approved Pacific Complete CEMP.

Management measures identified in this borrow site management plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.

5.3 Biodiversity

The borrow site is located on and adjacent to cleared agricultural land with remnant patches of vegetation. This remnant vegetation does not form part of an OEH biometric vegetation type. Section 4.4.17 of the SPIR discussed the presence of Stringybark (*Eucalyptus acmenoides*) and the invasive introduced Caphor Laurel (*Cinnamomum camphora*) species at the site. A number of hollow bearing trees and koala feed trees also exist within the site. All of the vegetation within the site is located within the approved SPIR vegetation clearing limits and the current clearing limits for the project.

A patch of Swamp Sclerophyll Forest on Coastal Floodplain, listed as an endangered ecology community (EEC), is located to the east of the site, on the opposite side of the project alignment. This vegetation is located within the approved SPIR vegetation clearing limits and the current clearing limits for the project. Two Soldiers Crest Orchids (*Oberonia titania*), also known as Red-flowered King of the Fairies Orchids, a species listed as vulnerable under the *Threatened Species Conservation Act 1995* and included in the Threatened Flora Management Plan for the project are located approximately 100 and 200 metres east of the site. These are located on the opposite side of the project alignment, outside of the approved project and clearing boundary. The borrow site is not considered to impact these threatened species.

There has been one koala sighting recorded at the site, with a number of other sightings in the surrounding area, the majority of which have been to the north and south east of the site. The borrow site is located in the vicinity of the Wardell Road koala hotspot outlined in the Koala Management Plan (Sections 1-11) (RMS, 2016) and the figure opposite that provides habitat for the Coolgardie-Bagotville koala population. As outlined above, the borrow site is located on and adjacent to cleared agricultural land with remnant patches of vegetation. A number of koala feed trees are located on the site, however these are located within the approved SPIR vegetation clearing limits and the current clearing limits for the project. The clearing of vegetation at the site and along the alignment will be carried out in accordance with the Koala Management Plan (Sections 1-11). This will include the staged approach to vegetation clearing, referred to as 'phased resource reduction' outlined in Section 6.3.5 of the Koala Management Plan (Sections 1-11). Fauna (koala) exclusion fencing will be established at the site to entirely enclose the borrow site and batch plant, to the south of the borrow site, as shown in Figure 3-2. Koala grids will be implemented at all entry points to allow traffic movements in and out of the site whilst maintaining a barrier between the site and any koalas potentially in the area. If additional security fencing is required around the site or sections of the site, this fencing will be established within the boundary of the fauna (koala) exclusion fencing.

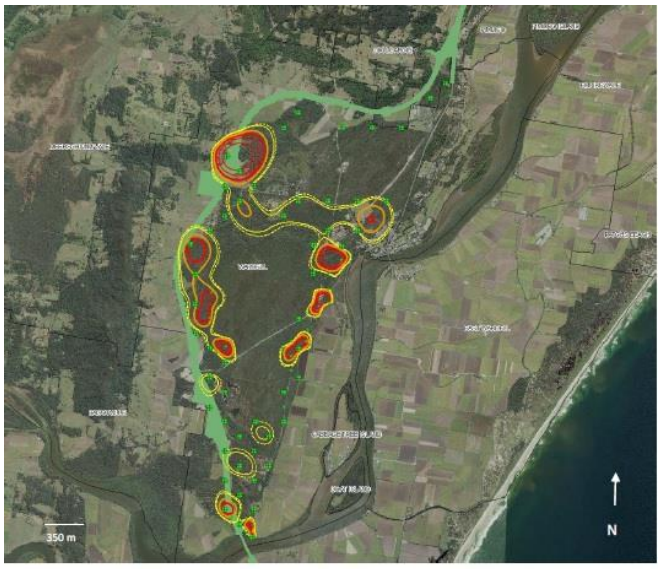


Figure 5.1 Koala activity model for the Wardell meta-population study area. Surveyed primary field sites are shown as large green dots, supplementary sites are shown as small green dots. Dotted yellow lines represent the 7% activity contour, solid yellow lines = 10% activity, thick orange lines = 23% activity (i.e. medium use), thick red lines = 33% activity (i.e. high use), additional narrow red lines = 50% and 75% activity respectively.

Some cleared agricultural land to the south and east of the borrow site has been identified for koala habitat revegetation under the Section 10 Koala Revegetation Strategy, Appendix I of

the Koala Management Plan. This revegetation commenced in summer 2016. As outlined in the strategy, 50% of the revegetation will occur prior to construction (Autumn 2017) and the remainder planted as construction is progressed.

Section 6.3.9 of the Koala Management Plan (Sections 1-11) identifies two connectivity structures, outlined as dedicated fauna culvert, to the north of the site at chainage 152750 and to the south of the site at chainage 152050. If these are constructed and operational during the operation of the borrow site, fauna fencing will be established in accordance with the Koala Management Plan to funnel koalas and other species to these structures. The borrow site activities are not anticipated to impact on these connectivity structures.

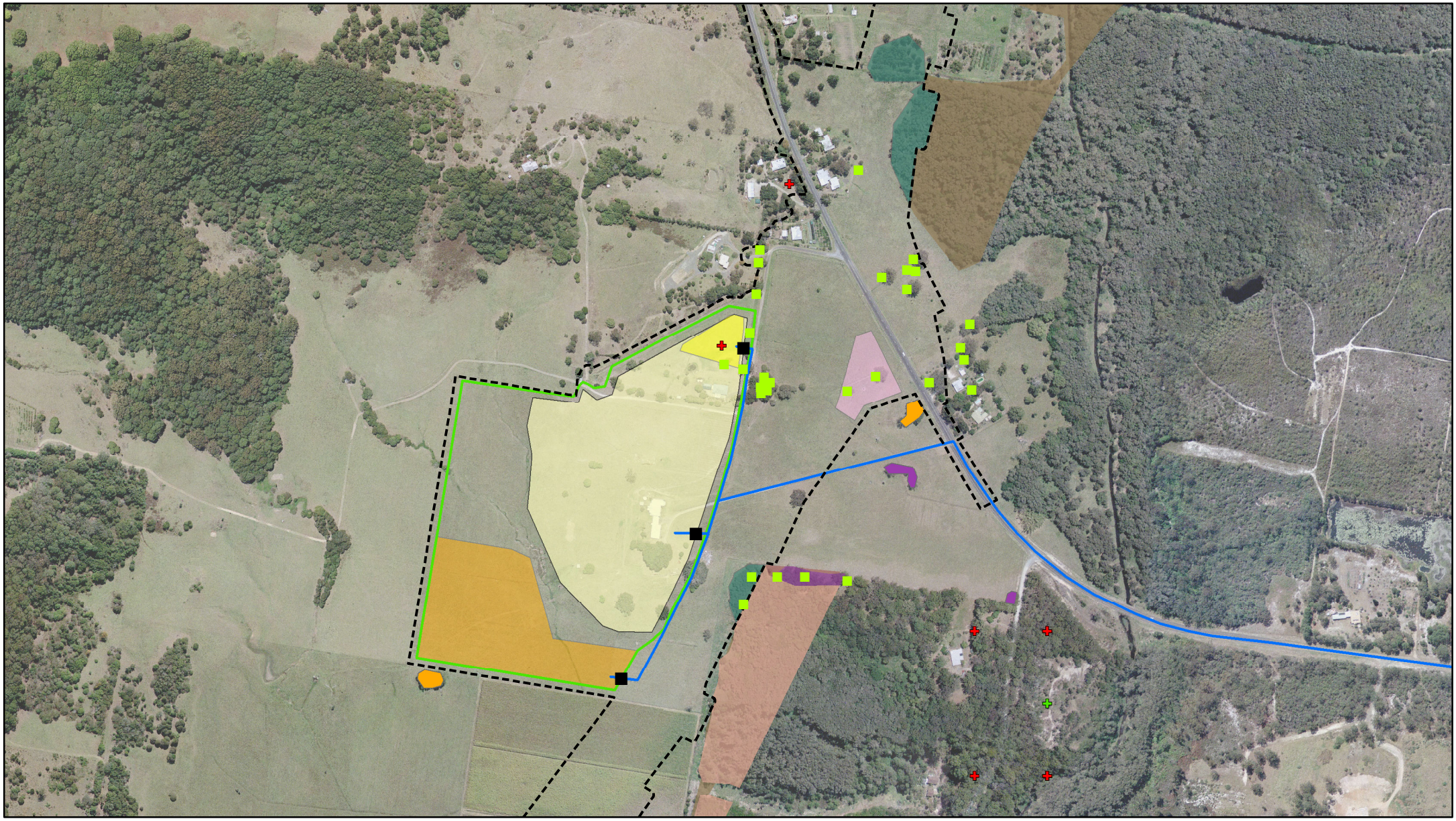
Long-nosed Potoroo habitat is located to the east of the site, on the opposite side of the project alignment. The main line construction process will implement environmental controls to protect this Long-nosed Potoroo habitat.

Figure 5-1 illustrates the biodiversity constraints within and adjacent to the borrow site.

Biodiversity impacts associated with the borrow site are considered to be consistent with those assessed and approved under the EIS and SPIR. These impacts will be managed in accordance with this borrow site management plan.

As outlined in Section 4.2.3 of the approved Pacific Complete CEMP, contractors will be required to develop project specific environmental management documentation to address the operational control requirements outlined in the Pacific Complete CEMP. This includes the development of a Contractor's Construction Environmental Management Plan that will be reviewed by Pacific Complete to ensure its compliance with the approved Pacific Complete CEMP.

Management measures identified in this borrow site management plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.



PACIFIC COMPLETE

PACIFIC HIGHWAY UPGRADE

Woolgoolga to Ballina

Lumleys Hill Borrow Site - Batch Plant and Satellite Compound Constraints

Figure 5-1

- Koala grid
- Koala ATLAS record
- Little Bentwing-bat ATLAS record
- Koala feed trees
- Site access
- Fauna (koala) exclusion fencing
- Lumleys Hill Borrow Site
- Approved Project Boundary Version 11 (June 2016)
- Ancillary Facility - Batch Plant
- Ancillary Facility - Satellite Compound
- Site office/staff amenities

Vegetation Communities - Biometric (EIS)

- Blackbutt grassy open forest of the lower Clarence Valley of the North Coast
- Grey Gum - Grey Ironbark open forest of the Clarence lowlands of the North Coast
- Paperbark swamp forest of the coastal lowlands of the North Coast
- Swamp Oak swamp forest of the coastal lowlands of the North Coast

Vegetation Communities - EEC (PSC Veg Oct 2015)

- Swamp Sclerophyll Forest on Coastal Floodplains

Vegetation Communities (April 2016)

- Remnant paddock trees (Eucalypts)
- Remnant paddock trees (Figs)

1:7,000 at A4

0 25 50 100 150 200
Metres

Print Date: 11/01/2017

Author: LABRUYEREA

5.4 Urban design and landscaping, social impact and visual

The borrow site is located in a rural-residential landscape, approximately 3 kilometres west of Wardell, adjacent to the approved project boundary. Lumleys Hill sits at an elevation of approximately 30 metres AHD (Australian Height Datum), at the foothills of the Blackwall Range that runs north-south with elevations of up to approximately 160 metres AHD. To the east of the site is low lying forested land. The excavation works will remove the top of Lumeys Hill and will alter the landscape character and appearance of the area.

The area surrounding the site is predominately rural-residential, agricultural and forestry land. Some of the surrounding properties were acquired by RMS for the project, however a number of sensitive receivers are still located in close proximity to the borrow site. The closest sensitive receiver is located less than 100 metres north of the site on Hillside Lane. Additional sensitive receivers are located on Wardell Road and Thurgates Lane to the north, east and south of the site. Figure 5-2 identifies sensitive receivers surrounding the borrow site.

Due to the topography of the area, the borrow site will be visible to sensitive receivers to the east, south and north as well as passing traffic travelling along Wardell Road.

The borrow site will be excavated to a maximum depth of approximately 23 metres and cover an area of approximately 8.4 hectares. This is consistent with what was proposed in the SPIR. Pacific Complete is not proposing to lower the maximum depth of excavation from the SPIR design, however the revised Pacific Complete design estimates that a total of 750,000m^3 will be extracted from the borrow site. The final depth of the borrow site will be dependent on the final mass haulage quantities for the project.

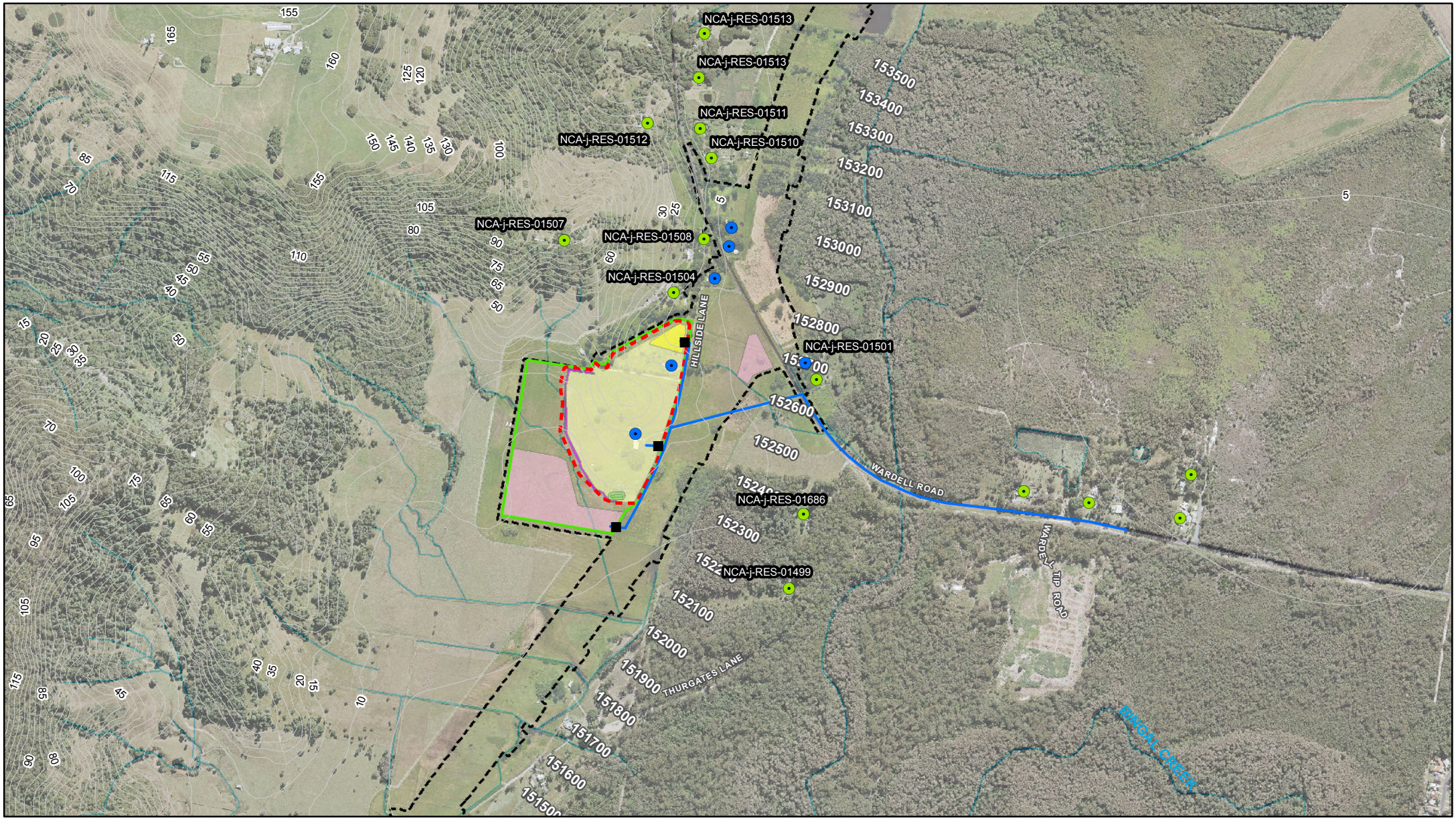
The rehabilitation of the site is outlined in Section 8.

The socio economic assessment for the project was completed during the EIS phase. This included a baseline description of the existing environment, an assessment of the positive and potential negative impacts on the local and regional communities. The assessment was a further development of the work completed for the Woolgoolga to Ballina Upgrade Working paper: Socio-economic assessment. The assessment considered matters related to social networks, community relationships and changes to local area character and amenity. Both construction and operational issues are considered and discussed. The assessment outlined a series of management measures which have been incorporated into construction phase requirements and the detailed design for the operational phase. There are no additional measures required for the borrow site proposal as it is consistent with the EIS and SPIR.

The borrow site footprint and depth will be consistent with the design outlined in the SPIR, therefore during excavation works the visual impacts are considered to be similar to those assessed and approved in the SPIR. There may be some visual changes to the final landform due to the increase in material to be extracted, however these are considered to be minor once the site has been rehabilitated and vegetated. Visual impacts associated with the borrow site are considered to be consistent with those assessed and approved under the EIS and SPIR. These impacts will be managed in accordance with this borrow site management plan.

As outlined in Section 4.2.3 of the approved Pacific Complete CEMP, contractors will be required to develop project specific environmental management documentation to address the operational control requirements outlined in the Pacific Complete CEMP. This includes the development of a Contractor's Construction Environmental Management Plan that will be reviewed by Pacific Complete to ensure its compliance with the approved Pacific Complete CEMP.

Management measures identified in this borrow site management plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.



PACIFIC COMPLETE

PACIFIC HIGHWAY UPGRADE

Woolgoolga to Ballina

Lumleys Hill Borrow Site Sensitive receivers

Figure 5-2

- Koala grid
- Sensitive receiver acquired by RMS
- Sensitive receiver
- 5m contour
- Proposed site access
- Drainage
- Erosion and sediment controls
- Excavation area
- Proposed ancillary facilities
- Site office/staff amenities
- Sediment basin
- Water diversion bund
- Approved Project Boundary Version 11 (June 2016)
- Fauna (koala) exclusion fencing

1:12,500 at A4

0 50 100 200 300 400 Metres

Print Date:	19/07/2017
Author:	ORFANOSM

5.5 Heritage

5.5.1 Aboriginal heritage

The SPIR outlines that the Lumleys Hill Borrow Site is located in an area of moderate sensitivity for Aboriginal heritage due to its location on the crest of a hill adjacent to flat, low-lying land. The site is also located within the Cooks Hill to Teven Junction Aboriginal Cultural Place.

No known Aboriginal sites are located within the borrow site area. The Aboriginal artefact scatter, Site 4, was located adjacent to the eastern side of the site, within the project corridor. The portion of Site 4 that occurs within the project boundary has been salvaged. Site fencing is required on the eastern side of the project boundary (the opposite side to the borrow site), to protect the remaining unsalvaged area of the artefact scatter. The clearance letter for Site 4 includes a figure illustrating the location of the required fencing that will need to be installed prior to construction, refer to Appendix B. The Wardell Road Scarred Trees are also located approximately 200 metres east of the borrow site, outside of the project boundary near the existing driveway. The consistency assessment for the use of the existing driveway outside the project boundary may include any required additional measures for the protection of Site 4 and the Wardell Road Scarred Trees. Two Aboriginal cultural places, known as Place G, are linked to two stands of bamboo located approximately 400 metres south of the site (partially within the project boundary), and approximately 450 metres east of the site, off Wardell Road. These sites are of both Aboriginal and on-Aboriginal significance. The works at the borrow site are not anticipated to impact the scar trees or Place G.

Figure 5-3 illustrates the heritage constraints surrounding the Lumleys Hill Borrow Site.

Aboriginal heritage impacts associated with the borrow site are considered to be consistent with those assessed and approved under the EIS and SPIR. These impacts will be managed in accordance with this borrow site management plan.

As outlined in Section 4.2.3 of the approved Pacific Complete CEMP, contractors will be required to develop project specific environmental management documentation to address the operational control requirements outlined in the Pacific Complete CEMP. This includes the development of a Contractor's Construction Environmental Management Plan that will be reviewed by Pacific Complete to ensure its compliance with the approved Pacific Complete CEMP.

Management measures identified in this borrow site management plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.

5.5.2 Non-Aboriginal heritage

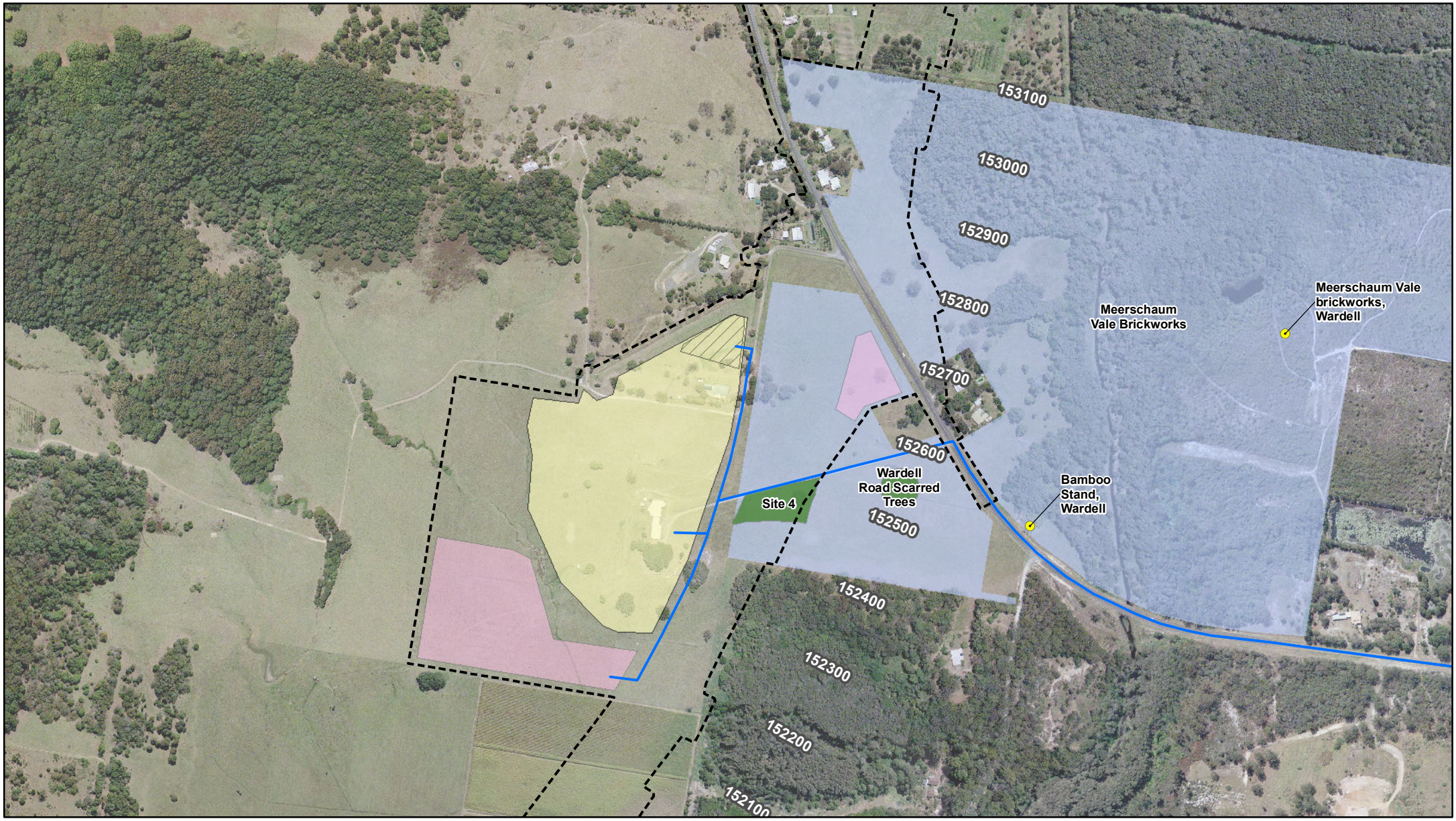
There are no non-Aboriginal heritage sites located within the boundary of the Lumleys Hill Borrow Site. The EIS identified a potential historical site in the northern portion of the borrow site area. The foundations of a house or shed, circular water tank and potential evidence of a small market garden or potato field were identified from aerial photos and a field survey in 2010. No evidence of archaeological deposits were found at the site. The EIS outlines that the site does not meet the criteria for local or state heritage listing.

A number of known non-Aboriginal heritage items are located in the vicinity of the site. The Meerschaum Vale Brickworks historical site (Item 27), listed as locally significant, is located adjacent to the north-east corner of the site, partially within the approved project boundary. Two separate bamboo stands (Item 30 in the EIS), listed as locally significant, are located approximately 400 metres south of the site and approximately 450 metres east of the site. The borrow site activities are not anticipated to have any impacts on these heritage items.

Non-Aboriginal impacts associated with the borrow site are considered to be consistent with those assessed and approved under the EIS and SPIR. These impacts will be managed in accordance with this borrow site management plan.

As outlined in Section 4.2.3 of the approved Pacific Complete CEMP, contractors will be required to develop project specific environmental management documentation to address the operational control requirements outlined in the Pacific Complete CEMP. This includes the development of a Contractor's Construction Environmental Management Plan that will be reviewed by Pacific Complete to ensure its compliance with the approved Pacific Complete CEMP.

Management measures identified in this borrow site management plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.



PACIFIC COMPLETE

PACIFIC HIGHWAY UPGRADE

Woolgoolga to Ballina

Lumleys Hill Borrow Site Heritage Constraints

Figure 5-3

- Site access
- Approved Project Boundary Version 11 (June 2016)
- Lumleys Hill Borrow Site
- Proposed ancillary facilities
- Site office/staff amenities

Heritage Constraints

- Non-Aboriginal Historic Sites
- Non-Aboriginal Historic Site areas
- Aboriginal Site area

1:7,000 at A4

0 25 50 100 150 200
Metres

Print Date:	20/12/2016
Author:	LABRUYEREA

5.6 Traffic, transport and access

Vehicles will access the borrow site from Wardell Road, east of the borrow site, along the existing driveway to the property located at the site and along the construction corridor as shown in Figure 3-2. During construction vehicles will also access the site directly from the construction corridor. The use of the existing driveway, that is located partially outside the construction corridor, will be covered under a separate consistency assessment.

The borrow site is estimated to generate approximately 200 light vehicle movements per day and 900 heavy vehicle movements at the peak of earthworks production. These predicted vehicle numbers would utilise the project corridor and are indicative and dependent on the contractor's bulk earthworks program.

Use of the local road network will be avoided were possible to minimise impacts to Wardell Road, and other local roads in the area. In accordance with SPIR mitigation measure T&T2 the contractor will prepare a strategy for bulk earthworks haulage between the crossing of Richmond River and the interchange at Wardell. The strategy will seek to maximise the extent of haulage with in the project boundary and limit the need to haul material through the township of Wardell.

It is anticipated that there would be times that mainline construction could obstruct vehicle movements along the construction corridor. These are anticipated to be short term and will be avoided where possible. During periods where the local road network will be used, vehicle numbers will be reduced where possible to minimise impacts to local roads and residents.

A number of other facilities including the adjacent batch plant and compound site may operate concurrently with the borrow site, however the batch plant is not proposed to be established until mid-2018. At peak it is anticipated that there would be up to a total of 100 light vehicle movements and 300 heavy vehicle movements using Wardell Road from the combined operation of the borrow site, batch plant and compound site.

Traffic control plans will be prepared by the contractor in accordance with the approved Pacific Complete Construction Traffic and Access Management Plan (sections 3 to 11), Appendix B1 of the CEMP for all traffic movements associated with the borrow site.

Construction speed limits and appropriate signage would be in place near school crossings and the speed zone on Wardell Road is to be lowered 80km/hr. Speed restrictions on unsealed roads will also be applied in accordance with the approved traffic control plans.

5.7 Noise and vibration

A Construction Noise and Vibration Management Plan (sections 3 to 11) (CNVMP) was produced as part of the Pacific Complete CEMP for the approved project. The management plan divides the project into a number of noise catchment areas (NCA) and outlines their associated rating background levels (RBL) and noise management level (NML). An RBL represents the average background/ existing noise level anticipated to occur in a given NCA during different periods of the day. An NML represents the level where receivers may feel discomfort/ agitation from construction noise. During standard construction hours the NML is based on the RBL calculated for the area plus 10 dBA. Lumleys Hill Borrow Site is located within Noise Catchment Area J (NCA-J) outlined in the CNVMP with an NML of 51dBA.

NCA-J is considered to be representative of the typical background noise levels throughout this project area. However, due to the proximity of sensitive receivers to the borrow site and other ancillary facilities, additional background noise monitoring was undertaken to provide further details about the noise levels within the vicinity of the site. As a result of community feedback, monitoring was undertaken during December 2016 at eight (8) residents within the vicinity of the site and a revised NML of 46dBA was identified to be representative of the site for the construction phase.

Construction noise modelling was undertaken to assess the noise impacts associated with the operation of the Lumleys Hill Borrow Site. The closest sensitive receiver is located less than 100 metres north of the site, on Hillside Lane. Additional sensitive receivers are located on Wardell Road and Thurgates Lane to the north, east and south of the site. Figure 5-2 identifies the sensitive receivers surrounding the site. As outlined in Section 4.3, the borrow site will operate during the approved standard-daytime hours.

A number of scenarios were modelled for the activities proposed at the Lumleys Hill Borrow Site. Extraction works and crushing and screening are the most noise intensive activities to occur at the borrow site. The modelling predicted that two sensitive receivers are anticipated to experience noise up to 15 dB above the standard-daytime NML during extraction works and six sensitive receiver are anticipated to experience noise up to 22 dBA above the standard-daytime NML during crushing and screening activities. Refer to Appendix C for the Construction Noise and Vibration Impact Assessment for the borrow site and noise contour maps that illustrate the level of impacts to sensitive receivers in the vicinity of the borrow site.

Table 5-1 identifies the worst case predicted noise levels and exceedances from the operations at the borrow site. Refer to Figure 5-2 for the location of each receiver identified in Table 5-1.

Table 5-1 Worst case predicted noise levels at sensitive receivers surrounding the borrow site

Receiver ID	Approximate distance and direction from the borrow site (m)	NML (dBA)	Predicted noise level range (dBA)	Exceedances of NML (dBA)
NCA-J-RES-01504	60 N	46	68	22
NCA-J-RES-01508	200 N	46	57	11
NCA-J-RES-01501	330 E	46	52	6
NCA-J-RES-01686	390 E	46	49	3
NCA-J-RES-01499	430 SE	46	49	3
NCA-J-RES-01510	380 N	46	49	3
NCA-J-RES-01511	450 N	46	45	-
NCA-J-RES-01507	280 NW	46	45	-
NCA-J-RES-01512	470 N	46	33	-
NCA-J-RES-01513	570 N	46	43	-

Note: The distances are based on the distance from the receiver to the closest boundary of the borrow site. The distance of receivers from specific activities will vary over time depending where the works are occurring within the borrow site.

The noise assessment is a conservative assessment to understand the worst-case potential noise impacts from the activities proposed at the site and is not a reflection of the noise levels anticipated for the duration of the borrow sites operation. The highest noise levels are anticipated for residents in close proximity to the northern portion of the site. As the excavations works progress south, the noise impacts will decrease as the distance between the plant and equipment and residents increases. The closest receiver to the southern portion of the site is located approximately 400 metres from the southern margin, therefore it is

anticipated that the most noise impacts will be experienced when works are occurring within the northern portion of the site.

Crushing and screening activities, considered to be the most noise intensive activity at the site, would only be required for the processing of high strength material. Due to the presence of low strength overburden material at the site, it is currently assumed that crushing and screening activities would only need to occur for approximately 50% of the time that the site is operational. This is pending on what material is found at the site, once excavation works commence.

All feasible and reasonable measures will be implemented to minimise the extent of noise levels above the NML. The CNVMP outlines the relevant reasonable and feasible construction noise mitigation and management measures relevant to these works. Where NMLs are expected to be exceeded, management measures will be implemented where appropriate.

The contractor will carry out ongoing noise monitoring as outlined in Section 8.3 of the approved CNVMP that will include the following:

- Periodic noise monitoring at nominated sensitive receiver locations to determine the effectiveness of mitigation measures.
- Where complaints are received, additional noise monitoring will be undertaken at sensitive receivers.
- Noise monitoring may be carried out for the purpose of refining construction methods or techniques to minimise noise.
- Ongoing spot checks of noise intensive plant and equipment will be undertaken through construction to ensure compliance with manufacturer's specifications.

5.7.1 Cumulative noise assessment

As outlined in Section 3, a batch plant and compound ancillary facility will be located in the vicinity of the borrow site. A cumulative noise model was generated to understand the cumulative impacts of the borrow site and the proposed ancillary facilities. The most noise intensive activities at the borrow site and batch plant were modelling to understand the worst case scenario of the cumulative impacts. The modelling predicted that six sensitive receivers are anticipated to experience noise up to 22 dBA above the standard-daytime NML.

Mainline construction scenarios from the CNVMP were utilised to predict the cumulative impacts of the borrow site and mainline construction that may occur concurrently. These are based on worst-case scenarios. In the majority of the scenarios the borrow site is the dominant noise source that will impact on sensitive receivers, however during periods of the most noise intensive mainline construction noise scenarios, such as earthworks and crushing, the noise impacts experienced by receivers is commonly a combination of both the borrow site and the mainline construction.

Table 5-2 identifies the cumulative worst case predicted noise levels and exceedances from the operations at the borrow site and batch plant. Refer to Figure 5-2 for the location of each receiver identified in Table 5-2.

Table 5-2 Cumulative worst case predicted noise levels at sensitive receivers from the borrow site and batch plant

Receiver ID	Approximate distance and direction from the borrow site (m)	NML (dBA)	Predicted noise level range (dBA)	Exceedances of NML (dBA)
NCA-J-RES-01504	60 N	46	68	22
NCA-J-RES-01508	200 N	46	57	11
NCA-J-RES-01501	330 E	46	53	7
NCA-J-RES-01686	390 E	46	51	5
NCA-J-RES-01499	430 SE	46	50	4
NCA-J-RES-01510	380 N	46	49	3
NCA-J-RES-01511	450 N	46	45	-
NCA-J-RES-01507	280 NW	46	45	-
NCA-J-RES-01512	470 N	46	34	-
NCA-J-RES-01513	570 N	46	43	-

Note: The distances are based on the distance from the receiver to the closest boundary of the borrow site. The distance of receivers from specific activities will vary over time depending where the works are occurring within the borrow site.

Refer to Appendix C for the construction noise and vibration impact assessment and noise contour maps that illustrate the level of impacts to sensitive receivers in the vicinity of the borrow site. Noise and vibration impacts associated with the borrow site are considered to be consistent with those assessed and approved under the EIS and SPIR. These impacts will be managed in accordance with this borrow site management plan.

As outlined in Section 4.2.3 of the approved Pacific Complete CEMP, contractors will be required to develop project specific environmental management documentation to address the operational control requirements outlined in the Pacific Complete CEMP. This includes the development of a Contractor's Construction Environmental Management Plan that will be reviewed by Pacific Complete to ensure all reasonable and feasible noise mitigation measures are considered and it achieves compliance with the approved Pacific Complete CEMP.

Management measures identified in this borrow site management plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.

5.7.2 Vibration

Impacts of vibration from the works at the borrow site are considered to be likely at the nearest sensitive receivers during some works at the site. Vibration intensive plant and equipment are not proposed for use at the borrow site. If any vibration intensive plant and equipment are proposed for use then the safe working distances outlined in Section 4.2.1 of the Construction Noise and Vibration Impact Assessment, Appendix C will be observed.

Noise and vibration impacts associated with the borrow site are considered to be consistent with those assessed and approved under the EIS and SPIR. These impacts will be managed in accordance with this borrow site management plan.

As outlined in Section 4.2.3 of the approved Pacific Complete CEMP, contractors will be required to develop project specific environmental management documentation to address the operational control requirements outlined in the Pacific Complete CEMP. This includes the development of a Contractor's Construction Environmental Management Plan that will be reviewed by Pacific Complete to ensure its compliance with the approved Pacific Complete CEMP.

Management measures identified in this borrow site management plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.

5.8 Air quality

Activities at the borrow site that may impact on air quality include excavation activities, crushing and screening, vehicle movements and emissions. The closest sensitive receiver is located less than 100 metres north of the site on Hillside Lane. Additional sensitive receivers are located on Wardell Road and Thurgates Lane to the north, east and south of the site. These receivers may be impacted by dust generated from the site. Dust suppression techniques outlined in the approved Pacific Complete Construction Air Quality Management Plan (sections 3 to 11) (CAQMP), Appendix B6 of the CEMP will be implemented to ensure that impacts to air quality are minimised.

To assist in monitoring the impact on air quality, a dust deposition gauge will be established and monitored at the site in accordance with the dust deposition gauge procedure, Appendix B of the CAQMP and the EPL for the project.

Air quality impacts associated with the borrow site and access track are considered to be consistent with those assessed and approved under the EIS and SPIR. These impacts will be managed in accordance with this borrow site management plan.

As outlined in Section 4.2.3 of the approved Pacific Complete CEMP, contractors will be required to develop project specific environmental management documentation to address the operational control requirements outlined in the Pacific Complete CEMP. This includes the development of a Contractor's Construction Environmental Management Plan that will be reviewed by Pacific Complete to ensure its compliance with the approved Pacific Complete CEMP.

Management measures identified in this borrow site management plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.

6 Management and mitigation

A range of environmental requirements and control measures are identified in the various environmental documents, including additional mitigation measures included in the Submission / Preferred Infrastructure Report (November 2013)(SPIR), the Conditions of Approval and additional studies conducted post approval of the SPIR. The Lumleys Hill Borrow Site will be established, operated, maintained and decommissioned in accordance with the requirements included in the Pacific Complete Construction Environmental Management Plan and sub-plans.

As outlined in Section 4.2.3 of the approved Pacific Complete CEMP, contractors will be required to develop project specific environmental management documentation to address the operational control requirements outlined in the Pacific Complete CEMP. This includes the development of a Contractor's Construction Environmental Management Plan that will be reviewed by Pacific Complete to ensure its compliance with the relevant requirements of the Pacific Complete CEMP.

In accordance with the Project CEMP an Environmental Work Method Statement will be developed by the contractor for the Lumleys Hill Borrow Site. Management measures identified in this borrow site management plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.

Specific measures and requirements to address environmental impacts from the Lumleys Hill Borrow Site that are not included in the approved CEMP documentation are listed in Table 6-1 below.

Table 6-1 Site specific mitigation measures additional to the CEMP

	Measure/Requirement	Responsibility	Timing/ frequency	Reference
GENERAL				
LUHBS 1	The extent of excavation and the landscape strategy at borrow sites will be reviewed considering material requirements on the project and the visual impact on the resultant cuttings.	Pacific Complete Construction Personnel Project Contractor's Project Engineer/ Foreman/ Environment Representative	Pre-construction	SPIR UD10
LUHBS 2	Where feasible activities at the borrow site will be positioned to assist in minimising noise, visual and air quality impacts to the sensitive receivers located to the north of	Project Contractor's	Pre-construction	Good practice

	Measure/Requirement	Responsibility	Timing/ frequency	Reference
	the borrow site. Where feasible and reasonable the site office and amenities will be located to create a buffer between site activities and sensitive receivers.	Project Engineer/ Foreman/ Environment Representative		
LUHBS 3	An Environmental Work Method Statement (EWMS) will be developed by the contractor for the establishment, operation and rehabilitation of the Lumleys Hill Borrow Site. Management measures identified in this borrow site management plan will be incorporated into the EWMS. The EWMS will be prepared in consultation with the Department of Planning and Environment and the relevant agencies.	Project Contractor's Project Engineer/ Environment Representative	Pre-construction	Department of Planning and Environment approval letter (condition 2)
LUHBS 4	The applicant shall ensure that material extracted from the borrow sites established for the SSI (i.e. project), is only used for the construction of the SSI subject to this approval, and no other sections of the Pacific Highway or other works.	Pacific Complete Construction Personnel Contractor Project Engineer	Pre-construction Construction	MCoA B79
LUHBS 5	The contractor operating the site will appoint a communications manager to be the direct contact for residents. This role will be overseen by the Pacific Complete Communications and Stakeholder Engagement Lead. Complaints received from residents will be handled in accordance with the Approved Communications and Stakeholder Engagement Strategy.	Pacific Complete Construction Personnel Project Contractor's Project Engineer/ Foreman/ Environment Representative	Pre-construction Construction	Communications and Stakeholder Engagement Strategy
SOIL, SEDIMENT AND WATER				
LUHBS 6	Erosion and sediment controls will be established around the boundary of the site to ensure runoff and sediments are managed appropriately within the boundary of the site.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Good practice
LUHBS 7	Groundwater seepage and/ or rainfall runoff will be captured within the borrow site footprint and diverted to the sediment basin at the southern end of the site using	Project Contractor's	Construction	Good practice

	Measure/Requirement	Responsibility	Timing/ frequency	Reference
	bunds and other erosion and sediment control measures in accordance with the Blue Book.	Project Engineer/ Foreman/ Environment Representative		
LUHBS 8	An erosion and sediment control plan (ESCP) for the borrow site will be prepared by the contractor's soil conservationist prior to the works commencing. This will be prepared in accordance with the Blue Book and the approved Pacific Complete Soil and Water Quality Management Plan (Sections 3 to 11) (CSWMP), Appendix B4 of the CEMP.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Pre-construction	CEMP, G38
LUHBS 9	Soil and water management at borrow source sites will be in line with Volume 2E of the Blue Book which covers water management of mines and quarries.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Pre-construction Construction	SPIR SSW39
LUHBS 10	If excavation works at the site encounter a permanent water table in the bedrock and penetrate the water table, to a depth in excess of 5 metres, a review of management measures will be undertaken, and these will include re-evaluation of the groundwater impact, return of captured water (inflows) to local drainages after treatment in an appropriate sedimentation pond (to capture suspended solids) or ceasing excavation below the -5m mark. These management measures will be implemented in accordance with the project approvals and the approved Pacific Complete Construction Soil and Water Quality Management Plan (sections 3 to 11) (CWQMP), Appendix B4 of the CEMP. DPI Water will be consulted during this process.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Groundwater memorandum
BIODIVERISTY				
LUHBS 11	Induction training will be conducted for all contractors and project staff working at the borrow site. This training will be in accordance with the approved Koala Management Plan (Section 1 to 11). The training will identify areas of koala habitat, crossing zones and key threatened species. The importance of following the clearing and rehabilitation protocols will be made clear to all project personnel.	Pacific Complete Construction Personnel Project Contractor's Project Engineer/	Pre-construction Construction	Koala Management Plan (Sections 1 to 11)

	Measure/Requirement	Responsibility	Timing/ frequency	Reference
		Foreman/ Environment Representative		
LUHBS 12	Fauna (koala) exclusion fencing will be established to entirely enclose the borrow site and the batch plant to the south of the borrow site. Koala grids will be implemented at all entry points to allow traffic movements in and out of the site whilst maintaining a barrier between the site and any koalas potentially in the area. If security fencing is required around the site or sections of the site this fencing will be established within the boundary of the fauna (koala) exclusion fencing.	Pacific Complete Construction Personnel Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Good practice
LUHBS 13	The clearing of vegetation at the site and along the alignment will be carried out in accordance with the approved Koala Management Plan (Section 1 to 11). This will include the staged approach to vegetation clearing, referred to as 'phased resource reduction' outlined in Section 6.3.5 of the approved Koala Management Plan (Sections 1 to 11).	Pacific Complete Construction Personnel Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Koala Management Plan (Sections 1 to 11)
LUHBS 14	If the fauna connectivity structures located in the vicinity of the borrow site are constructed and operational during the operation of the borrow site, fauna fencing will be established in accordance with the approved Koala Management Plan (Sections 1 to 11) to funnel koalas and other species to these structures.	Pacific Complete Construction Personnel Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Koala Management Plan (Sections 1 to 11)
LUHBS 15	The Unexpected Threatened Species/ EEC Procedure, Appendix O of the approved Pacific Complete Flora and Fauna Management Plan (Sections 3 to 11), will be implemented if a koala or any other threatened species is identified at the site.	Project Contractor's Project Engineer/	Construction	Pacific Complete Flora and

	Measure/Requirement	Responsibility	Timing/ frequency	Reference
		Foreman/ Environment Representative		Fauna Management Plan (Sections 3 to 11)
HERITAGE				
LUHBS 16	Impacts on item 27: Meerschaum Vale brickworks, Wardell. If brick material or any other historical heritage remains are discovered during works, management measure HH1 will be applied. *HH1:* If at any time during construction associated with the project, unidentified historical heritage materials, features and/or deposits are found, the Roads and Maritime Standard Management Procedure: Unexpected Archaeological Finds (20121) will be followed.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	SPIR HH41
TRAFFIC AND ACCESS				
LUHBS 17	A strategy will be prepared for bulk earthworks haulage between the crossing of the Richmond River and the interchange at Wardell. The strategy will seek to maximise the extent of haulage within the project boundary and limit the need to haul material through the town of Wardell. *Note: This strategy will be prepared in consultation with the Department of Planning and Environment, the Environment Representative and Ballina Shire Council, prior to haulage commencing from the borrow site. The strategy will include material haulage along local roads and through Wardell, and cumulative traffic generated by the batch plant and ancillary facility.*	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	SPIR T&T2 *(Additional note from Department of Planning and Environment approval letter (condition 3))*
LUHBS 18	Material will only be hauled along the existing road network when mainline construction obstructs vehicle movements along the construction corridor. During these times traffic control plans will be prepared by the contractor in accordance with the approved Pacific Complete Construction Traffic and Access Management Plan (sections 3 to 11), Appendix B1 of the CEMP.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Pacific Complete Construction Traffic and Access

	Measure/Requirement	Responsibility	Timing/ frequency	Reference
				Management Plan
NOISE AND VIBRATION				
LUHBS 19	Ongoing consultation with residents identified as having potentially high impact will occur prior to and throughout the operation of the borrow site. This consultation will be tailored for individually affected residents and will include discussions around: • the timing, location and distance of noise intensive activities • potential for impacts • proposed mitigations (either at the site or at their property) • how the works may impact on residents work schedules and lifestyle. • Where noise impacts cannot be mitigated, alternative arrangements/ agreements will be attempted to be made on a case by case basis with individual residents.	Pacific Complete Construction Personnel Project Contractor's Project Engineer/ Foreman/ Environment	Pre-construction Construction	Communications and Stakeholder Engagement Strategy
LUHBS 20	The provision of architectural treatment in line with the RMS Noise Management Manual guideline shall be offered to receiver NCA-J-RES 01504 to mitigation noise from the borrow site, as soon as possible. Pending the installation of the architectural treatment, alternative noise management and mitigation measures such as temporary accommodation, shall be offered to receiver NCA-J-RES 01504 should monitored construction noise levels meet or exceed 22dB(A) above the Noise Management Level.	RMS Pacific Complete Construction Personnel Project Contractor's Project Engineer	Pre-construction Construction	Department of Planning and Environment approval letter (condition 4)
LUHBS 21	As outlined in Section 8.3 of the CNVMP the contractor will carry out ongoing noise monitoring that will include the following: • Periodic noise monitoring at nominated sensitive receiver locations to determine the effectiveness of mitigation measures. • Where complaints are received, additional noise monitoring will be undertaken at sensitive receivers. • Noise monitoring will be carried out for the purpose of refining construction methods or techniques to minimise noise. • Ongoing spot checks of noise intensive plant and equipment will be undertaken through construction to ensure compliance with manufacturer's specifications.	Pacific Complete Construction Personnel Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Based on CNVMP

	Measure/Requirement	Responsibility	Timing/ frequency	Reference
LUHBS 22	The use of temporary noise shielding will be investigated at locations where substantial exceedances of noise criteria are predicted. Note: This may include the establishment of noise mounds around crushing and screening plant.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Based on CNVMP NV8
LUHBS 23	Crushing operations will only be undertaken: (a) between the hours of 8.00am to 5.00pm Monday to Friday; (b) between the hours of 8.00am to 1.00pm Saturday; and in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	CNVMP NV14
LUHBS 24	Construction activities resulting in impulsive or tonal noise emission (such as rock breaking, rock hammering, pile driving) shall only be undertaken: (a) between the hours of 8:00am to 5:00pm Monday to Friday; (b) between the hours of 8:00am to 1:00pm Saturday; and (c) in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block. For the purposes of this condition 'continuous' includes any period during which there is less than a one hour respite between ceasing and recommencing any of the work the subject of this condition. The works subject to this condition may be undertaken in sparsely populated areas within the construction hours specified in condition CoA B15.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	CNVMP NV35 MCoA B18
LUHBS 25	The location of the crushing and screening plant at the borrow site will be no closer than 200 metres from receiver NCA-J-RES 01504 identified in Figure 5-2 of this plan.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Department of Planning and Environment approval letter (condition 4)

	Measure/Requirement	Responsibility	Timing/ frequency	Reference
LUHBS 26	Once the Operational Noise Report for the Approved Project has been finalised, residents impacted by the borrow site that have been identified for at house noise treatment as a result of operational impacts from the highway will be investigated for prioritisation for the implementation of these treatments. *Note: This will be done in accordance with Ministers Condition of Approval B29: Where feasible and reasonable, operational noise mitigation measures shall be implemented at the start of construction (or at other times during construction) to minimise construction noise impacts.*	Pacific Complete Construction Personnel Project Contractor's Project Engineer/ Foreman/ Environment	Construction	Communications and Stakeholder Engagement Strategy *(Additional note from Department of Planning and Environment approval letter)*
LUHBS 27	If any vibration intensive plant and equipment are proposed for use then the safe working distances outlined in Section 4.2.1 of the Construction Noise and Vibration Impact Assessment, Appendix C of this plan, will be observed.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Construction Noise and Vibration Impact Assessment, Appendix C
REHABILITATION				
LUHBS 28	Any topsoil from the borrow site will be stockpiled separately and reused in the rehabilitation of the borrow site.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Good practice
LUHBS 29	Any backfilling of the West of Wardell borrow sites [referred to in this management plan as the Lumleys Hill Borrow Site] will be undertaken with available surplus material from the project. Rehabilitation of the sites will be undertaken in accordance with the landscape strategy (UD3), design principles (UD5) and the intended future land use of the sites. UD3 – The project will be carried out in accordance with the urban design and landscape strategy, as identified in Section 11.4.1 of the EIS. Detailed landscape design for all project batters, and medium planting areas will be developed in	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	SPIR UD12

	Measure/Requirement	Responsibility	Timing/ frequency	Reference
	accordance with the Landscape Guidelines (RTA, 2008), the requirements of the Working Paper – Biodiversity (Section 5.2.2) and the landscape strategy to provide a robust, successful and effective planting design. UD5 (UD4 in the SPIR) – The built form of the project, including consideration of the height, bulk, scale, materials and finishes for: – Bridges – Retaining walls – Cuttings and embankments – Road barriers – Signage – Fences – Clearing zones – Topsoil management – Water quality control ponds – Fauna crossing – Place marking and cultural plantings The project will be designed in accordance with the design principles identified in Work Paper – Urban Design, Landscape Character and Visual Impact, and relevant Roads and Maritime guidelines. *Note: The site will be rehabilitated in accordance with the commitments to site rehabilitation and the following principles outlined in section 6.8 of the Urban Design and Landscape Plan (UDLP) for Richmond River to Ballina – Sections 10 and 11 (RMS, 2016):* *1. Establish landowner requirements and identify rehabilitation objectives* *2. Consideration of the location context and amenity requirements* *3. Integrate rehabilitation with adjacent landform, topography* *4. Consider fauna connectivity and wildlife corridors and enhance where possible* *5. Apply landscape treatments consistent with the project UDLP to ensure an integrated outcome.*			
LUHBS 30	Material identified for backfilling will be managed in accordance with the following documents as outlined in the approved Pacific Complete Construction Waste,	Project Contractor's	Construction	Pacific Complete

	Measure/Requirement	Responsibility	Timing/ frequency	Reference
	Resource and Energy Management Plan (sections 3 to 11) (CWREMP), Appendix B7 of the CEMP: • Excavated Natural Material Exemption 2014 (EPA, 2014) • Guidelines on Resource Recovery Exemptions – Land Application of Waste Materials as Fill (2011, DECCW). • RMS Waste Fact Sheets: Virgin Excavated Natural Material (VENM), Excavated Natural Material (ENM) and Waste Sampling.	Project Engineer/ Foreman/ Environment Representative		Construction Waste, Resource and Energy Management Plan (sections 3 to 11)
LUHBS 31	Mulch used for rehabilitation will be sourced from the clearing of similar vegetation, to reduce the introduction of weeds or pathogens as well as species that are not endemic to the area.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Post-construction	Good practice
LUHBS 32	The revegetation of the site will be carried out in accordance with the Koala Revegetation Strategy, Appendix I of the Koala Management Plan (Sections 1-11).	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Post-construction	Koala Revegetation Strategy

7 Consultation

7.1 Community

7.1.1 During the preparation of the EIS and SPIR

Roads and Maritime conducted a community information session at Wardell Memorial Hall on 15 January 2013 where the Lumleys Hill Borrow Site was discussed. Additional meetings were also carried out with local residents and adjacent and directly affected land owners.

Consultation with the two residents adjacent to the borrow site was later undertaken to discuss the design refinements outlined in the SPIR.

7.1.2 Post SPIR and project approval

Community consultation was carried out in October and November 2016 to discuss the Lumleys Hill Borrow Site and other project related activities in the vicinity of the borrow site including the batch plant, proposed to the south of the site, and satellite compound to the east. Consultation was carried out from Thursday 20 October to Friday 18 November 2016.

About 400 letters were delivered to local residents and businesses and stakeholders inviting feedback on the proposal. Copies were also provided to the NSW Member of Parliament for Ballina, Ballina Shire Council and emergency services. Refer to Appendix D for a copy of the consultation letter. A drop-in session was also held on November 2, 2016 at the Wardell Hall.

Feedback was received from 28 residents and two organisations, with four people supporting the proposal, 20 against and four neutral. The primary concerns raised by the public included:

- Dust
- Noise
- Health
- Water Quality
- Koalas.

The Community Consultation Report for the Lumleys Hill Borrow Site, Batch Plant and Satellite Compound (Wardell Road) is attached in Appendix E. A formal response will be issued to the public which addresses the primary concerns raised during the feedback period. Additional home visits and face to face meetings will be undertaken with impacted receivers as needed.

Following representations from a section of the Meerschaum Vale community, a further consultation meeting was completed at the Meerschaum Vale Hall on 25th February 2017. The meeting was to respond to their concerns in relation to the borrow site and other matters. Refer to Appendix F for the meeting minutes. The issues raised at the meeting and through the formal consultation process have been addressed within this borrow site management plan.

7.2 Government agencies

The EPA, OEH and DPI (Fisheries) were provided with a briefing memo describing the location and activities that will be carried out at the Lumleys borrow site. Their comments have been considered and incorporated into this management plan where required.

8 Rehabilitation

8.1 Existing landscape

The Lumleys Hill Borrow Site is located in a rural-residential landscape, approximately 3 kilometres west of Wardell, near Wardell Road. Lumleys Hill sits at an elevation of approximately 30 metres AHD (Australian Height Datum), at the foothills of the Blackwall Range that runs north-south with elevations of up to 160 metres AHD. To the east of the site is low lying forested land.

The existing Pacific Highway currently crosses the Richmond River and passes through the township of Wardell. The new highway alignment bypasses Wardell and will pass through the rural-residential landscape west of Wardell. The Lumleys Hill Borrow Site will be located on the western side of the new highway alignment, within the project boundary.

8.2 Visual impacts

As outlined in Section 5.4, due to the topography of the area, the borrow site will be visible to sensitive receivers to the east, south and north as well as passing traffic travelling along Wardell Road, and the new highway alignment post construction. Roads and Maritime acquired a number of properties in this area to allow for the new highway alignment, reducing the number of sensitive receivers in the vicinity of the borrow site. Due to the rural nature of the area, the number of sensitive receivers that will be impacted by the borrow site is considered to be minimal.

8.3 Rehabilitation

The excavation works at the borrow site will remove the crest of Lumleys Hill. The final landform that will remain post excavation will include a batter slope at the western side of the excavation area. The remainder of the site will become flat land leading up to the new highway alignment.

The final landform post excavation will need to provide a smooth transition between the batter slopes, the existing landform and flattened area resulting from the excavation works to allow for rehabilitation of the site. If surplus material is available from the project, the excavation area will be partially backfilled. Where possible, topsoil initially stripped from the borrow site will be used to assist in the rehabilitation and revegetation of the site. Additional topsoil from external sources may also be required, depending on the quality and quantity of the existing topsoil at the site.

The site has been identified for koala revegetation that will include the planting of specific koala habitat species as well as grasses and shrubs to foster the growth of an understory. This revegetation will be carried out in accordance with the Koala Revegetation Strategy, Appendix I of the approved Koala Management Plan (Sections 1 to 11). The site will also be rehabilitated in accordance with the design principles and commitments to site rehabilitation outlined in the Urban Design and Landscape Plan for sections 10 and 11 (RMS, 2016).

Mulch may also be used to assist in the rehabilitation of the site, this mulch will be sourced from the clearing of similar vegetation to reduce the introduction of weeds and pathogens as well as species that are not endemic to the area.

It is anticipated that revegetation will occur over a couple of years. The rate of regeneration will be dependent on climatic factors such as rainfall, seasonal temperatures and bushfires that can influence the rate of regeneration. Figure 8-2 to Figure 8-5 provide indicative graphical illustrations of the borrow site prior to excavation and post excavation (prior to rehabilitation) from two viewpoints outlined in Figure 8-1. These figures are indicative only, the final depth of the borrow site will be dependent on the final mass haulage quantities for the project. The final landform post excavation will also be dependent on the shape of the void and available surplus

material for backfilling. The rehabilitation of the site will minimise the visual impacts of the cut and assist in creating a more natural appearance. Over time the vegetation planted will mature and blend into the surrounding landscape.

Material identified for backfilling will be managed in accordance with the following documents as outlined in the approved Pacific Complete Construction Waste, Resource and Energy Management Plan (sections 3 to 11) (CWREMP), Appendix B7 of the CEMP:

- Excavated Natural Material Exemption 2014 (EPA, 2014)
- Guidelines on Resource Recovery Exemptions – Land Application of Waste Materials as Fill (2011, DECCW).
- RMS Waste Fact Sheets: Virgin Excavated Natural Material (VENM), Excavated Natural Material (ENM) and Waste Sampling.

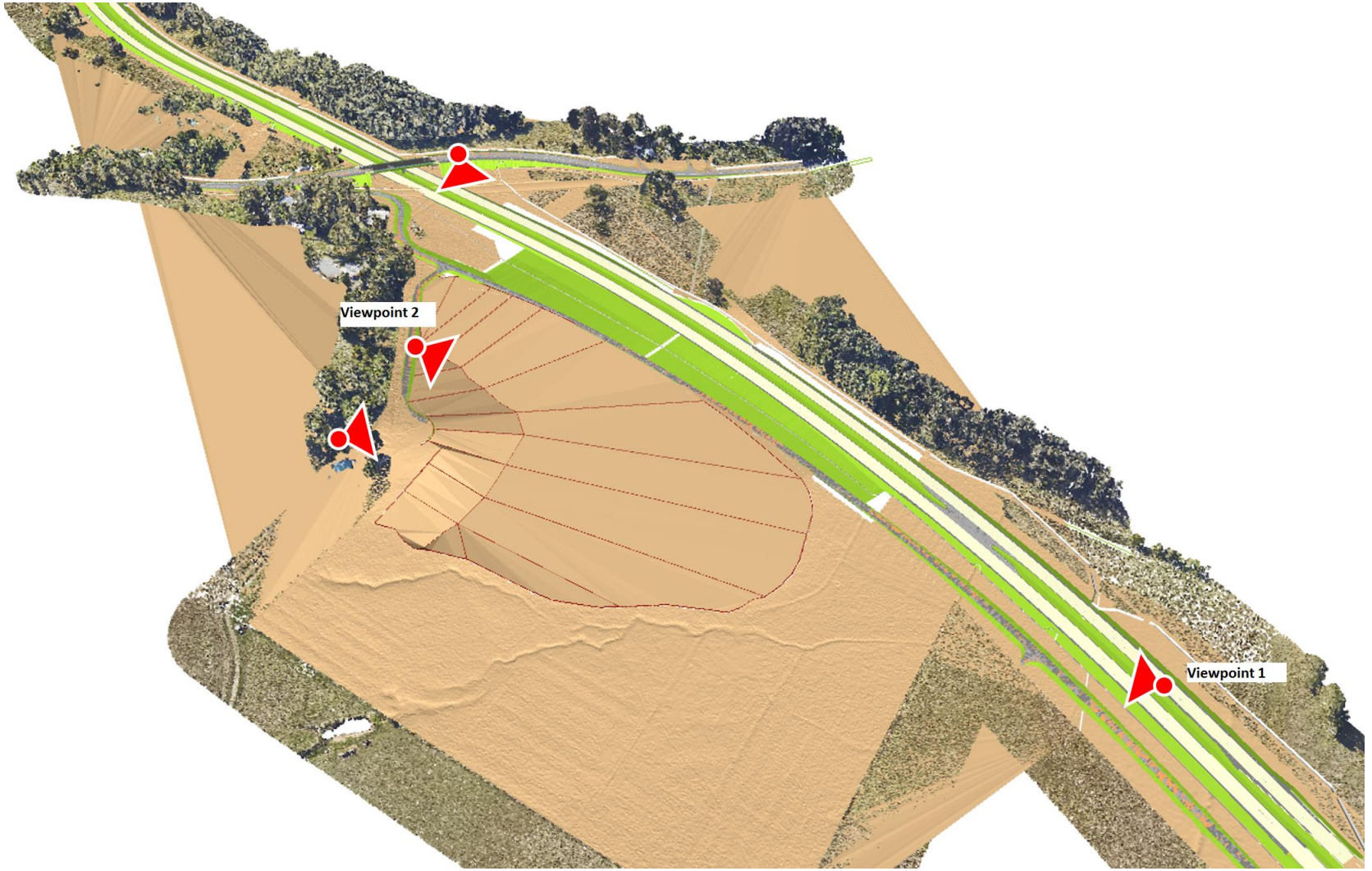


Figure 8-1 Overview of viewpoints of the borrow site

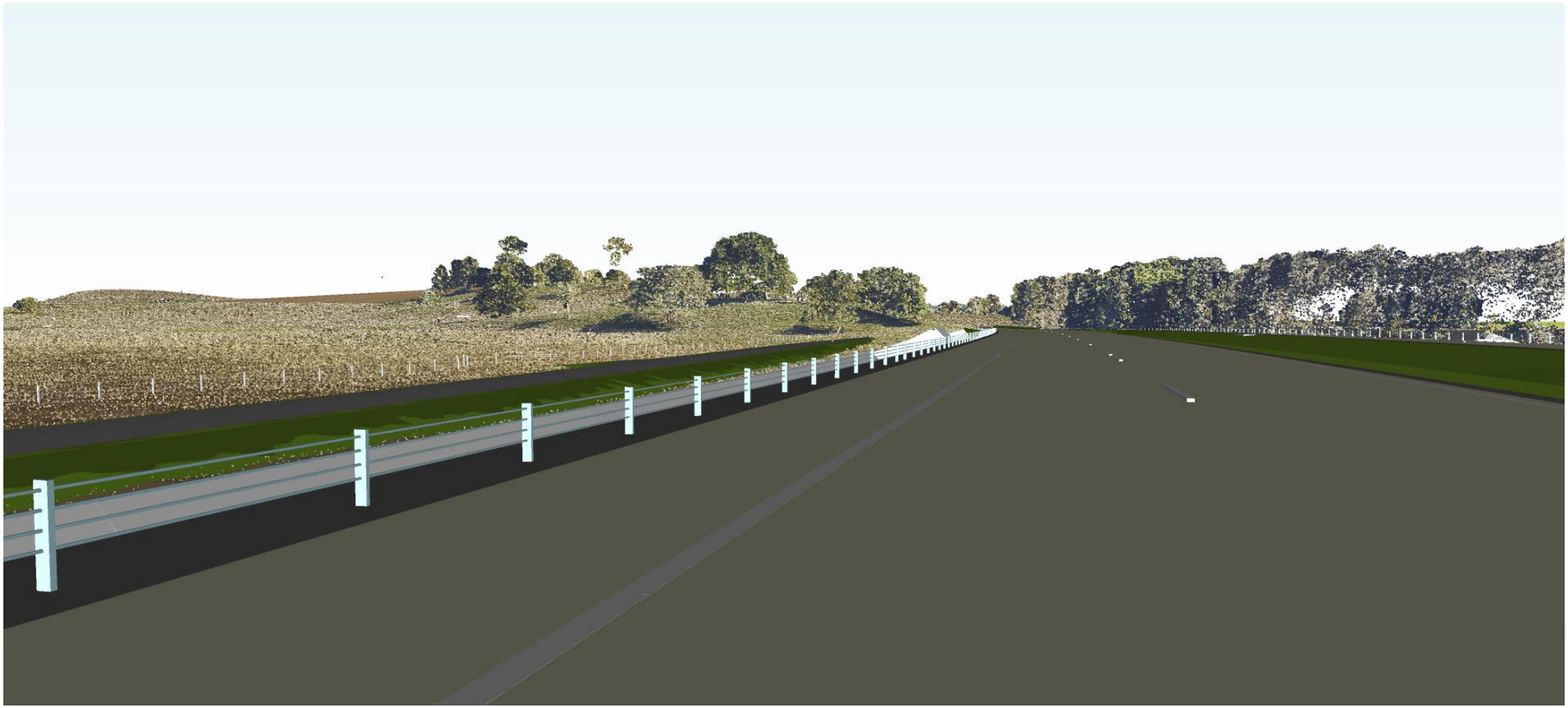


Figure 8-2 Viewpoint 1 – Looking north from new highway alignment prior to excavation

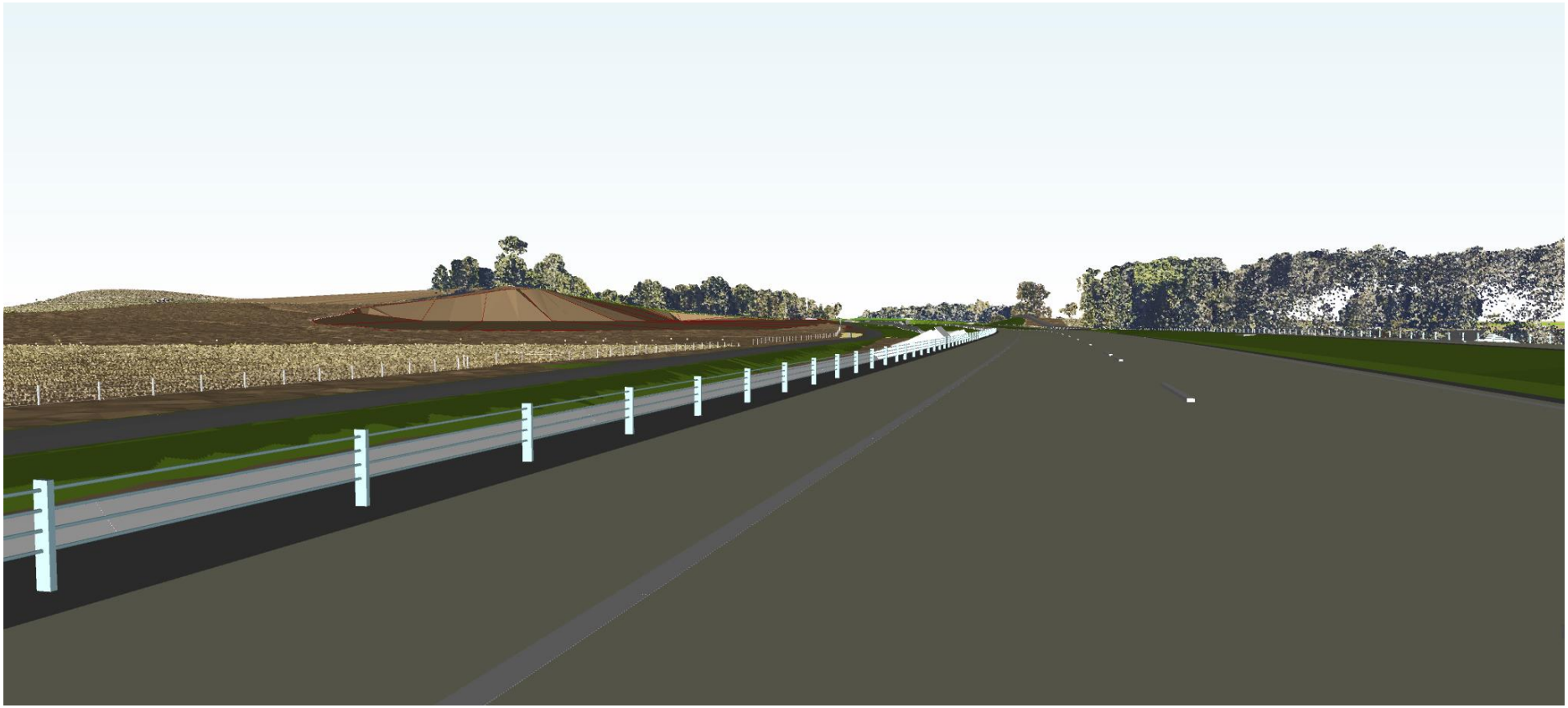


Figure 8-3 Viewpoint 1 – Looking north along new highway alignment post excavation

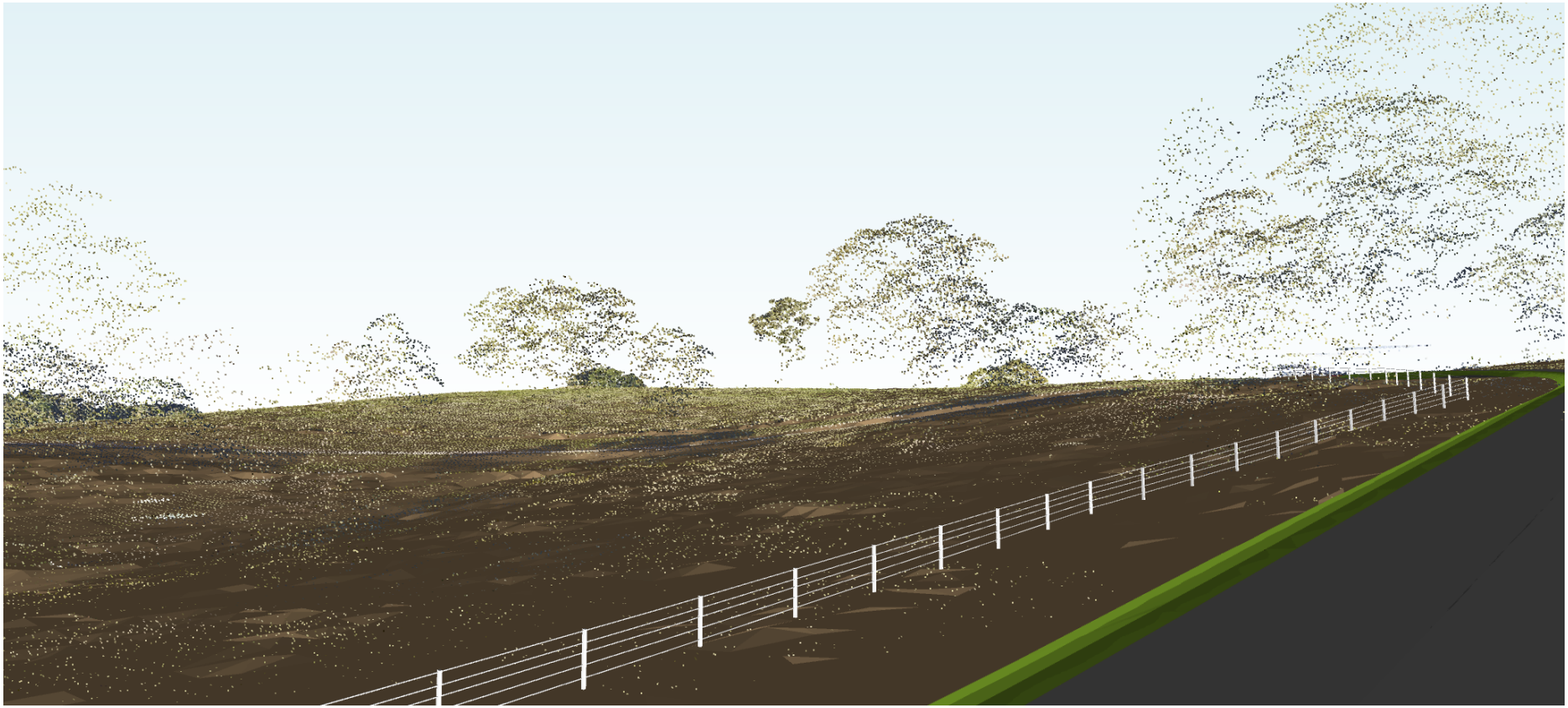


Figure 8-4 Viewpoint 2 –Looking south from Hillside Lane local road prior to excavation

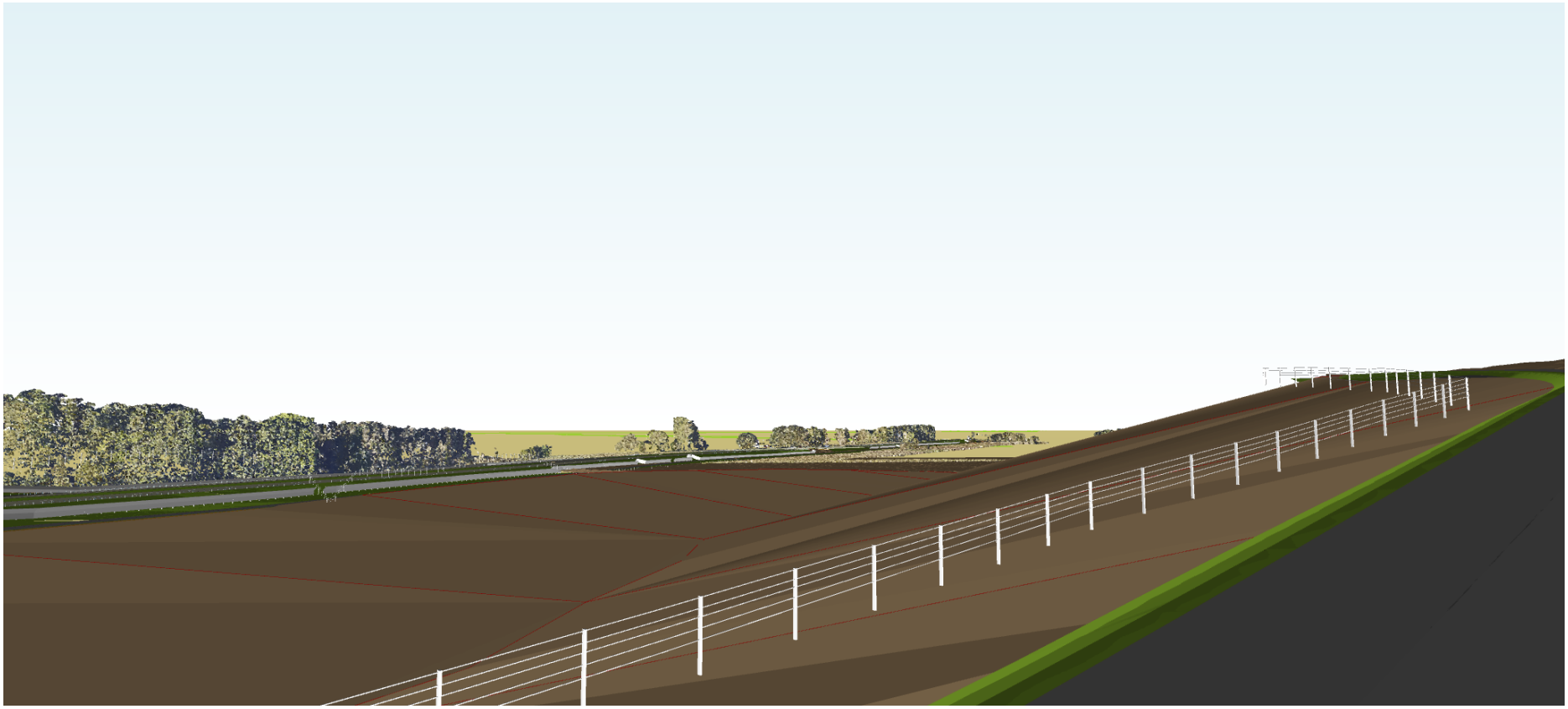


Figure 8-5 Viewpoint 2 – Looking south from Hillside Lane local road post excavation

9 Review and improvement

9.1 Continuous improvement

Continuous improvement of this plan will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance
- Determine the cause or causes of non-conformances and deficiencies
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies
- Verify the effectiveness of the corrective and preventive actions
- Document any changes in procedures resulting from process improvement
- Make comparisons with objectives and targets.

9.2 Borrow Site Management Plan update and amendment

The processes described in Chapter 8 and Chapter 9 of the CEMP may result in the need to update or revise this plan. These updates will occur as required.

Any revisions to the Lumleys Hill Borrow Site Management Plan will be in accordance with the process outlined in Section 1.6 of the CEMP.

A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure – refer to Section 10.2 of the CEMP.

Appendix A Groundwater Memorandum

TO:	Chris Greenaway – Sustainability and Environment Manager	**FUNCTION:**	Environment
FROM:	Ray Hatley – Capability Executive Hydrogeologist	**FUNCTION:**	Environment
CC:	Georgia Harmey	**DATE:**	27 October 2016
REF:		**NO. OF PAGES:**	11
SUBJECT:	**W2B Lumleys Hill Borrow Site - Groundwater Review**		

Abstract/Summary

This review of the groundwater systems present in the vicinity of the proposed Lumleys Hill borrow pit area, indicates that two (2) groundwater regimes operating there, one associated with the shallow alluvial sediments associated with the Richmond River Alluvium and Bingal Creek alluvium) and a second within the bedrock of the Neranleigh Fernvale Beds underlying the alluvium.

The Neranleigh Fernvale Beds, the material to be quarried, itself sustains two groundwater systems, (a) a shallow perched (within 5 m below ground level) in the thin weathered regolith profile, and (b) a deeper fractured bedrock groundwater system. This fractured bedrock system is likely to be below the maximum excavation depth of ~23 m and final proposed depth elevation of the borrow pit (~6 mAHD) but above the surrounding alluvium water table (~2 - 3 mAHD).

Groundwater flow within the local deeper bedrock aquifer occurs within the fracture/joint plane conduits in the rockmass. Since the water table in the deeper bedrock is likely to be located below the level of the proposed pit floor (≤6 mAHD, based on geotechnical investigations) it is therefore unlikely to be intersected by the borrow pit activities. As such, it is anticipated that negligible direct impact will be caused to this bedrock fractured rock aquifer by the proposed quarrying activities.

The perched groundwater system is surficial and has limited connection to the deeper bedrock groundwater system, and, is predominantly sustained by direct rainfall recharge.

On the basis that (a) the ecological communities are sustained by the shallow perched groundwater; and (b) the deep groundwater system is likely to be located below the final proposed depth elevation of the borrow pit (~6 mAHD), the proposed excavation works to be carried out at the borrow site are unlikely to impact on the sensitive local ecological communities. Limited reductions to the groundwater flow flux to the downgradient side of the Lumleys Hill can be anticipated. Since this area is predominately cleared agricultural land (grazing land) and lacking threatened/endangered communities potentially sustained by groundwater, this constraint to groundwater recharge is not considered to pose a meaningful ecological impact.

The presence of the borrow pit may enhance rainfall recharge to the bedrock groundwater system marginally causing mild mounding of the local groundwater table beneath the immediate footprint of the pit. The limited mass flux of infiltrating rainfall water is unlikely to adversely impact the water quality of the regional groundwater for similar reasons.

This review therefore concludes that the proposed borrow pit works will not have a meaningful impact on the groundwater levels and water quality, and existing groundwater users in the area. In the unlikely event that the borrow pit does encounter a permanent water table in the bedrock, and penetrates this water table, to a depth in excess of 5 m, a review of management measures shall be undertaken, and these will include re-evaluation of the groundwater impact (in the light of the additional data gathered during operation of the quarry); return of captured water (inflows) to local drainages after treatment in an appropriate sedimentation pond (to capture suspended solids).

Issue

This memo has been prepared to consider the potential for local and regional impacts to the groundwater regime in the *Lumleys Hill Borrow Pit* (LHBP) area such that existing bore water users and groundwater dependant ecosystems might be adversely affected. It provides substantiating information on the potential for groundwater levels and quality impacts to the local ecology (including groundwater dependent ecosystems, GDE's) and existing bore water users (consumptive use) based on existing data available for the area.

The memo and accompanying assessment will be provided to DPI-Water for consideration.

Background

The Woolgoolga to Ballina Pacific Highway Upgrade involves upgrading approximately 155 kilometres (km) of highway to four-lane dual-carriageway road between Woolgoolga (north of Coffs Harbour) and Ballina (near the NSW/Queensland border) on the NSW north coast.

The Pacific Complete CEMP (sections 3 to 11) describes the overall system for environmental management of the project being delivered by Pacific Complete in partnership with Roads and Maritime.

The purpose of the *Woolgoolga to Ballina (sections 3-11) Pacific Highway Upgrade Lumleys Hill Borrow Site Management Plan* (State Significant Infrastructure: SSI-4963) is to describe how Pacific Complete would manage the establishment, operation and rehabilitation of the Lumleys Hill Borrow Site (Figure 1) which would be used to provide fill material for the construction of the Woolgoolga to Ballina Pacific Highway Project (sections 3 to 11).

The BSMP has been prepared to address the requirements of the Minister's Conditions of Approval (MCoA), specifically MCoA D22, the mitigation measures listed in the Pacific Highway Upgrade: the Submissions / Preferred Infrastructure Report November 2013 (SPIR) and all applicable legislation. The BSMP has been reviewed and endorsed by RMS in consultation with relevant government agencies and stakeholders to satisfy project approval requirements (SSI-4963).

The BSMP should be consulted when considering the detail of this memo as it provides the detailed background to the Lumleys Hill Borrow site (the Site), the objectives of the plan, the site setting, environmental safeguards, legislative requirements, EPBC Act requirements, and staffing competencies, and the Ministers requirements (particularly, D22(b).

Proposal

The project EIS indicates that if nearby road projects and quarries cannot supply the material required for the project, other material sources near the project would be investigated. The Lumleys Hill Borrow site fulfils these needs in this section of the W2B project.

The Lumleys Hill Borrow Site is located approximately 3 kilometres west of the township of Wardell. The site is located within the approved project boundary on the western side of the highway alignment and is therefore included in the EPL boundary for the project (EPL number 20713). The activities at the site will be carried out in accordance with the EPL. The borrow site is on Portion D on Lot 158 DP755731 and Lot 3 DP707736.

The borrow site, consisting of an excavation area, access track and associated infrastructure, is located within the approved project boundary. The borrow site would provide material to construct sections 10 and 11 of the project and largely comprises weathered rock material from the bedrock underlying Lumleys Hill. It would be operational for 3 years, and operate during the proposed construction hours. A batching plant will be located to the south of the Borrow Site and a proposed ancillary facility is to be located east on the opposite side of the alignment to the borrow site, refer to Figure 1.

Lumleys Hill sits at an elevation of approximately 30 metres AHD (Australian Height Datum), at the south-eastern slope of the foothills of the Blackwall Ranges that runs north-south. To the east of the site is low lying forested land.

The borrow site was originally identified in the environmental impact assessment (EIS) with an area covering approximately three hectares and excavations to a depth of 25 metres providing an estimated 333,000 m^3. The borrow site was then expanded in the SPIR to cover an area of approximately 8.4 hectares, with excavation depths reduced to 20-23 metres. This revised design would provide an estimated 620,000 m^3. Pacific Complete are not proposing to lower the maximum depth of excavation from the SPIR design, however the revised Pacific Complete design estimates that a total of 750,000m^3 will be extracted from the borrow site. The final depth of the borrow site will be dependent on the final mass haulage quantities for the project and the depth of bedrock. Cross-sections of the Lumleys Hill Borrow Site are provided in Figure 2. The excavation works will remove the top of Lumleys Hill (30 – 31 m AHD) and reduce its elevation to approximately 8 - 9 m AHD, altering the landscape character and appearance of the area. The lowest elevation of borrow pit excavation is the south to southeast flank of Lumleys Hill at approximately 6 mAHD.

The Lumleys Hill Borrow Site is located above the 20 year and 100 year ARI flood levels for the area and the site would not result in any changes to flood impact, duration or velocity characteristics.

The borrow site is located on cleared agricultural land with remnant patches of vegetation. This remnant vegetation does not form part of an OEH biometric vegetation type. All of the vegetation within the site is located within the approved SPIR vegetation clearing limits for the project. A small patch of Swamp Sclerophyll Forest on Coastal Floodplain, listed as an endangered ecology community (EEC), is located to the east of the site, on the opposite side of the project alignment.

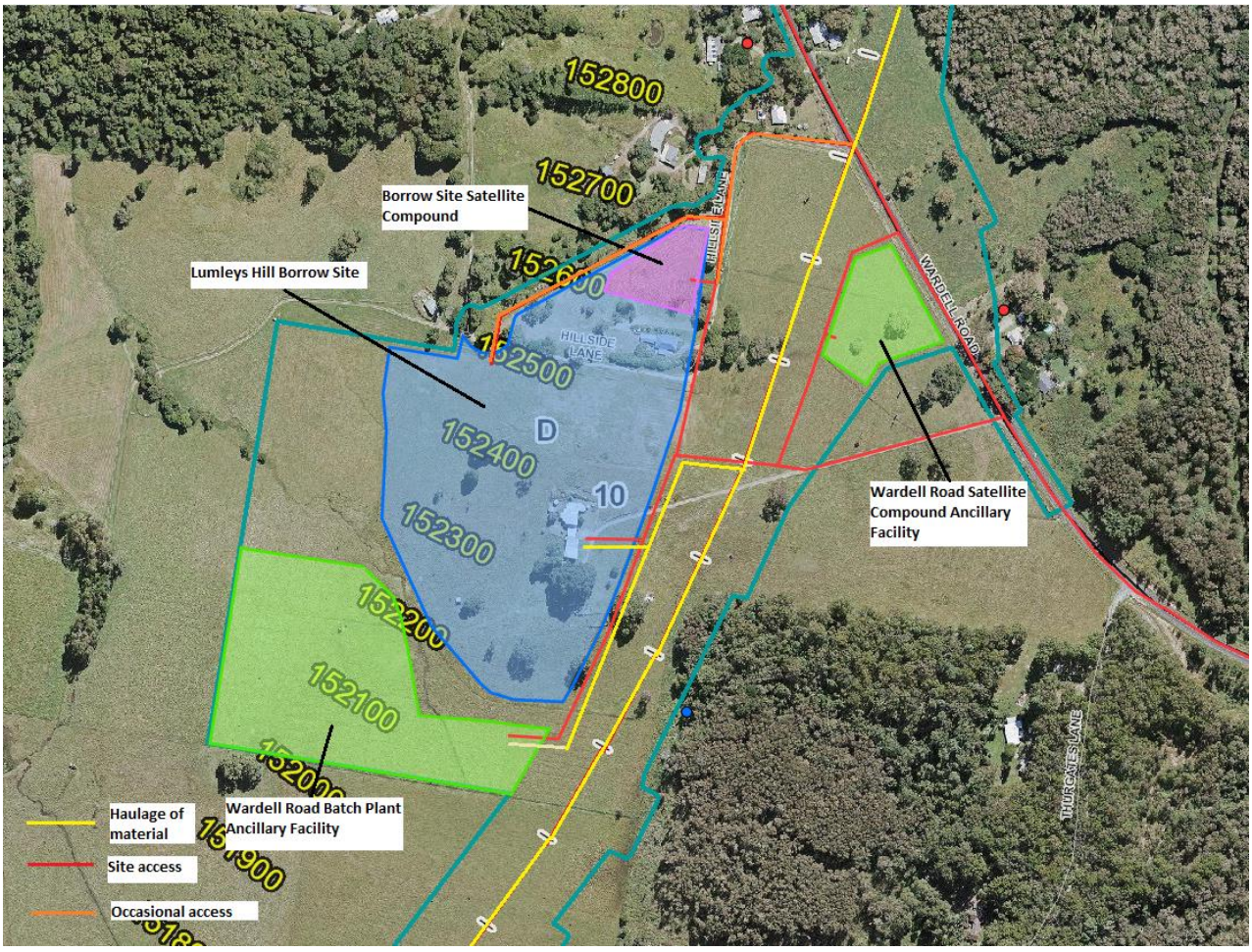


Figure 1 Layout and extent of the proposed Lumleys Hill Borrow Site

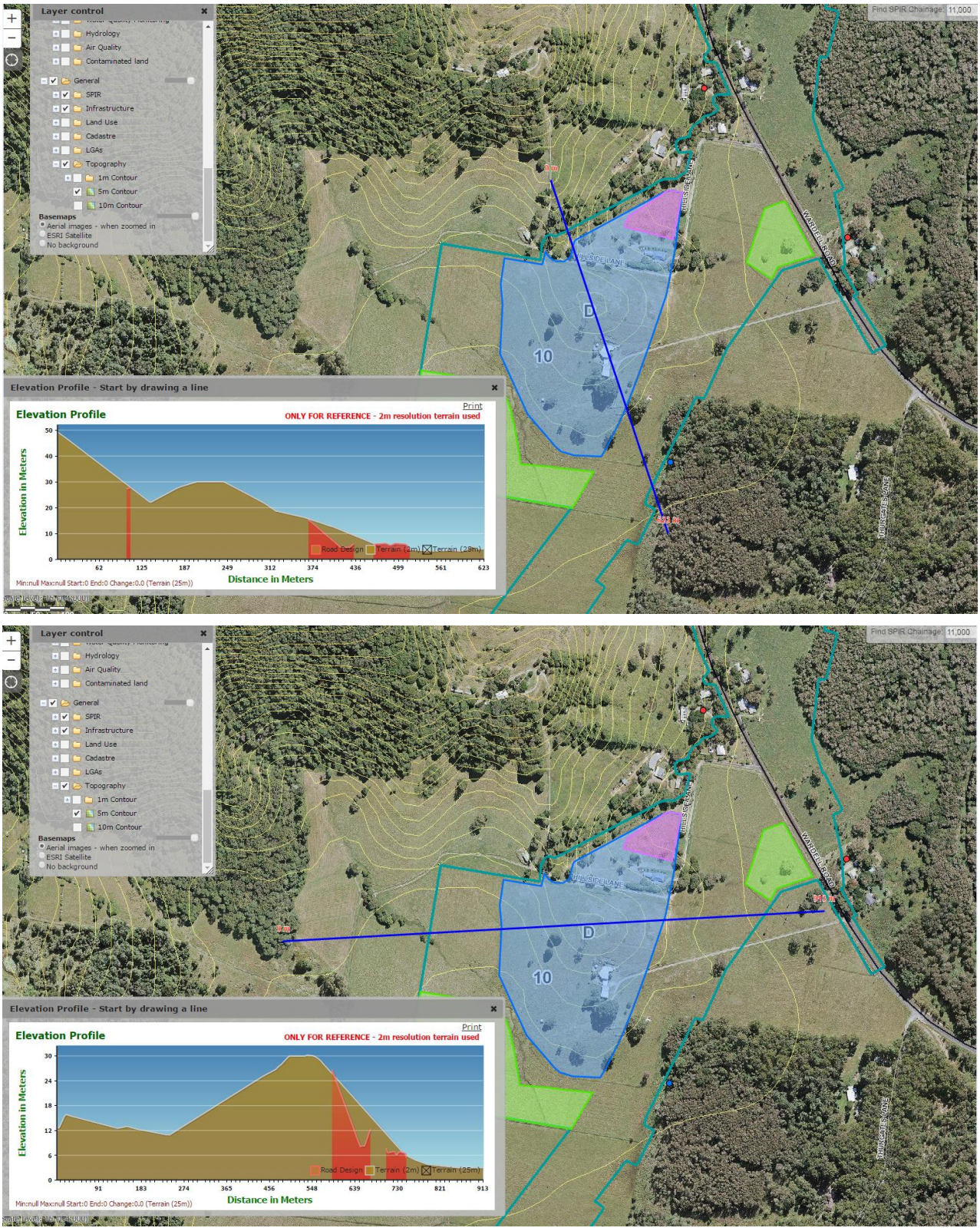


Figure 2 Cross sections through the extents of the proposed Lumleys Hill Borrow Site, north-south, and west-east

Geotechnical investigation locations at Lumleys Borrow Site (cored holes, test pits and installation of standpipe wells for groundwater information) are presented on Figure 3.

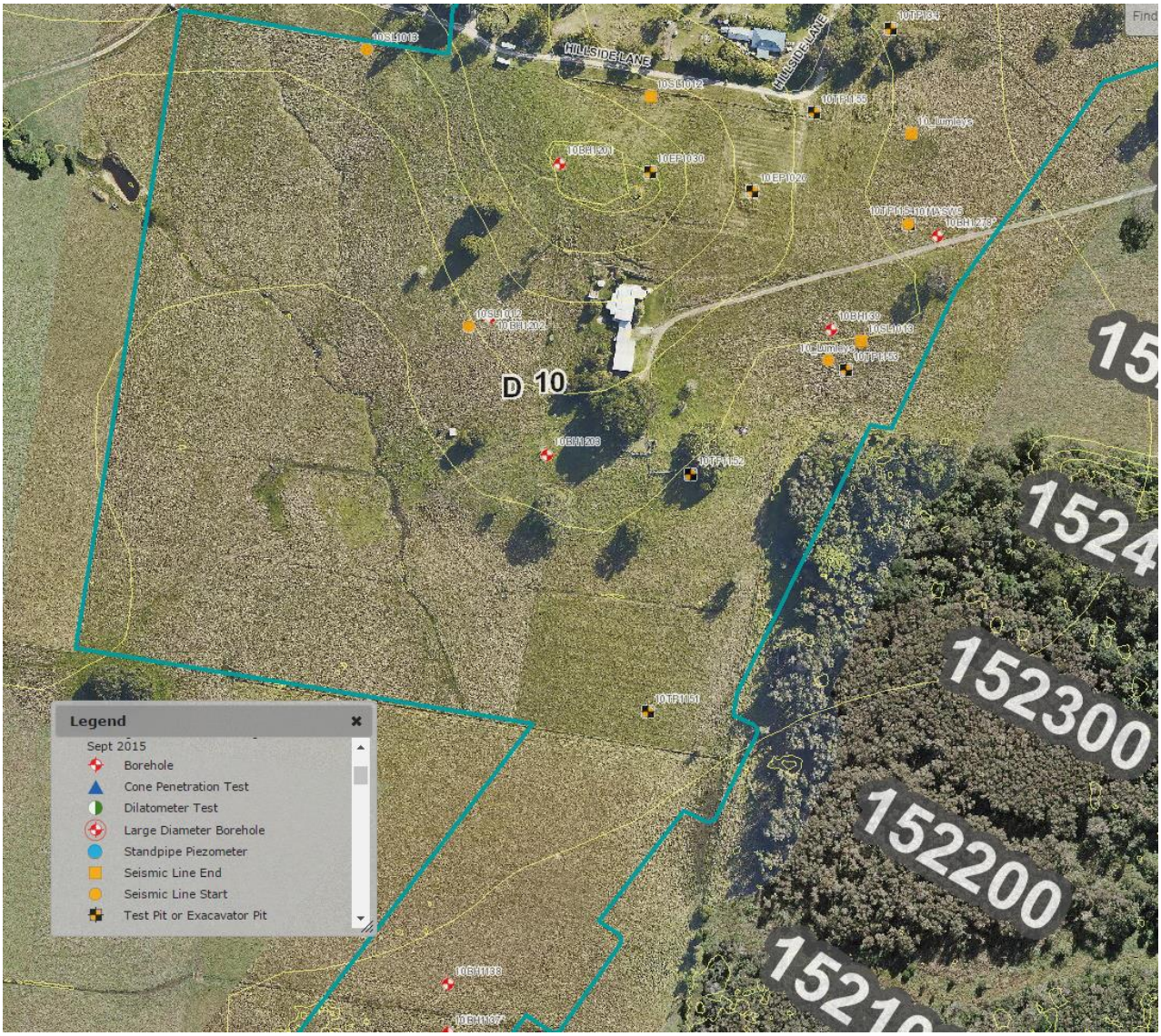


Figure 3 Geotechnical investigation drill sites

Hydrogeology

Two groundwater regimes are present at and surrounding the Lumleys Hill Borrow Pit site and include: Richmond River Alluvium; and underlying Neranleigh Fernvale Beds bedrock systems. Table 1 summarises the key features of the Richmond River Alluvium system, while the bedrock materials in general is not considered as an aquifer except where structural deformity zones occur providing the occurrence of fractured rock aquifer systems.

The Borrow Site is located near the eastern margin of the Clarence-Moreton Basin which is an extensive sedimentary basin in north east New South Wales and southern Queensland.

Table 1 Groundwater and related characteristics

Underlying aquifers (GMU)	Richmond Coastal Sands; New England Fold Belt
Water Sharing Arrangements	Richmond River Area Alluvial Aquifer Water Sharing Plan
Acid sulfate soils	Majority of section mapped as having a low probability of occurrence. Northern portion of route mapped as having no known occurrence of acid sulfate soils.
Groundwater levels	Shallow watertables recorded along the entire section.

Source: extracted from "Upgrading the Pacific Highway, Woolgoolga to Ballina Upgrade - Working paper – Groundwater, November 2012 (final)"

Neranleigh Fernvale Beds (Aquitard – poor Aquifer)

The Neranleigh Fernvale Beds comprises interbedded metamorphosed siltstones, sandstones and minor conglomerate and claystone with basic meta-volcanics of the New England Fold Belt. The indurated and cemented nature of the bedrock rockmass means that the primary porosity and permeability of the sedimentary units is very low, and is dominantly associated with secondary porosity textures (defects) in the rock. The inferred overprint of fracturing and jointing defects provide minimal improvement in porosity, permeability and storage except possibly in zones associated with localised zones of structural deformation and weathering. As such groundwater flow within the fresh rockmass is limited and the Neranleigh bedrock is considered as an *aquitard to poor aquifer systems within structural zones of higher permeability* at this location. A shallow perched ephemeral groundwater system may occur within the surficial weathered regolith profile on the bedrock surface during prolonged rainfall events.

Unconsolidated Sediments (Aquitard – Aquifer)

The unconsolidated sediments to the east of Lumleys Hill and the alignment comprise estuarine mud-silt-clay sediments and sand, gravels sediments associated with the Richmond River alluvium and coastal sands. The mud-silt-clay sediments are of low permeability and comprise aquitard conditions while the interbedded sand and gravels are of higher permeability and provide shallow aquifer systems.

Water Table Levels and Groundwater Flow

The local groundwater table is anticipated to mimic the topography, that is, the inferred groundwater levels in the unconsolidated sediments at the base of Lumleys Hill are likely to be located at a shallow depth, while groundwater levels on the Hill are much deeper within the bedrock. No groundwater was intersected within investigation boreholes drilled in the Lumley Hill (BH1201, BH1202 and BH1203)

which ranged in depth from 15.6 to 35 m below ground level (bgl). This would imply that the the regional bedrock groundwater table beneath Lumleys Hill is deep and may not be intersected by borrow pit to a maximum excavation depth of 22 – 23 m bgl.

As mentioned above, minor perched groundwater system/s may potentially be present within the soil/weathered profile on the Lumleys Hill, particularly near the lower slopes. This appears to be confirmed by shallow groundwater occurring in BH138 and test pits TP1153, TP1156 and TP134 located near the base of the hill below the Borrow Site footprint on the east side. Water levels ranged from 0.3m bgl (8 m RL) in BH139 to 3.1 m (5 m RL) in TP134 and typically occurred within silty to sandy clay beds, possibly residual soil of the Neranleigh Fernvale Beds.

The unconsolidated sediments of the Richmond River floodplain that is present to the east of the borrow pit site sustain shallow groundwater systems. They are intimately hydraulically connected with the surface water system of the Richmond River, and is considered entirely separate from the Neranleigh Fernvale bedrock groundwater system. To the east of the Borrow Pit area within the floodplain sediments the water table systems are typically less than 3 m bgl.

Groundwater flow beneath the proposed borrow pit site is inferred to be radially outward from the topographic high-point of Lumley Hill, resulting in a mildly mounded groundwater system in the bedrock inlier (following the topographic slope).

Groundwater recharge to the bedrock groundwater system is via rainfall infiltration at the topographic surface through clay regolith soils into the underlying bedrock percolating downwards through weathered and structural discontinuities. Rainfall on the land surface will both discharge as surface runoff and infiltrate to the subsurface. Is the case of the latter, the thin soil-weathered rock layer (the regolith zone) will facilitate rapid horizontal flow within a shallow perched system, overlying the low permeable bedrock of the underlying Neranleigh Fernvale Beds. Limited vertical infiltration from this perched system sustains the deeper water table in the bedrock.

Local Bedrock Groundwater Systems

From the above discussion, two bedrock groundwater flow systems are inferred in the immediate vicinity of the proposed borrow pit site; namely:

- *Perched water*: the shallow perched groundwater in the veneer comprising the soil/weathered zone on top of the bedrock of the Neranleigh Fernvale Beds; and
- *Deep bedrock fractured aquifer system*: located at depth and likely beneath the pit floor elevation.

Groundwater flow in the perched system is controlled by the local scale topography (at the 10 m scale), while the latter is controlled by the more regional topography (at the 100-1000 m scale)

The groundwater levels within the shallow perched systems are inferred to fluctuate considerably over time due to their dependence on rainfall recharge and their limited storage capacity. Groundwater flow is strictly controlled by the immediate topographic profile in the bedrock inlier and discharges to local drainages (such as Bingal Creek). This shallow groundwater system is located in the root zone of the local plant ecology and, as such, sustains these local communities, with evapo-transpiration contributing significantly to the water balance losses from these systems.

The deeper bedrock groundwater system is a slow flowing deep system which reacts slowly to rainfall events and, as such, do not typically fluctuate much over time. Because of its depth beneath the Borrow Site, this groundwater system does not sustain the local ecology to any meaningful degree.

As noted previously, the geotechnical investigation drilling conducted in the borrow pit footprint was reported not to have intersected the water table during drilling (this was not confirmed by subsequent water level measurements, and is only considered indicative). However, it does suggest that it is likely that regional groundwater table is not expected to be intercepted during the operational life of the borrow pit. It is noted however that recharge in the footprint of the excavation directly into the bedrock may increase infiltration to the groundwater system, thereby

enhancing groundwater mounding beneath Lumleys Hill. This aspect of the borrow pit is further considered in following text.

Ecosystems sustained or dependant on groundwater

The ecological studies undertaken to date (refer to the BSMP) report that the footprint of the proposed borrow site is located on predominately cleared agricultural land with scattered patches of remnant vegetation. The remnant vegetation does not form part of an OEH biometric vegetation type and consists of Stringybark (*Eucalyptus acmenoides*) and the invasive introduced Caphor Laurel species. Vegetation within the excavation area falls within the approved SPIR vegetation clearing limits for the project.

The BSMP also reports that a patch of Swamp Sclerophyll Forest on Coastal Floodplain, listed as an endangered ecology community (EEC), is located off-site to the east of the proposed borrow pit, on the opposite side of the project alignment and it is potentially sustained by shallow groundwater and surface water flooding associated with Bingal Creek. This vegetation is located within the approved SPIR vegetation clearing limits for the project.

On the basis that (a) the ecological communities are sustained by the shallow perched groundwater; and (b) the deep groundwater system is likely to be located below the final proposed depth elevation of the borrow pit (~6 mAHD), the proposed excavation works to be carried out at the borrow site are unlikely to impact on sensitive local ecological communities near the Borrow Site. Limited reductions to the groundwater flow flux to areas below Lumleys Hill can be anticipated by virtue of the removal of the recharge land-surface of the regolith aquifer up-gradient of this area. On the basis that this area is predominately cleared agricultural land (grazing land) and lacking threatened/ endangered communities potentially sustained by groundwater, this constraint to groundwater recharge is not considered to pose a meaningful ecological impact.

The presence of the proposed borrow pit may enhance rainfall recharge to the bedrock groundwater system marginally. This will be limited due to the low permeability of the bedrock mass, but may give rise to mild mounding of the local groundwater table beneath the immediate footprint of the pit. The limited mass flux of infiltrating rainfall water is unlikely to adversely impact the water quality of the regional groundwater for similar reasons. The limited density (broad spacing) and tightness of fracture/joint flow pathways would effectively filter any suspended solids (turbidity) arising from quarry activities (considered the primary contaminant type associated with quarrying).

In summary, the current vegetation on the pit rim is not anticipated to be meaningfully impacted since these ecosystems (largely grazing) are sustained by the recharge-in/recharge-out processes associated with rainfall infiltration which typically characterise the behaviour of shallow perched water table flow systems.

Groundwater users

Registered groundwater bores within 2 km of the proposed borrow pit site are shown in Figure 4. One (1) bore (GW044337) is located within the immediate vicinity of the borrow pit site. Within 1 km of the Borrow Site there are a total of fifteen (15) bores of which nine (9) bores are active for groundwater usage, two (2) are cancelled and four (4) are monitoring bores. Details of these registered bores within 1 km are provided in Table 2 and generally have yields less than 1 L/s. Some of these water bores intersect sand aquifer presumably associated with the Richmond River floodplain alluvium while other bores intersect fractured bedrock comprising shale, greywacke, sandstone and coal.

No meaningful impact of the Lumleys Hill borrow pit on these bores can reasonably be anticipated because of: (a) the lack of consequential hydraulic connections between the alluvium and the underlying bedrock groundwater systems, (b) the strong hydraulic connection between the surface waters of the Richmond River and the underlying alluvium aquifer/s and (c) the elevation of base of the borrow pit (being above the water level in the alluvium aquifer).

Table 2 Details of registered bores within 1 km of Lumleys Hill borrow site

DPI Water registration number	Distance from Lumleys Hill Borrow Site (m)	Purpose	Bore Depth (m)	SWL (m bgl)	aquifer zone (m bgl)	Aquifer Geology	Yield (L/s)
GW044337	0	stock	3.7	n/a	na	na	0.51
GW305761	62	monitoring	9.4	n/a			
GW305762	134	monitoring	7.6	2.8			
GW044338	278	stock	3.7	2.4		sand ?	0.51
GW304394	311	domestic	7	2	2 - 7m	sand	0.4
GW067532	367	stock and domestic	25	3.5	18 – 25 m	fractured shale	0.8
GW044336	445	stock	5.2	3.7	na	na	0.38
GW305922	469	monitoring	8	1			
GW071393	568	cancelled	31	6	9 - 10 m	fractured shale	0.12
GW305923	758	monitoring	8.8	1			
GW302917	897	domestic	10	n/a	na	na	na
GW301500	972	stock and domestic	55	21	34 - 36 m; 47 - 48 m	broken greywacke	0.01
GW302826	972	cancelled	12	n/a	3 - 7 m	na	na
GW044267	982	stock and domestic	3.7	n/a	1.8 - 3.7 m	sand	0.51
GW300557	999	stock and domestic	45.7	20	21.3 – 30.4 m	basalt	0.225

SWL: - Standing water level; m bgl – metres below ground level; na - not available

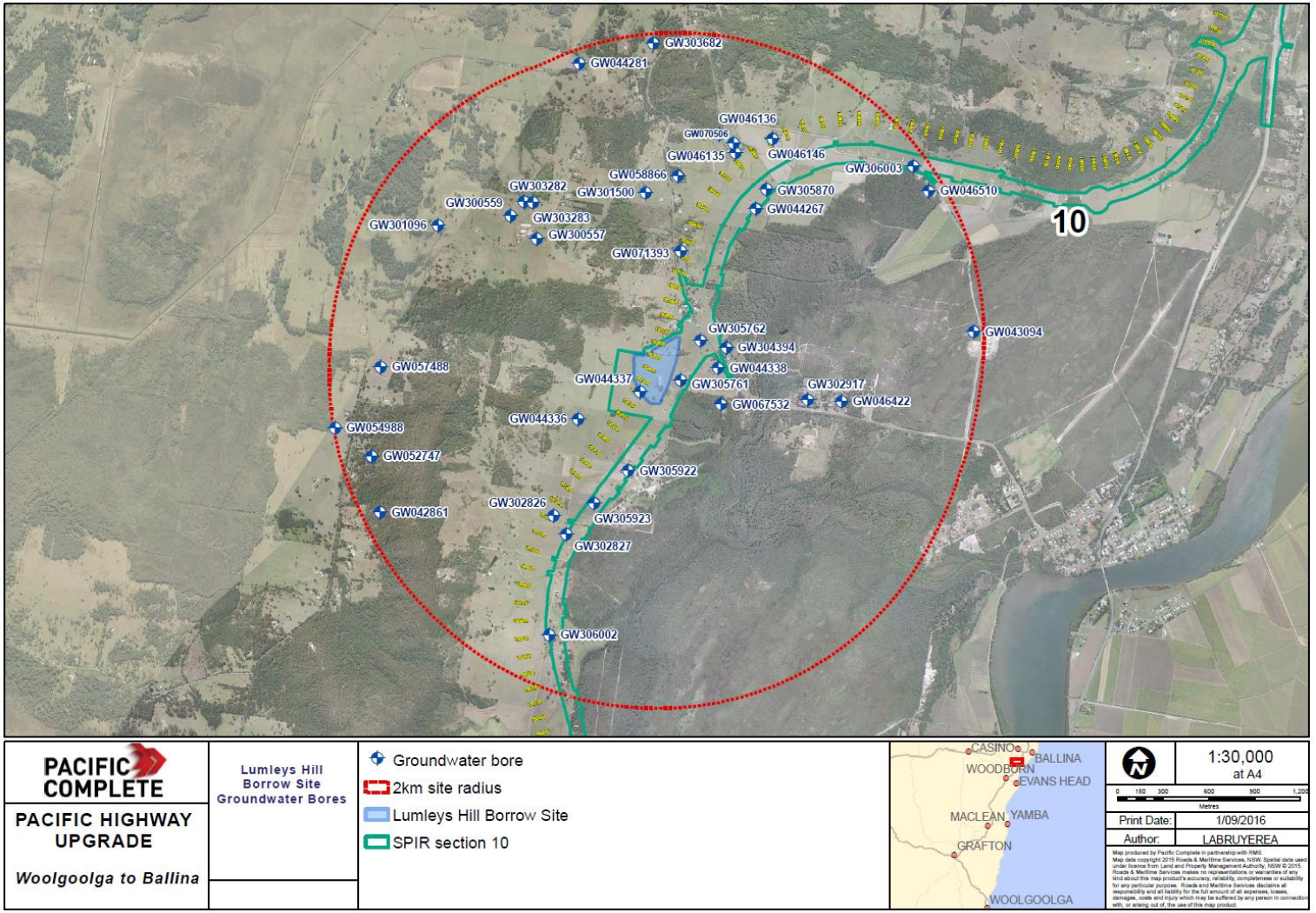


Figure 4 - Register water bores within vicinity of the proposed Lumleys Hill Borrow Pit site (≤2 km) (DPI-Water, Pinneena database)

Conclusion

This review of the groundwater systems present in the vicinity of the proposed Lumleys Hill borrow pit site, indicates that there are two (2) main groundwater regimes operating in the site area, one associated with the shallow alluvial aquifers (Richmond River Alluvium) and a second within the Neranleigh Fernvale bedrock underlying the alluvium.

The Neranleigh Fernvale bedrock, the material to be quarried, itself sustains two groundwater systems:

- *Perched water aquifer*: a shallow perched (within 1-5 mbgl) in the thin weathered regolith profile; and
- *Deep aquitard – poor aquifer system*: a deeper bedrock groundwater system (potentially below the final proposed depth elevation of the borrow pit (~6 mAHD) but above the surrounding alluvium water table (~1 - 3 m AHD)).

Groundwater flow within the local deeper bedrock aquifer occurs within the defect conduits in the rockmass (in the fracture, joint and fault planes). Since the water table in the deeper bedrock is likely to be located below the level of the proposed pit floor (≤6 mAHD, based on geotechnical investigations) it is therefore unlikely to be intersected by the borrow pit activities. As such, it is anticipated that negligible direct impact will be caused to this aquifer by the proposed quarrying activities.

The perched groundwater system is shallow, surficial and ephemeral system, and has limited hydraulic connection to the deeper bedrock groundwater system, and, is predominantly sustained by direct rainfall recharge and variable horizontal flow.

On the basis that (a) the ecological communities are sustained by the shallow perched groundwater; and (b) the deep groundwater system is likely to be located below the final proposed depth elevation of the borrow pit (~6 mAHD), the proposed excavation works to be carried out at the borrow site are unlikely to impact on the sensitive local ecological communities. Limited reductions to the ground-water flow flux to the downgradient side of the site can be anticipated. Since this area is predominately cleared agricultural land (grazing land) and lacking threatened/ endangered communities potentially sustained by groundwater, this constraint to groundwater recharge is not considered to pose a meaningful ecological impact.

The presence of the borrow pit may enhance rainfall recharge to the bedrock groundwater system marginally causing mild mounding of the local groundwater table beneath the immediate footprint of the pit. The limited mass flux of infiltrating rainfall water is unlikely to adversely impact the water quality of the regional groundwater for similar reasons.

This review therefore concludes that the proposed borrow pit works will not have a meaningful impact on the groundwater levels and water quality, and existing groundwater users in the area. In the unlikely event that the borrow pit *does* encounter a permanent water table in the bedrock, and penetrates this water table, to a depth *in excess* of 5 m, a review of management measures shall be undertaken, and these will include re-evaluation of the groundwater impact (in the light of the additional data gathered during operation of the quarry); return of captured water (inflows) to local drainages after treatment in an appropriate sedimentation pond (to capture suspended solids).

Should you have any questions please contact Ray Hatley – Capability Executive Hydrogeologist.

Department of Primary Industries
Water

Contact Christie Jackson
Phone 02 6763 1426
Email christie.jackson@dpi.nsw.gov.au

WSP Parsons Brinckerhoff

Email: harmeyG@pbworld.com

Attention: Georgia Harmey

Dear Ms Harmey,

Lumleys Hill Borrow Pit – Pacific Highway Upgrade

I refer to your email dated the 31 October 2016 seeking the Department of Primary Industries – Water's (DPI Water) comments on the Lumleys Hill Borrow Pit in relation to potential groundwater impacts. I apologise for the delayed response.

DPI Water understands exploration drilling has been undertaken to a depth 35m below ground level, being approximately 12m deeper than the proposed level of the borrow pit. This drilling has identified the absence of an aquifer or water bearing zone. As there is no predicted groundwater intersection or take of groundwater, there are no predicted groundwater concerns to water dependent assets and no licences required.

DPI Water understands as a precaution the proponent has nominated a contingency management response in the unlikely event that groundwater is intercepted. This management response includes a review of groundwater management measures including re-evaluation of groundwater impact and the return of captured water to local drainages following treatment. DPI Water supports the contingency plan.

DPI Water has noted the following errors which should be addressed for the final document:

1. P2, "Issue". "Lang Hill" should be changed to "Lumleys Hill".
2. P3, "depth of 25 hectares" should be changed to "25 metres".
3. P6 Hydrogeology. The site is not located within the Clarence Moreton Basin, this reference should be changed.

DPI Water has no further comments.

If you require clarification on any of the above please contact Christie Jackson on (02) 6763 1426 at the Tamworth office.

Yours sincerely,

Vickie Chatfield
Regional Manager Water Regulatory Operations
6 December 2016

Appendix B Heritage Clearance Letter Site 4

Site 4 – Site Clearance Document

Iluka Road to Ballina, Pacific Highway Upgrade: Archaeological Salvage Program

Navin Officer Heritage Consultants Pty Ltd *16 March 2016*

Overview

The salvage work at Site 4 form part of a wider salvage program being undertaken by Navin Officer Heritage Consultants (NOHC) as part of the Conditions of Approval for the Iluka Road to Ballina sections of the Woolgoolga to Ballina Pacific Highway Upgrade Project.

This document provides details on the recently completed salvage program at Site 4 (Chainage 152400-152500). Construction is able to commence at this site subject to the conditions outlined in this document (see Page 2) and the provisions detailed in Appendix 1 regarding human remains.

It should be noted that the RMS (2012) Standard Management Procedure for Unexpected Archaeological Finds applies to all areas of the project south of Chainage 152400 and north of Chainage 152500, unless otherwise covered by a site clearance document.

Methodology

Salvage excavations were conducted at Site 4 in accordance with the broader aims detailed in the *Strategy for Salvage and Storage of Aboriginal Objects, Iluka Road to Ballina Section* (NOHC 2014).

Salvage excavations at Site 4 comprised Phase 1 excavations only:

- Phase 1 involved mechanical excavation across a series of test locations within the proposed impact area at the site. This was in order to further refine the locations where Phase 2 excavations would take place; and

The *Strategy for Salvage and Storage of Aboriginal Objects, Iluka Road to Ballina Section* (NOHC 2014) recommended that Phase 1 excavations be undertaken across two transects of 40m and 80m in length. A minimum of 10m^2 was planned for this component of excavation. The requirement for and location of Phase 2 excavations was to be guided by the results of the Phase 1 excavations.

Salvage Excavation Results

Excavations at Site 4 consisted solely of Phase 1 mechanical excavations. Phase 2 broad area excavations were deemed unnecessary due to the low numbers of artefacts present at this site.

- **Phase 1 Mechanical –** 13 mechanical pits approximately 1m^2 in size (total of 13m^2 salvaged)

Recovery of Previously Recorded and Reburied Artefacts

One previously recorded and reburied artefact located in STP33 from the past subsurface testing at this site was recovered. All other previously recorded and reburied artefacts were searched for but were unable to be located and recovered.

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Site Fencing – Conditions for Construction

Site fencing has yet to be installed at Site 4

Site fencing will need to be installed between Chainage 152400 and Chainage 152500 along the eastern project boundary (see Figure 1). This is in order to protect areas of the site outside of the project boundary from inadvertent impact.

Site fencing should be installed in consultation with representatives of the Aboriginal community.

In the event that ancillary infrastructure, or associated investigations such as geotechnical pits, is planned outside the project boundary between Chainage 152400 and Chainage 152500, additional heritage assessments will be required. Depending upon the location and nature of impacts, additional archaeological excavations may be necessary. Any additional investigations should be undertaken in consultation with representatives of the Aboriginal community.

Conclusion

Site 4 has been successfully salvaged. An area of 13m^2 of deposit was salvaged by the recently completed excavation program. Construction within this site may commence subject to the site fencing conditions outlined above and the provisions detailed in Appendix 1 regarding human remains.

References

Navin Officer Heritage Consultants (NOHC) 2014 Strategy for Salvage and Storage of Aboriginal Objects, Iluka Road to Ballina Section. Report to RMS.

NSW Roads and Maritime Service (RMS) 2012 *Standard Management Procedure. Unexpected Archaeological Finds*. Environment Branch, Roads and Maritime Services, NSW Group: North Sydney.

Figure 1 Site 4 with section requiring fencing marked in red.

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Appendix 1: Protocol to follow in the event of the discovery of suspected human remains

1. All ground surface disturbance in the area of the finds should cease immediately the finds are uncovered.

    a. The discoverer of the find(s) will notify all field workers and machinery operators in the immediate vicinity of the find(s) so that work can be halted; and

    b. The excavation director, site supervisor and representatives of RMS will be informed of the find(s).

2. If there is substantial doubt regarding a human origin for the remains, then consider if it is possible to gain a qualified opinion within a short period of time. If feasible, gain a qualified opinion (this can circumvent proceeding further along the protocol for remains which turn out to be non-human). If conducted, this opinion must be gained without further disturbance to any remaining skeletal material and its context (Be aware that the site may be considered a crime scene containing forensic). If a quick opinion cannot be gained, or the identification is positive, then proceed to the next step.

3. Immediately notify the following people of the discovery:

    a. The local Police (this is required by law);

    b. Department of Planning and Infrastructure

    c. An archaeologist or Aboriginal Heritage Officer (as appropriate) from the Office of the Environment and Heritage (OEH) (Environment hotline: 131 555);

    d. Representative(s) from the registered Aboriginal parties (as appropriate); and

    e. The project archaeologist (if not already present).

4. Facilitate the evaluation of the find(s) by the statutory authorities and comply with any stated requirements. Depending on the evaluation of the find(s), the management of the find(s) and their location may become a matter for the Police and/or Coroner.

5. Excavation works in the area of the find(s) may not resume until the proponent receives written approval from the relevant statutory authority: from the Police or Coroner in the event of an investigation, or from OEH in the case of Aboriginal or Non-Aboriginal remains outside of the jurisdiction of the Police or Coroner.

In the event that the proponent continues an active role in the evaluation and/or management of the find(s), via a direction or advice from the Police, Coroner and/or the OEH or Heritage Council, then all or some of the following steps *may* be conducted:

6. Facilitate, in co-operation with the appropriate authorities, the definitive identification of the skeletal material by a specialist (if not already completed). This must be done with as little further disturbance to any remaining skeletal material and its context as possible.

7. If the specialist identifies the remains as non-human then, where appropriate, the protocol for the discovery of Non-Aboriginal or Aboriginal artefacts should be followed.

8. If the specialist determines that the remains are human, then the proceeding course of action may be of three types:

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a. The remains are of an Aboriginal or non-Aboriginal person who died less than 100 years ago. All further decisions and responsibilities regarding the remains and find location rest with the Police and/or the State Coroner.

b. The remains are of a non-Aboriginal person who died more than 100 years ago. In this case, and where the Police have indicated that they have no interest in the find(s), the following steps may be followed:

   i. Ascertain the requirements of the Heritage Branch (OEH), the proponent, the project archaeologist, and the views of any relevant community stakeholders;

   ii. Based on the above, determine and conduct an appropriate course of action. Possible strategies could include one or more of the following:

      a. Avoiding further disturbance to the find and conserving the remains in situ (this option may require relocating the development and this may not be possible in some contexts);

      b. Conducting (or continuing) archaeological salvage of the finds following receipt of any required statutory approvals;

      c. Scientific description (including excavation where necessary), and possibly also analysis of the remains prior to reburial;

      d. Recovering samples for dating and other analyses; and/or

      e. Subsequent reburial at another place and in an appropriate manner determined by the Heritage Council and in consultation with other relevant stakeholders.

c. The remains are of an Aboriginal person who died more than 100 years ago. In this case the following steps may be followed:

   i. Ascertain the requirements of the relevant registered Aboriginal parties, the OEH, the proponent, and the project archaeologist;

   ii. Based on the above, determine and conduct an appropriate course of action. Possible strategies could include one or more of the following:

      a. Avoiding further disturbance to the find and conserving the remains in situ, (this option may require relocating the development and this may not be possible in some contexts);

      b. Conducting (or continuing) archaeological salvage of the finds following receipt of any required statutory approvals (e.g. AHIP issued);

      c. Scientific description (including excavation where necessary and where an AHIP has been issued), and possibly also analysis of the remains prior to reburial;

      d. Recovering samples for dating and other analyses; and/or

      e. Subsequent reburial at another place and in an appropriate manner determined by the registered Aboriginal parties and the OEH.

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Appendix C Construction Noise and Vibration Impact Assessment

Woolgoolga to Ballina Pacific Highway Upgrade (Sections 3 to 11)

Lumley Hill Borrow Site, Wardell Road Batch Plant and Wardell Road Compound

SS D21 & D22 Construction Noise and Vibration Impact Assessment

Report Number 610.15470-CNIA-R7 Wardell Road D21

17 July 2017

Pacific Complete
21 Prince Street
Grafton NSW 2460

Version: v4.0

Woolgoolga to Ballina Pacific Highway Upgrade (Sections 3 to 11)

Lumley Hill Borrow Site, Wardell Road Batch Plant

and Wardell Road Compound

SS D21 & D22 Construction Noise and Vibration Impact Assessment

PREPARED BY:

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
610.15470-CNIA-R7 Wardell Road D21	Revision 4	17 July 2017	Nicholas Vandenberg	Mark Russell	Mark Russell
610.15470-CNIA-R7 Wardell Road D21	Revision 3	23 June 2017	Nicholas Vandenberg	Mark Russell	Mark Russell
610.15470-CNIA-R7 Wardell Road D21	Revision 2	16 March 2017	Thomas Gouvernet	Mark Russell	Mark Russell
610.15470-CNIA-R7 Wardell Road D21	Revision 1	4 October 2016	Nicholas Vandenberg	Mark Russell	Mark Russell

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APPENDICES

1 INTRODUCTION

1.1 Project Background

NSW Roads and Maritime Services (RMS) is progressively upgrading the Pacific Highway to dual carriageway between the Hunter and the NSW / Queensland border.

The Woolgoolga to Ballina Pacific Highway Upgrade (W2B) involves upgrading approximately 155 km of highway to four-lane dual-carriageway road between Woolgoolga (north of Coffs Harbour) and Ballina (near the NSW / Queensland border) on the NSW north coast. The project bypasses the towns of Grafton, South Grafton, Ulmarra, Woodburn, Broadwater and Wardell. The project will include road duplication, alignment modification and new road sections. Once complete, the project will create a four-lane divided road, with two lanes in each direction. It would also allow for the road's upgrade in the future to a six-lane divided highway.

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Pacific Complete to prepare a Construction Noise Impact Assessment (CNIA) of the noise impacts associated with the Wardell Road Borrow Site, Wardell Road Batch Plant and Wardell Road Compound. This report presents the results of the assessment.

1.2 Relevant Guidelines

The main guidelines, specifications and policy documents relevant to this CNIA include:

- RMS QA Specification G36: Environmental Protection (Management System) (RMS, 2014)
- NSW *Road Noise Policy* (RNP) (DECCW 2011)
- NSW *Industrial Noise Policy* (EPA 2000)
- RTA *Environmental Noise Management Manual* (ENMM) (RTA 2001)
- NSW *Interim Construction Noise Guideline* (ICNG) (DECC 2009)
- NSW *Assessing Vibration: A Technical Guideline* (DEC 2006)
- British Standard *BS7385: Part 2 Evaluation and Measurement of Vibration in Buildings*
- German *DIN 4150: Part 3 – 1999 Effects of Vibration on Structure* (DIN 1999)
- *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (1990)* Australian and New Zealand Environment and Conservation Council (ANZECC)
- Australian Standard *AS2187.2-2006: Explosives – Storage, Transport and Use*

1.3 Terminology

The assessment has used specific acoustic terminology. An explanation of common terms is included as **Appendix A**.

2 ANCILLARY FACILITY DETAILS

2.1 Description of Project Sites

2.1.1 Description of Wardell Road Borrow Site

The proposed Wardell Road Borrow Site is located within Lot 158 DP 755731 and Lot 3 DP707736, Wardell, in the Ballina Council Local Government Area which is situated in Section 10 of the W2B project. The area of the site is approximately 10 hectares in size and would be access from Wardell Road and the new main alignment of the project.

The primary uses of the Wardell Road Borrow Site would be:

- Excavation Works
- Satellite Office
- Material Storage
- Stockpiling
- Crushing and Screening

2.1.2 Description of Wardell Road Batch Plant

The proposed Wardell Road Batch Plant is located to the south of the borrow site, within Lot 158 DP 755731. The area of the site is approximately 4 hectares in size and would be access from Wardell Road and the new main alignment of the project.

The primary uses of the Wardell Road Batch Plant would be:

- Batch Plant
- Satellite Office
- Stockpiling
- Material Storage

2.1.3 Description of Wardell Road Compound

The proposed Wardell Road Compound is located to the east of the borrow site within Lot 3 DP249649. The area of the site is approximately 1 hectares in size and would be access from Wardell Road and the new main alignment of the project.

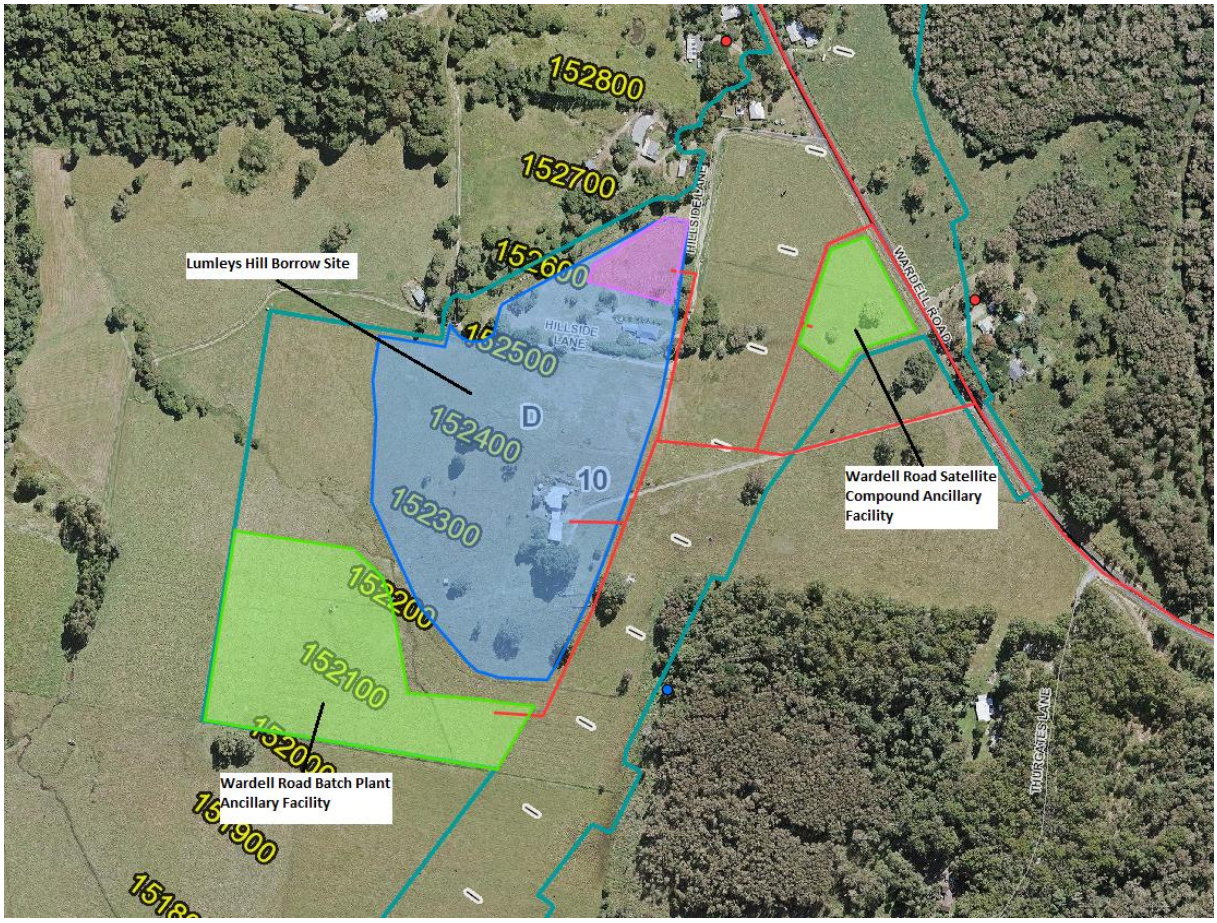
The primary uses of the Wardell Road Compound would be:

- Satellite Office
- Material Storage
- Stockpiling

2.2 Wardell Road Facility

The concept layout for the proposed Wardell Road Borrow Site, Wardell Road Batch Plant and Wardell Road Compound (herein referred to as the Wardell Road Facilities) is shown in **Figure 1**.

Figure 1 Proposed Site Layout Plan for Wardell Road Facilities



Note 1: Drawing provided by the client.

2.3 Approved Project Construction Hours

Activities associated with the use of the site would be undertaken during the following standard project approved construction hours:

- 7:00 am to 6:00 pm Monday to Friday, inclusive.
- 8:00 am to 5:00 pm Saturday.
- At no time on Sunday or Public Holidays

Activities which would be deemed as being of low noise impact to the surrounding environment may be conducted between 6:00 am and 7:00 am Monday to Friday, and 6:00 pm and 7:00 pm Monday to Friday in accordance with the Project Approval. Any Out of Hours works (OOHW) would be undertaken in accordance with the projects approved Out of Hours Works Protocol included in the *Construction Environmental Management Plan* (CEMP) for the Approved Project.

3 EXISTING ENVIRONMENT

3.1 Sensitive Receivers

The *Construction Noise and Vibration Management Plan* (CNVMP) for the Approved Project identified sensitive receivers within the project area and defined Noise Catchment Areas (NCAs) characterising the changing land uses adjacent to the project. The Wardell Facilities are located within NCA-J, as defined in the CNVMP.

NCA-J consists primarily of farmland and bushland, adjacent to the existing highway, with scattered rural dwellings and the townships of Wardell. There are a total of 246 residential, 3 recreational areas and 7 commercial sensitive receivers in NCA-J.

Of these, 26 residential receivers and 1 commercial receiver have been identified within 1,000 m of the Wardell Road Facilities.

3.2 Ambient Noise

To quantify and characterise the existing ambient noise environment, a baseline noise survey was undertaken as part of the Environmental Impact Statement (EIS) for the Approved Project.

The noise monitoring location applicable to NCA-J is Noise Monitor ID 68, located at 109 Meridian Drive, Coolgardie.

Table 1 Ambient Noise Monitoring Results

NCA	Noise Monitor ID	Address	RBL[1] (dBA)		
			Day (07:00-18:00)	Evening (18:00-22:00)	Night-time (22:00-07:00)
NCA-J	68	109 Meridian Drive, Coolgardie, NSW 2478	41	42	38

Note 1: The Rating Background Levels (RBL) have been obtained using the calculation procedures documented in the *NSW Industrial Noise Policy* (INP).

The NMLs determined for the project and as noted in **Table 1** for NCA-J are considered to be representative of the typical background noise levels throughout the project area. Given the locality of the Wardell Facility in relation to nearby sensitive receivers, the project has conducted additional monitoring to provide further detail of the noise levels within the immediate vicinity of the site.

A subsequent investigation of background noise levels was conducted by Wilkson Murray (report no. 00725-G) in February 2017 to confirm levels at sensitive receivers near to the site. The monitoring locations along with a summary of the measured levels is presented in **Table 2**.

Table 2 Ambient Noise Monitoring Results

Monitoring Location		RBL[1] (dBA)		
ID	**Address**	**Day (07:00-18:00)**	**Evening (18:00-22:00)**	**Night-time (22:00-07:00)**
L1	10 Hillside Lane	37	39	38
L2	56 Hillside Lane	34	37	37
L3	18 Thurgates Lane	36	34	30 (29)
L4	106 Thurgates Lane	30	34	34
L5	1155 Wardell Road	35	37	36
L6	1162 Wardell Road	37	37	38

L7	1207 Wardell Road	36	37	33
L8	1247 Wardell Road	38	35	36

Based on a review of the collected monitoring data detailed in **Table 2** and considering the locality of the monitoring locations to the proposed site, location L3 has been used to define a localised noise management level (NMLs).

4 CONSTRUCTION NOISE AND VIBRATION CRITERIA

4.1 Construction Noise Criteria

The NSW EPA *Interim Construction Noise Guideline* (ICNG) requires project specific Noise Management Levels (NMLs) to be established for noise affected receivers. In the event construction noise levels are predicted to be above the NMLs, all feasible and reasonable work practices are investigated to minimise noise emissions.

Having investigated all feasible and reasonable work practices, if construction noise levels are still predicted to exceed the NMLs then the potential noise impacts would be managed via the construction noise mitigation and management measures outlined in the Approved Project CNVMP and this CNIA.

4.1.1 Residential Receivers

The ICNG provides an approach for determining $L_{Aeq(15minute)}$ NMLs at residential receivers in the vicinity of the Wardell Road Facilities by applying the measured $L_{A90(15minute)}$ background noise levels, as described in **Table 3**.

Table 3 Determination of Noise Management Levels for Residential Receivers

Time of Day	NML $L_{Aeq(15minute)}$	How to Apply
Standard hours Monday to Friday 7.00 am to 6.00 pm Saturday 8.00 am to 1.00 pm No work on Sundays or public holidays	RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq(15minute)}$ is greater than the noise management level, the proponent should apply all feasible and reasonable work practises to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restructuring the hours that the very noisy activities can occur, taking into account: • Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools or mid-morning or mid-afternoon for works near residences. • If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Time of Day	NML $L_{Aeq(15minute)}$	How to Apply
Outside recommended standard hours	RBL + 5 dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practises have been applied and noise is more than 5 dB above the noise affected level, the proponent should negotiate with the community.

Note 1: Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Adopting the measured background noise levels in at location L3 noted in **Table 2**, the NMLs derived for the project are detailed in **Table 4**.

Table 4 Construction Noise Management Levels for Residential Receivers

NCA	NML (dBA)				
	Standard Hours – Daytime	Out of Hours – Daytime	Out of Hours – Evening	Out of Hours – Night-time	Sleep Disturbance
NCA-J	46	41	39	35	45

4.1.2 Other Sensitive Receivers

The ICNG provides NMLs for other sensitive land uses such as schools and commercial premises. The NMLs applicable to this project are shown in **Table 5**.

Internal noise levels are assessed at the centre of the occupied room. Where internal noise levels cannot be measured, external noise levels may be used. A conservative estimate of the difference between internal and external noise levels is 10 dB for buildings other than residences. Some buildings may achieve greater performance, such as where windows are fixed (ie, cannot be opened).

Table 5 Constructions Noise Management Levels for Other Sensitive Receivers

Land Use	NML $L_{Aeq(15minute)}$ (Applicable when the property is in use)
Classrooms at schools and other educational institutions	Internal noise level 45 dB
Hospitals and operating theatres	
Places of worship	
Active recreation areas[1]	External noise level 65 dB
Passive recreation areas[2]	External noise level 60 dB
Community centres	Maximum internal levels recommended in AS2107 for specific use
Industrial and commercial premises	External noise level 75 dB
Other noise sensitive businesses	Investigation to determine suitable noise levels on project-by-project basis

Note 1: Active recreation areas are characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion.

Note 2: Passive recreation areas are characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion (eg. reading, meditation).

4.2 Construction Vibration Criteria

Effects of ground borne vibration on buildings may be segregated into the following three categories:

- Human comfort – vibration in which the occupants or users of the building are inconvenienced or possibly disturbed.
- Effects on building contents – where vibration can cause damage to fixtures, fittings and other non-building related objects.
- Effects on building structures – where vibration can compromise the integrity of the building or structure itself.

Vibration criteria for these three categories have been defined in the CNVMP for the Approved Project.

The first of these vibration effects relating specifically to the human comfort aspects of the project are taken from the *Assessing Vibration – A Technical Guideline*, DEC (2006). This type of impact can be further categorised and assessed using the appropriate criterion as follows:

- Continuous vibration – from uninterrupted sources (refer to **Table 6**).
- Impulsive vibration – up to three instances of sudden impact, eg dropping heavy items, per monitoring period (refer to **Table 7**).
- Intermittent vibration – such as from drilling, compacting or activities that would result in continuous vibration if operated continuously (refer to **Table 8**).

Table 6 Continuous Vibration Acceleration Criteria (m/s^2) 1-80 Hz

Location	Assessment Period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z- axis	x- and y-axis
Residences	Daytime	0.010	0.007	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Educational institutions, places of worship and offices	Day or night-time	0.020	0.014	0.040	0.028
Workshops	Day or night-time	0.04	0.029	0.080	0.058

Table 7 Impulsive Vibration Acceleration Criteria (m/s^2) 1-80 Hz

Location	Assessment Period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z- axis	x- and y-axis
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.07	0.20	0.14
Educational institutions, places of worship and offices	Day or night-time	0.64	0.46	1.28	0.92
Workshops	Day or night-time	0.64	0.46	1.28	0.92

Table 8 Intermittent Vibration Impacts Criteria (m/s$^{1.75}$) 1-80 Hz

Location	Assessment Period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z- axis	x- and y-axis
Residences	Day or night-time	0.20	0.40	0.13	0.26

Educational institutions, places of worship and offices	Day or night-time	0.40	0.80	0.40	0.80
Workshops	Day or night-time	0.80	1.60	0.80	1.60

The other two effects relate to impacts on the building itself and are assessed against international standards as follows:

- British Standard *BS7385: Part 2-1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration* (BSI 1993)
- German *DIN4150: Part 3 – 1999 Effects of Vibration on Structure* (DIN 1999).

The German standard provides the most stringent criteria and has been adopted in the CNVMP. The DIN guideline values for peak particle velocity (mm/s) measured at the foundation of the building are summarised in **Table 9**. The criteria are frequency dependent and specific to particular categories of structure.

Table 9 Structural Damage Criteria

Type of Structure	**Peak Component Particle Velocity, mm/s**			
	Vibration at the foundation at a frequency of:			**Vibration of horizontal plane of highest floor at all frequencies**
	1 Hz to 10 Hz	**10 Hz to 50 Hz**	**50 Hz to 100 Hz[1]**	
Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
Structures that, because of their sensitivity to vibration, do not correspond to those listed in Rows 1 and 2 and are of great intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

Note 1: The criteria applied for frequencies above 100 Hz shall be at least the values specified in this column.

4.2.1 Safe Working Distances

The CNVMP outlines safe working distances for construction plant that may be used in the construction of the project. These are reproduced in **Table 10** and **Table 11**.

Key:

Expected to comply with vibration criteria
Expected to exceed the recommended vibration criteria
Expected to exceed the maximum vibration criteria

Table 10 Typical Plant Vibration Levels – Structural Damage

Plant Description	**Vibration Level (mm/s)[1] at Distance from Structure**				
	5 m	**10 m**	**25 m**	**50 m**	**100 m**
Criterion	5 (typical) / 3 (heritage)				

Vibratory roller (3-8 tonne)[2]	7	3	0.7	0.3	0.1
Vibratory roller (8-13 tonne)[2]	19	9	2	1	0.4
Vibratory roller (13-18 tonne)[2]	22	10	3	1	0.4
Vibratory roller (>18 tonne)[2]	28	13	4	1	0.5
Hydraulic hammer	6	2	0.5	0.2	0.1
Impact Pile driver[3]	30	12	3.6	1.5	0.6
Vibratory pile driver[4]	28	11	3	1	0.4
Drilling of blasting holes	6	2	0.5	0.2	0.1
Pile boring	6	2	0.5	0.2	0.1
Jackhammer (hand held)	2	0.8	0.2	<0.1	-

Note 1: Calculated in accordance with *BS5228 – Code of practice for noise and vibration control on construction and open sites (95% confidence) / FTA Guidance Manual for Transit Noise and Vibration Impact Assessment*
Note 2: Mid amplitude setting.
Note 3: Assumes soft ground
Note 4: Steady state operation (startup / shutdown may be higher).

Table 11 Typical Plant Vibration Levels – Human Comfort

Plant Description	**eVDV (mm/s$^{1.75}$)[1] at Distance from Receiver**				
	5 m	**10 m**	**25 m**	**50 m**	**100 m**
Criterion	0.2 daytime / 0.1 night-time				
Vibratory roller (3-8 tonne)[2]	5.9	2.3	0.6	0.2	0.1
Vibratory roller (8-13 tonne)[2]	16.2	7.3	2.2	0.8	0.3
Vibratory roller (13-18 tonne)[2]	18.2	8.2	2.5	0.9	0.3
Vibratory roller (>18 tonne)[2]	23.7	10.7	3.2	1.2	0.4
Hydraulic hammer	5	1.8	0.5	0.2	0.1
Impact Pile driver[3]	65	26	8	3.2	1.3
Vibratory pile driver[4]	23	9	2.5	0.9	0.4
Drilling of blasting holes	5	1.8	0.5	0.2	0.1
Pile boring	5	1.8	0.5	0.2	0.1
Jackhammer (hand held)	1.9	0.7	0.2	<0.1	-

Note 1: Calculated in accordance with *Assessing vibration a technical guideline* and assumes 6 hrs per day of intermittent vibration.
Note 2: Mid amplitude setting.
Note 3: Assumes soft ground
Note 4: Steady state operation (startup / shutdown may be higher).

5 CONSTRUCTION NOISE IMPACT ASSESSMENT

People are usually more tolerant to noise during the construction phase of projects than during normal operation. This response results from recognition that the construction emissions are of a temporary nature – especially if the most noise-intensive construction impacts occur during the less sensitive daytime period. For these reasons, acceptable noise levels are normally higher during construction than during operations.

Construction often requires the use of heavy machinery which can generate high noise levels at nearby buildings and receivers. For some equipment, there is limited opportunity to mitigate the noise levels in a cost-effective manner and hence the potential impacts should be minimised by using all feasible and reasonable management techniques.

At any particular location, the potential impacts can vary greatly depending on factors such as the relative proximity of sensitive receivers, the overall duration of the construction works, the intensity of the noise levels, the time at which the construction works are undertaken and the character of the noise emissions.

The following section details the assessment of potential noise impacts associated with the Wardell Facilities. Construction noise goals have been determined based on the measured RBLs in accordance with the procedure outlined in the ICNG. Potential noise levels have been predicted at sensitive receivers for expected activities and where levels are above the goals, feasible and reasonable noise mitigation measures are considered.

5.1 Proposed Construction Activities

The construction noise and vibration assessment has considered the following construction activities associated with the Wardell Facility:

- Site set up including earthworks, vehicles and loading.
- Site operation including stockpiling, vehicle movements, material extraction, material processing, and batch plant operations.
- Site decommissioning including earthworks, vehicles and loading.

5.2 Construction Noise Modelling

Construction noise modelling of the Wardell Facility was undertaken using SoundPLAN V7.1 modelling software.

Maximum sound power levels (L_{WA}) for the typical construction equipment (item) and construction activities that have been used in the noise modelling are listed in **Table 12**.

Table 12 Sound Power Levels for Construction Equipment

ID	Construction Activity	Equipment	Operating minutes in 15-min period	No of items in same location	Sound Power Level L_{WA} (dB)	
					Item	Activity
1a	Borrow Site – Site Set Up / Decommission - Earthworks	Excavator (25 tonne)	15.0	1	102	113
		Grader	15.0	1	108	
		Smooth Drum Roller*	15.0	1	109	
		Articulated Dump Truck	15.0	1	103	
1b	Borrow Site – Site Set Up / Decommission – Vehicles & Loading	Water Tanker (8000 litre)	15.0	1	98	106
		Mobile Crane (25 tonne)	15.0	1	100	
		Semi-trailer	5.0	1	106	
		Vehicle (Light commercial e.g. 4WD)	5.0	2	101	
2	Borrow Site Operations – Extraction Works	Excavator (40 tonne)	15.0	2	109	116
		Dozer	15.0	1	110	
		Articulated Dump Truck	15.0	3	103	
		Truck (12-15 tonne)	15.0	1	103	
		Water Tanker (8000 litre)	15.0	1	98	
		Vibratory Roller (10 - 12 tonne)	15.0	1	109	

ID	Construction Activity	Equipment	Operating minutes in 15-min period	No of items in same location	Sound Power Level L_{WA} (dB)	
					Item	Activity
		Vehicle (Light commercial e.g. 4WD)	5.0	3	101	
3	Borrow Site Operations – Storage and Fixed Plant	ute	15.0	1	98	105
		Semi-trailer	15.0	1	106	
		Generator	15.0	1	101	
		Air Conditioning Exchange Unit	15.0	40	75	
4	Borrow Site Operations – Stockpiling	Excavator (30 tonne)	15.0	1	104	115
		Dozer	15.0	1	110	
		Semi-trailer	5.0	1	106	
		Back Hoe (7.5 tonne JCB)	15.0	1	102	
		Front End Loader	15.0	1	112	
5	Borrow Site Operations – Crushing and Screening	Crusher - Jaw	15.0	1	120	123
		Screen	15.0	1	119	
		Excavator (30 tonne)	15.0	1	104	
		Front End Loader	15.0	1	112	
		Water Tanker (8000 litre)	15.0	1	98	
		Vehicle (Light commercial e.g. 4WD)	5.0	3	101	
6	Borrow Site Operations – Rehabilitation	Excavator (25 tonne)	15.0	1	102	114
		Dozer	15.0	1	110	
		Articulated Dump Truck	15.0	1	103	
		Vibratory Roller (10 - 12 tonne)	15.0	1	109	
		Vehicle (Light commercial e.g. 4WD)	5.0	5	101	
7a	Batch Plant – Site Set Up / Decommission - Earthworks	Excavator (25 tonne)	15.0	1	102	113
		Grader	15.0	2	108	
		Vibratory Roller (10 - 12 tonne)	15.0	1	109	
7b	Batch Plant – Site Set Up / Decommission – Vehicles & Loading	Water Tanker (8000 litre)	15.0	1	98	106
		Mobile Crane (50 tonne)	15.0	1	100	
		Semi-trailer	5.0	1	106	
		Vehicle (Light commercial e.g. 4WD)	5.0	2	101	
8a	Batch Plant Operations – Batch Plant	Semi-trailer	15.0	1	106	120
		Water Tanker (8000 litre)	15.0	1	98	
		Mobile Crane (50 tonne)	15.0	1	100	
		Vehicle (Light commercial e.g. 4WD)	5.0	4	101	
		Front End Loader	15.0	2	112	
		Back Hoe (7.5 tonne JCB)	15.0	1	102	
		Batch Plant	15.0	1	118	

ID	Construction Activity	Equipment	Operating minutes in 15-min period	No of items in same location	Sound Power Level L_{WA} (dB)	
					Item	Activity
9a	Batch Plant Operations – Fixed Plant and Storage	Vehicle (Light commercial e.g. 4WD)	15.0	1	101	106
		Semi-trailer	15.0	1	106	
		Generator	15.0	1	101	
		Air Conditioning Exchange Unit	15.0	40	75	
10a	Batch Plant Operations – Stockpiling	Excavator (30 tonne)	15.0	1	104	115
		Dozer	15.0	1	110	
		Semi-trailer	15.0	1	106	
		Back Hoe (7.5 tonne JCB)	15.0	1	102	
		Front End Loader	15.0	1	112	
11a	Compound – Site Set Up / Decommission - Earthworks	Excavator (25 tonne)	15.0	1	102	113
		Grader	15.0	1	108	
		Smooth Drum Roller*	15.0	1	109	
		Articulated Dump Truck	15.0	1	103	
11b	Compound – Site Set Up / Decommission – Vehicles & Loading	Water Tanker (8000 litre)	15.0	1	98	106
		Mobile Crane (25 tonne)	15.0	1	99	
		Semi-trailer	15.0	1	106	
		Vehicle (Light commercial e.g. 4WD)	15.0	2	101	
12a	Compound Operations – Fixed Plant and Storage	Vehicle (Light commercial e.g. 4WD)	15.0	1	101	105
		Semi-trailer	15.0	1	106	
		Generator	15.0	1	101	
		Air Conditioning Exchange Unit	15.0	40	75	
13a	Compound Operations – Stockpiling	Excavator (30 tonne)	15.0	1	104	115
		Dozer	15.0	1	110	
		Semi-trailer	15.0	1	106	
		Back Hoe (7.5 tonne JCB)	15.0	1	102	
		Front End Loader	15.0	1	112	

Note 1: In accordance with the ICNG, for activities identified as particularly annoying (such as jackhammering, rock breaking and power saw operations), a 5 dB 'penalty' is added to the source sound power level when predicting noise using the quantitative method.

Consistent with the requirements of the ICNG, the construction noise impacts are based on a realistic worst-case assessment. For most construction activities, it is expected that the construction noise levels would frequently be lower than predicted for the realistic worst-case assessment.

5.3 Predicted Construction Noise Impacts

In the receiver areas surrounding the Wardell Facility, the noise impacts have been quantitatively assessed for several construction activities. The activities considered are described in **Table 12**.

Due to the size of the works area, the borrow pit and batch plant sites have been broken down into smaller sections to better quantify the site noise emissions.

The predicted $L_{Aeq(15minute)}$ noise levels at the surrounding noise sensitive receivers are detailed in **Table 13**. Construction activities are representative of the 'noisiest' construction periods, which accounts for the simultaneous operation of noise intensive construction plant in close proximity. Noise contour maps of the worst-case maximum $L_{Aeq(15minute)}$ noise levels are provided in **Appendix B.** A table summarising predicted noise level at each receiver is provided in **Appendix C**. As the compound is spread over three areas, a cumulative assessment addressing worst case noise intensive plant from the Borrow Site and Batch Plant has been predicted in **Table 14**.

Table 13 Predicted Construction Noise Levels

Sensitive Receiver Type	NML				Noise Level – $L_{Aeq(15minute)}$ (dB)					Number of Exceedances (Receivers)			
					Worst-case Predicted	NML Exceedance							
	Day	Day OOH	Eve OOH	Night OOH		Day	Day OOH	Eve OOH	Night OOH	Day	Day OOH	Eve OOH	Night OOH
1a, 7a, 11a –All Sites – Site Set Up / Decommission - Earthworks													
Residential	46.	41.	39.	35.	Up to 58	Up to 12	Up to 17	Up to 19	Up to 23	3	6	6	14
Commercial	75	-	-	-	Up to 29	-	-	-	-	-	-	-	-
1b, 7b, 11b – All Sites – Site Set Up / Decommission – Vehicles & Loading													
Residential	46.	41.	39.	35.	Up to 53	Up to 7	Up to 12	Up to 14	Up to 18	1	3	3	6
Commercial	75	-	-	-	Up to 22	-	-	-	-	-	-	-	-
2a – Borrow Site Operations – Extraction Works													
Residential	46.	41.	39.	35.	Up to 61	Up to 15	Up to 20	Up to 22	Up to 26	2	6	6	11
Commercial	75	-	-	-	Up to 27	-	-	-	-	-	-	-	-
3a – Borrow Site Operations – Storage and Fixed Plant													
Residential	46.	41.	39.	35.	Up to 50	Up to 4	Up to 9	Up to 11	Up to 15	1	1	1	2
Commercial	75	-	-	-	Up to 16	-	-	-	-	-	-	-	-
4a - Borrow Site Operations – Stockpiling													
Residential	46.	41.	39.	35.	Up to 60	Up to 14	Up to 19	Up to 21	Up to 25	2	3	6	9
Commercial	75	-	-	-	Up to 26	-	-	-	-	-	-	-	-
5a - Borrow Site Operations – Crushing and Screening													
Residential	46.	41.	39.	35.	Up to 68	Up to 22	Up to 27	Up to 29	Up to 33	6	12	15	18
Commercial	75	-	-	-	Up to 34	-	-	-	-	-	-	-	-
6a - Borrow Site Operations – Rehabilitation													
Residential	46.	41.	39.	35.	Up to 59	Up to 13	Up to 18	Up to 20	Up to 24	2	3	6	8
Commercial	75	-	-	-	Up to 25	-	-	-	-	-	-	-	-
8a – Batch Plant Operations – Batch Plant													
Residential	46.	41.	39.	35.	Up to 45	-	Up to 4	Up to 6	Up to 10	-	3	4	8
Commercial	75	-	-	-	Up to 33	-	-	-	-	-	-	-	-
9a – Batch Plant Operations – Fixed Plant and Storage													
Residential	46.	41.	39.	35.	Up to 31	-	-	-	-	-	-	-	-
Commercial	75	-	-	-	Up to 19	-	-	-	-	-	-	-	-

Sensitive Receiver Type	NML				Noise Level – $L_{Aeq(15minute)}$ (dB)					Number of Exceedances (Receivers)			
					Worst-case Predicted	NML Exceedance							
	Day	Day OOH	Eve OOH	Night OOH		Day	Day OOH	Eve OOH	Night OOH	Day	Day OOH	Eve OOH	Night OOH
10a – Batch Plant Operations – Stockpiling													
Residential	46.	41.	39.	35.	Up to 40	-	-	Up to 1	Up to 5	-		2	4
Commercial	75	-	-	-	Up to 28	-	-	-	-	-	-	-	-
12a - Compound Operations – Fixed Plant and Storage													
Residential	46.	41.	39.	35.	Up to 42	-	Up to 1	Up to 3	Up to 7	-	1	1	3
Commercial	75	-	-	-	Up to 14	-	-	-	-	-	-	-	-
13a – Compound Operations – Stockpiling													
Residential	46.	41.	39.	35.	Up to 52	Up to 6	Up to 11	Up to 13	Up to 17	2	4	5	11
Commercial	75	-	-	-	Up to 24	-	-	-	-	-	-	-	-

As it is anticipated that multiple activities will occur simultaneously across the site, predictions of noise levels from the loudest operations at the batch plant site (batch plant operations) and the Borrow Site (crushing and screening) have been assessed cumulatively to represent a worst case noise emission from complete facility. These results are presented below in **Table 14**.

Table 14 Cumulative Construction Noise Levels

Borrow Pit and Batch Plant													
Residential	46.	41.	39.	35.	Up to 68	Up to 22	Up to 27	Up to 29	Up to 33	6	13	14	17
Commercial	75	-	-	-	Up to 37	-	-	-	-	-	-	-	-

5.4 Results Discussion

5.4.1 Site Commissioning/Decommissioning

During standard construction hours, exceedances of the NMLs of up to 12 dB are predicted at three residential receivers when earthworks are performed as part of the site establishment. Exceedances of up to 23 dB are predicted at 14 residential receivers during Out of Hour's works.

5.4.2 Borrow Site

During standard construction hours, exceedances of the NMLs of up to 15 dB are predicted at two residential receivers during extraction works, and up to 22 dB at six residential receivers during crushing and screening operations. Exceedances of the Out of Hours NMLs of up to 26 dB are predicted at 11 residential receivers during extraction works and up to 33 dB at 18 residential receivers during crushing and screening operations.

5.4.3 Batch Plant

During standard construction hours, no exceedances of the NMLs are predicted at any residential receiver during works conducted within the Batch Plant Area. Exceedances of the Out of Hours NMLs of up to 10 dB are predicted at eight residential receivers during batch plant operations.

5.4.4 Compound Site

During standard construction hours, exceedances of the NMLs of up to 6 dB at two residential receivers are predicted during stockpiling works. Exceedances of up to 17 dB are predicted at 11 residential receivers during Out of Hour's works. .

5.4.5 Cumulative Operations

During standard construction hours, exceedances of the NMLs of up to 22 dB at six residential receivers are predicted with the cumulative operations of the borrow pit and batch plant sites. Exceedances of the Out of Hours NMLs of up to 33 dB at 17 residential receivers are predicted.

From the assessment of the cumulative operations it is evident that the site emissions are dominated by the activities of the Borrow Site due to its closer proximity to residential receivers.

Where construction noise levels are predicted to exceed the NMLs, it is recommended that construction noise mitigation measures should be considered, where reasonable and feasible. Construction noise mitigation measures are discussed in **Section 7**.

5.5 Cumulative Construction Noise Impacts

In order to assess the cumulative noise impacts of the Wardell Facility with construction activities which may occur on the mainline, construction activities for the mainline works have been extracted from the CNVMP. Mainline construction activities are shown in **Table 15**.

Table 15 Mainline Construction Activities

Construction Activity			Overall Sound Power Level L_{WA} (dB)
ID	**Reference**	**Activity**	
01	08_BAS	Construction of water quality basins	106
	20_SGN	Signage installation	
02	17_LMK	Linemarking	107
	18_WLI	Wall installation	
03	11_ENV	Installation of environmental controls	108
04	16_SPS	Spray sealing activities	109
05	01_GEO	Geotechnical works	110
	02_DCL	Discrete clearing	
	07_SER	Services and drainage installation	
	14_CSC	Soft concrete saw cutting	
06	03_BCL	Broad clearing	111
	09_HAU	Plant and materials haulage	
07	10_VMW	Verge and median works	112
	19_BDG	Bridge installations – bored piling	
08	05_DRL	Earthworks – drill and blasting	113
	12_KCB	Kerb and barrier works	
	15_SCP	Shoulder concrete paving	
	21_MCP	Main compound	
09	13_CCP	Carriageway concrete paving	114
10	06_FIL	Earthworks – fill and compact	116
11	04_CUT	Earthworks – cut	124
12	22_CCP	Crushing compound	125

Cumulative impacts from the mainline construction activities were modelled with the Wardell Facility construction activities. The cumulative noise levels, exceedances and dominant construction activities are summarised in **Table 16** and **Table 17**.

Table 16 Cumulative Construction Noise Impacts at Residences - Site Establishment and Borrow Site

Mainline Scenarios	Worst-case Predicted Noise Level – $L_{Aeq(15minute)}$ (dB) Cumulative Noise Level (Day NML Exceedance)[2]							Dominant Construction Noise Source[1]						
	Ancillary Construction Scenarios							Ancillary Construction Scenarios						
	01a	01b	02a	03a	04a	05a	06a	01a	01b	02a	03a	04a	05a	06a
01	58 (12)	53 (7)	61 (15)	50 (4)	60 (14)	68 (22)	59 (13)	AF	AF	AF	AF	AF	AF	AF
02	58 (12)	53 (7)	61 (15)	50 (4)	60 (14)	68 (22)	59 (13)	AF	AF	AF	AF	AF	AF	AF
03	58 (12)	53 (7)	61 (15)	50 (4)	60 (14)	68 (22)	59 (13)	AF	AF	AF	AF	AF	AF	AF
04	58 (12)	53 (7)	61 (15)	50 (4)	60 (14)	68 (22)	59 (13)	AF	AF	AF	AF	AF	AF	AF
05	58 (12)	53 (7)	61 (15)	50 (4)	60 (14)	68 (22)	59 (13)	AF	AF	AF	AF	AF	AF	AF
06	58 (12)	53 (7)	61 (15)	50 (4)	60 (14)	68 (22)	59 (13)	AF	AF	AF	AF	AF	AF	AF
07	58 (12)	53 (7)	61 (15)	50 (4)	60 (14)	68 (22)	59 (13)	AF	AF	AF	AF	AF	AF	AF
08	58 (12)	53 (7)	61 (15)	50 (4)	60 (14)	68 (22)	59 (13)	AF	AF	AF	AF	AF	AF	AF
09	58 (12)	53 (7)	61 (15)	51 (5)	60 (14)	68 (22)	59 (13)	AF	AF	AF	CU	AF	AF	AF
10	58 (12)	54 (8)	61 (15)	51 (5)	60 (14)	68 (22)	59 (13)	AF	CU	AF	CU	AF	AF	AF
11	59 (13)	56 (10)	61 (15)	55 (9)	61 (15)	68 (22)	60 (14)	CU	CU	AF	CU	CU	AF	CU
12	60 (14)	57 (11)	62 (16)	56 (10)	61 (15)	68 (22)	60 (14)	CU	CU	CU	CU	CU	AF	CU

Note 1: AF = Ancillary Facility; ML = Mainline; CU = Cumulative.
Note 2: Day NML exceedances notes in Red.

Table 17 Cumulative Construction Noise Impacts at Residences – Batch Plant and Compound Sites

Mainline Scenarios	Worst-case Predicted Noise Level – $L_{Aeq(15minute)}$ (dB) Cumulative Noise Level (Day NML Exceedance)[2]					Dominant Construction Noise Source[1]				
	Ancillary Construction Scenarios					Ancillary Construction Scenarios				
	8a	9a	10a	12a	13a	8a	9a	10a	12a	13a
01	51 (5)	51 (5)	51 (5)	49 (3)	54 (8)	CU	CU	CU	CU	CU
02	52 (6)	52 (6)	52 (6)	50 (4)	54 (8)	CU	CU	CU	CU	CU
03	53 (7)	53 (7)	53 (7)	51 (5)	54 (8)	CU	CU	CU	CU	CU
04	54 (8)	54 (8)	54 (8)	52 (6)	55 (9)	CU	CU	CU	CU	CU
05	55 (9)	55 (9)	55 (9)	53 (7)	55 (9)	CU	CU	CU	CU	CU
06	56 (10)	56 (10)	56 (10)	54 (8)	56 (10)	CU	CU	CU	CU	CU
07	57 (11)	57 (11)	57 (11)	55 (9)	56 (10)	CU	CU	CU	CU	CU
08	58 (12)	58 (12)	58 (12)	56 (10)	57 (11)	CU	CU	CU	CU	CU
09	59 (13)	59 (13)	59 (13)	57 (11)	58 (12)	CU	CU	CU	CU	CU
10	61 (15)	61 (15)	61 (15)	59 (13)	59 (13)	CU	CU	CU	CU	CU
11	69 (23)	69 (23)	69 (23)	67 (21)	67 (21)	CU	CU	CU	CU	CU
12	70 (24)	70 (24)	70 (24)	68 (22)	68 (22)	CU	CU	CU	CU	CU

Note 1: AF = Ancillary Facility; ML = Mainline; CU = Cumulative.
Note 2: Day NML exceedances notes in Red.

As shown in **Table 16** and **Table 17** worst-case noise levels during combinations of ancillary facility and mainline construction activities are predicted to exceed the daytime NMLs at residential receivers.

Where the dominant noise source is listed as ancillary facility (AF), mainline construction activities do not contribute to the $L_{Aeq(15minute)}$ noise levels at the most-affected receivers.

Where the dominant noise source is listed as mainline (ML), ancillary facility construction activities do not contribute to the $L_{Aeq(15minute)}$ noise levels at the most-affected receivers.

Where the dominant noise source is listed as cumulative (CU), both the ancillary facility and mainline construction activities contribute to the $L_{Aeq(15minute)}$ noise levels at the most-affected receivers.

Where the dominant noise source is noted as either the ancillary facility or cumulative impacts, and construction noise levels are predicted to exceed the NMLs, it is recommended that construction noise mitigation measures should be considered, where reasonable and feasible. Construction noise mitigation measures are discussed in **Section 7**.

5.6 Construction Traffic

The Wardell Road Facility will be accessed directly from the mainline and as such it is not anticipated that the use of local roads will be required and as such no assessment of project vehicle movements on public roads has been undertaken.

6 CONSTRUCTION VIBRATION IMPACT ASSESSMENT

6.1 Predicted Construction Vibration Impacts

No vibration intensive items of plant have been identified to operate within the safe working distances for the proposed construction activities outlined in **Table 12**.

Where vibration intensive construction activities are proposed within 100 m of sensitive receivers, it is recommended that construction vibration mitigation measures should be considered, where reasonable and feasible. Construction vibration mitigation measures are discussed in **Section 7**.

7 CONSTRUCTION NOISE AND VIBRATION MITIGATION

The CNVMP for the Approved Project outlines a range of environmental requirements and control measures to minimise construction noise and vibration impacts associated with the project. The strategies are designed to minimise, to the fullest extent practicable, noise and vibration during construction.

Where construction noise levels are predicted to exceed the NMLs or vibration intensive construction activities are proposed within 100 m of sensitive receivers, it is recommended that construction noise and vibration mitigation measures be considered, where reasonable and feasible.

Particular works which are noted in **Table 13** as having the potential for impacts are;

- Borrow site extraction works (scenario 2a)
- Borrow site crushing and screening (scenario 5a)

Scenarios listed above include items of construction equipment with relatively high sound power levels, such as front end loaders and dozers. Mitigating noise emission from these key items of plant is key in minimising noise impacts at nearby receivers.

Mitigating exceedances through the means of locating noisy equipment as far away from receivers as practicable is not always feasible due to the nature of the task, i.e. borrow site extraction works which will be required where the material is located. Judicious selection of the location of the crusher and screen can (where feasible and practicable) manage / mitigate predicted exceedances due to the source being stationary.

8 CONCLUSION

SLR consulting has conducted a Construction Noise Impact Assessment (CNIA) of the noise impacts associated with the Wardell Road Borrow Site, Wardell Road Batch Plant and Wardell Road Compound.

An assessment of the airborne construction noise against the project NMLs (refer to **Section 4.1.1)** has been conducted and is presented in **Section 5** of this report. Exceedances of the NMLs were identified for various activities associated with the operation and construction, in particular the Crushing and Screening operations.

Mitigation and management measures outline in the Approved Project CNVMP should be implemented where reasonable and feasible for all activities.

No vibration intensive items of plant have been identified to operate within the safe working distances for the proposed construction activities. If any vibration intensive items of plant are proposed to be used then the safe working distances outlined in **Section 4.2.1** should be observed.

Acoustic Terminology

1 Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that in common usage 'noise' is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB(lin) or dB.

3 Sound Power Level

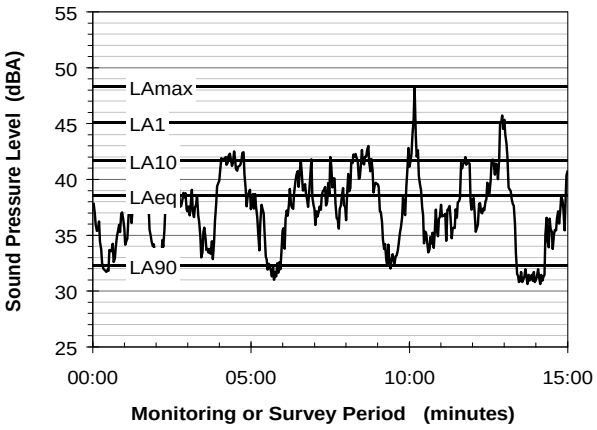
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or L_W, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

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

L_{A10} The noise level exceed for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the 'repeatable minimum' L_{A90} noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or 'average' levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than 'broad band' noise.

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

7 Frequency Analysis

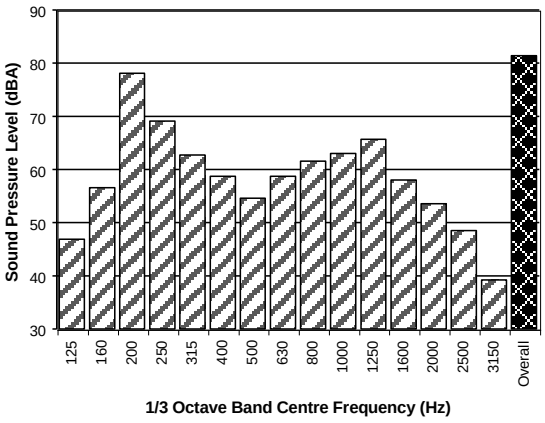
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



8 Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of 'peak' velocity or 'rms' velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as 'peak particle velocity', or PPV. The latter incorporates 'root mean squared' averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/V_o), where V_o is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used by some organizations.

9 Human Perception of Vibration

People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

10 Over-Pressure

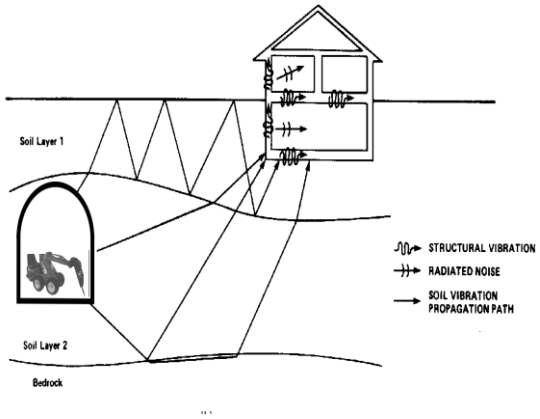
The term 'over-pressure' is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

11 Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

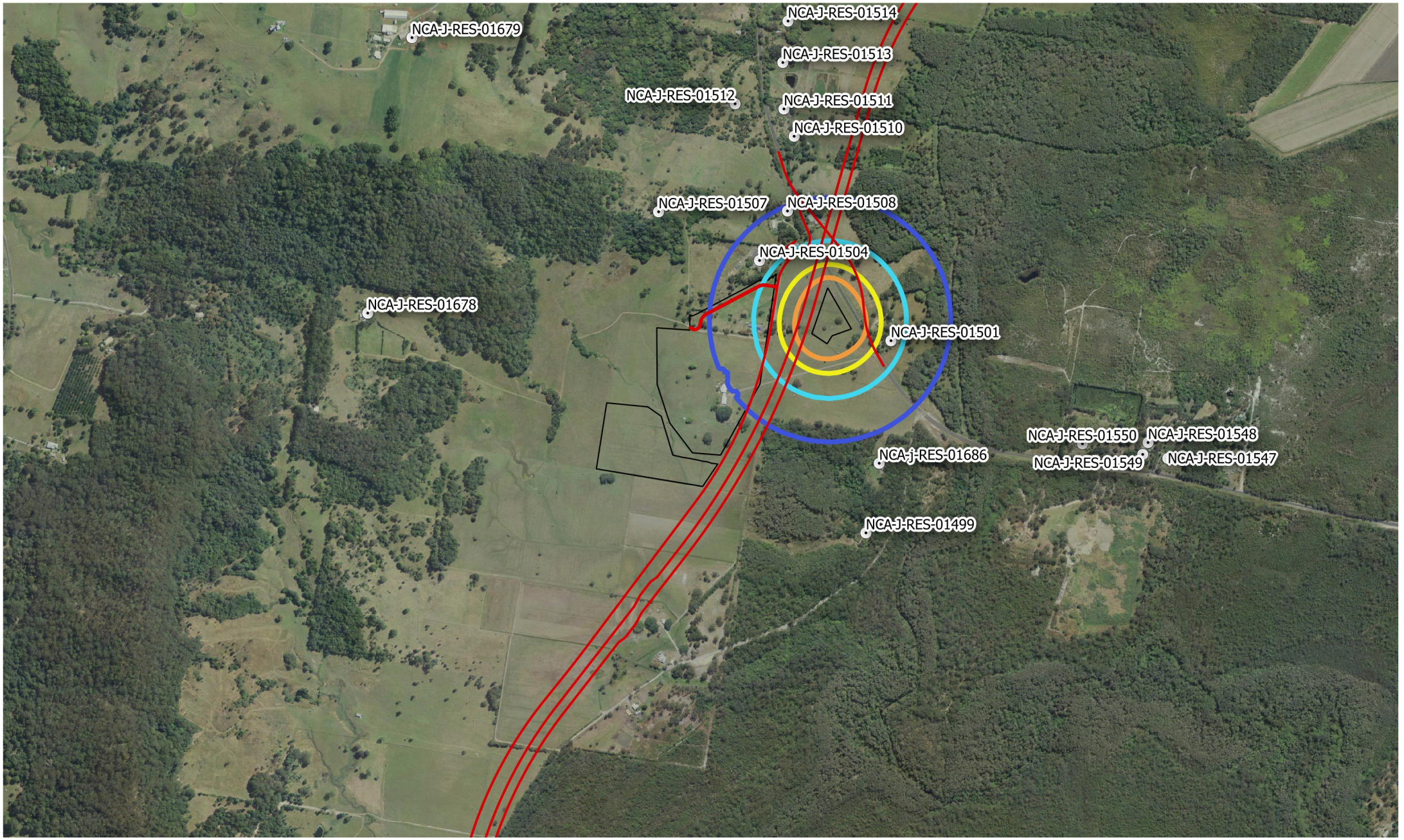
Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise

Noise Contour Maps



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Drawn by:	NV
Scale:	1:13,000
Sheet Size:	@A4
Projection:	GDA 1994 MGA Zone 56

N

100 0 100 200 300 m

Mainline Works

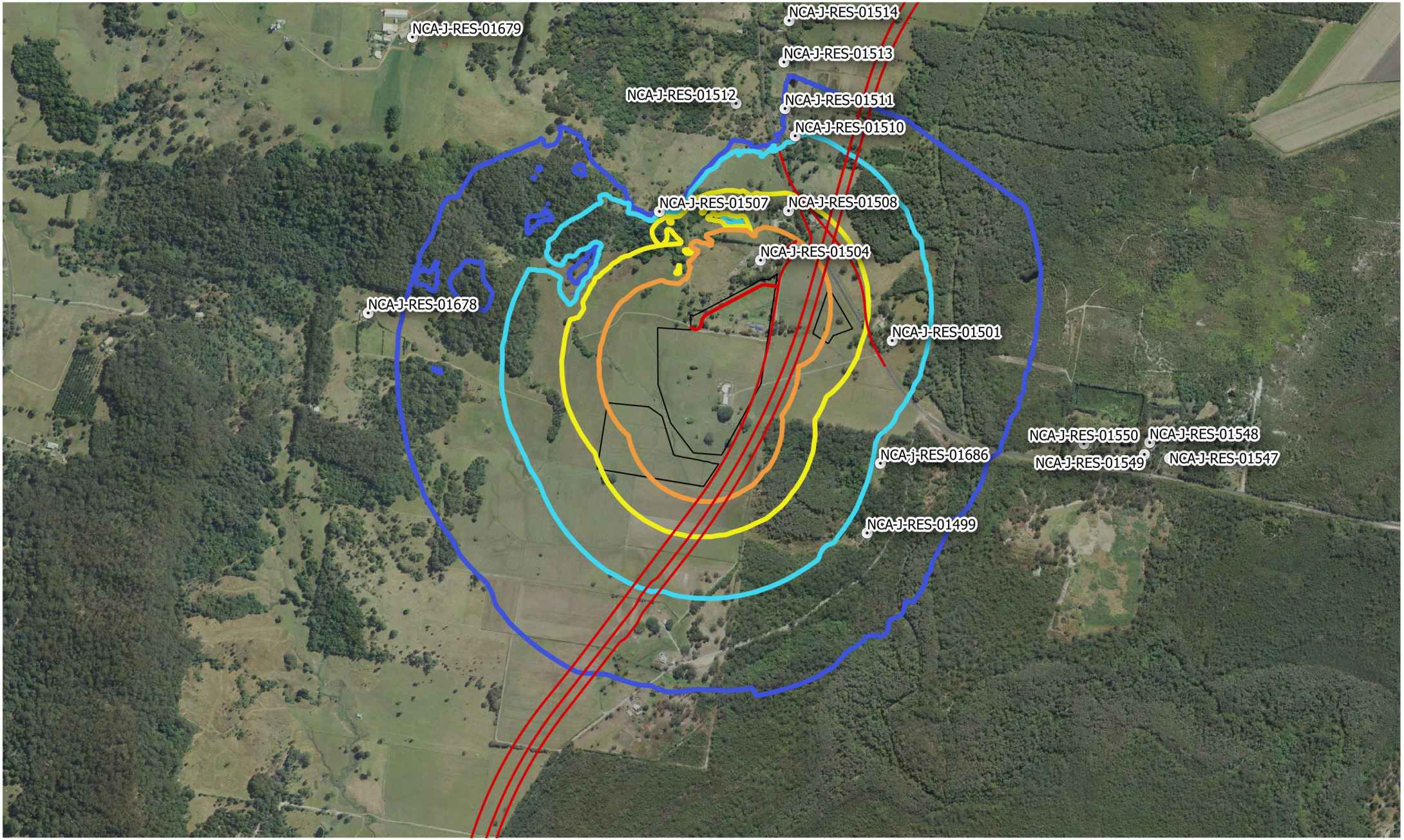
Predicted LAeq Noise Levels

45 dBA
50 dBA
55 dBA
60 dBA

Pacific Complete

Woolgoolga to Ballina Pacific Highway Upgrade (Sections 3 to 11)

Construction Noise Assessment
Scenario 13a – Stockpiling
Wardell Compound



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100 0 100 200 300 m

Mainline Works

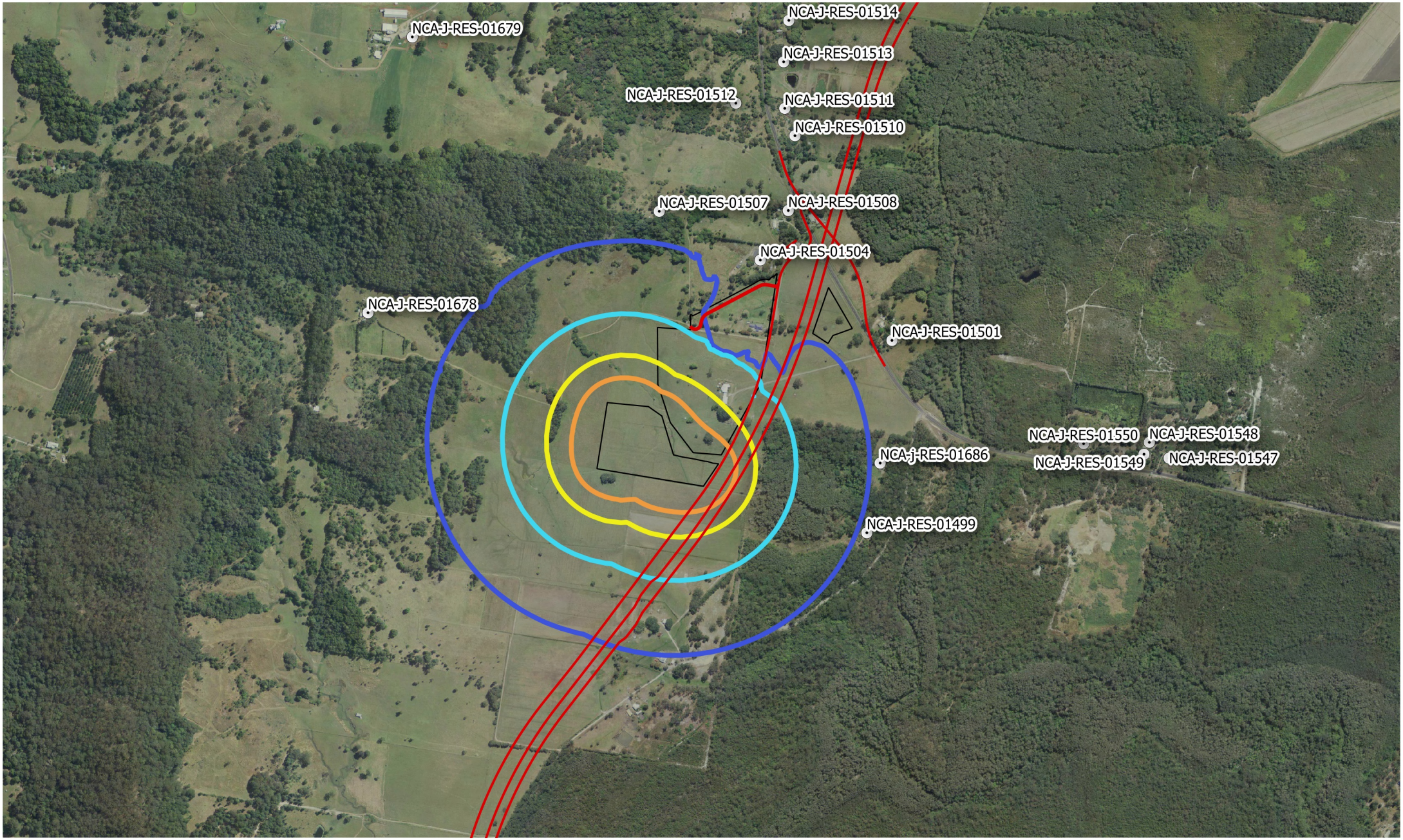
Predicted LAeq Noise Levels

45 dBA
50 dBA
55 dBA
60 dBA

Pacific Complete

Woolgoolga to Ballina Pacific Highway Upgrade (Sections 3 to 11)

Construction Noise Assessment
Scenario 5a – Crushing and Screening
Wardell Road Borrow Site



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100 0 100 200 300 m

Mainline Works

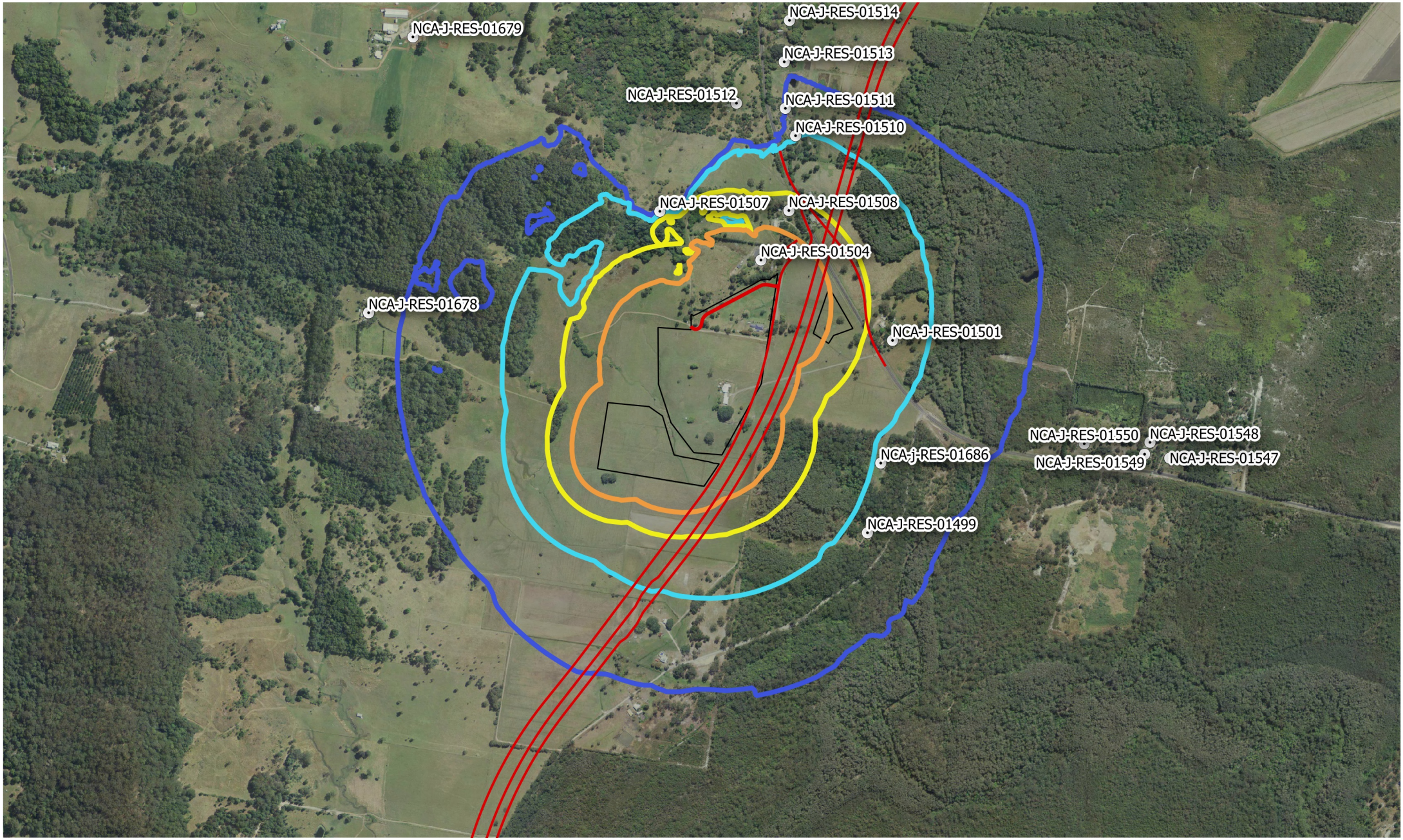
Predicted LAeq Noise Levels

45 dBA
50 dBA
55 dBA
60 dBA

Pacific Complete

Woolgoolga to Ballina Pacific Highway Upgrade (Sections 3 to 11)

Construction Noise Assessment
Scenario 8a – Batch Plant Operations
Wardell Road Batch Plant



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100 0 100 200 300 m

Mainline Works

Predicted LAeq Noise Levels

45 dBA
50 dBA
55 dBA
60 dBA

Pacific Complete

Woolgoolga to Ballina Pacific Highway Upgrade (Sections 3 to 11)

Construction Noise Assessment
Borrow Pit and Batch Plant
Cumulative Noise Impact
Wardell Road Facilities

Predicted Noise Level Receiver Summary

Predicted Receiver Level Summary

Receiver ID	Receiver Type	NML (DAY)	Highest Predicted Scenario Nosie Level (Worst Case LAeq (15 minute) and Corresponding Exceedance of daytime NML									
			Site Setup / Decommission	Exceedance of Daytime NML	Borrow Site Operations	Exceedance of Daytime NML	Batch Plant Operations	Exceedance of Daytime NML	Compound Operations	Exceedance of Daytime NML	Cumulative Scenario	Exceedance of Daytime NML
NCA-J-COM-01486	Com	75	29	-	34	-	33	-	24	-	37	-
NCA-J-RES-01496	Res	46	31	-	37	-	35	-	25	-	39	-
NCA-J-RES-01499	Res	46	43	-	49	3	45	-	39	-	50	4
NCA-J-RES-01501	Res	46	51	5	52	6	43	-	52	6	53	7
NCA-J-RES-01504	Res	46	58	12	68	22	30	-	48	2	68	22
NCA-J-RES-01507	Res	46	38	-	45	-	39	-	34	-	46	-
NCA-J-RES-01508	Res	46	48	2	57	11	27	-	46	-	57	11
NCA-J-RES-01510	Res	46	42	-	49	3	25	-	41	-	49	3
NCA-J-RES-01511	Res	46	39	-	45	-	22	-	39	-	45	-
NCA-J-RES-01512	Res	46	35	-	33	-	0	-	37	-	34	-
NCA-J-RES-01513	Res	46	37	-	43	-	21	-	37	-	43	-
NCA-J-RES-01514	Res	46	36	-	42	-	21	-	36	-	42	-
NCA-J-RES-01516	Res	46	33	-	39	-	0	-	33	-	39	-
NCA-J-RES-01520	Res	46	32	-	37	-	0	-	32	-	37	-
NCA-J-RES-01546	Res	46	28	-	31	-	0	-	28	-	31	-
NCA-J-RES-01547	Res	46	35	-	40	-	35	-	34	-	41	-
NCA-J-RES-01548	Res	46	36	-	41	-	36	-	34	-	42	-
NCA-J-RES-01549	Res	46	36	-	41	-	36	-	34	-	42	-
NCA-J-RES-01550	Res	46	37	-	43	-	37	-	36	-	44	-
NCA-J-RES-01679	Res	46	0	-	23	-	0	-	0	-	25	-
NCA-J-RES-01678	Res	46	38	-	44	-	41	-	31	-	46	-
NCA-J-RES-01686	Res	46	44	-	49	3	45	-	43	-	51	5

Appendix D Community Consultation Letter

Australian Government

BUILDING OUR FUTURE

NSW MAKING IT HAPPEN

October 2016

Building and working at the Wardell Road site compound, Lumleys Hill batch plant and borrow site.

The Australian and NSW governments are jointly funding the $4.36 billion Woolgoolga to Ballina Pacific Highway upgrade. As part of the project, we are seeking your feedback on building and working at a site compound at Wardell Road, and at a batch plant and borrow site at Lumleys Hill.

To build the Woolgoolga to Ballina upgrade, we will be establishing batch plants and site compounds along the 155 kilometre route. These site compounds will have different functions and will support the building of the road upgrade. We will be working at these sites throughout the project's development.

We are proposing to establish a compound, concrete batch plant and earthworks borrow site at a location within the project boundary accessed via Wardell Road and Hillside Lane. This site was assessed as part of the Environmental Impact Statement (EIS) in 2012 and the 2013 Submissions/Preferred Infrastructure Report (SPIR) and is as highlighted on the included map. If approved, we expect to start building at this site in February 2017, with the compound operational by April 2017. The site is proposed to be operational for about three years and will be rehabilitated after completion, in line with the project's conditions of approval.

Site compound and batch plant

The site compound and batch plant involves building:

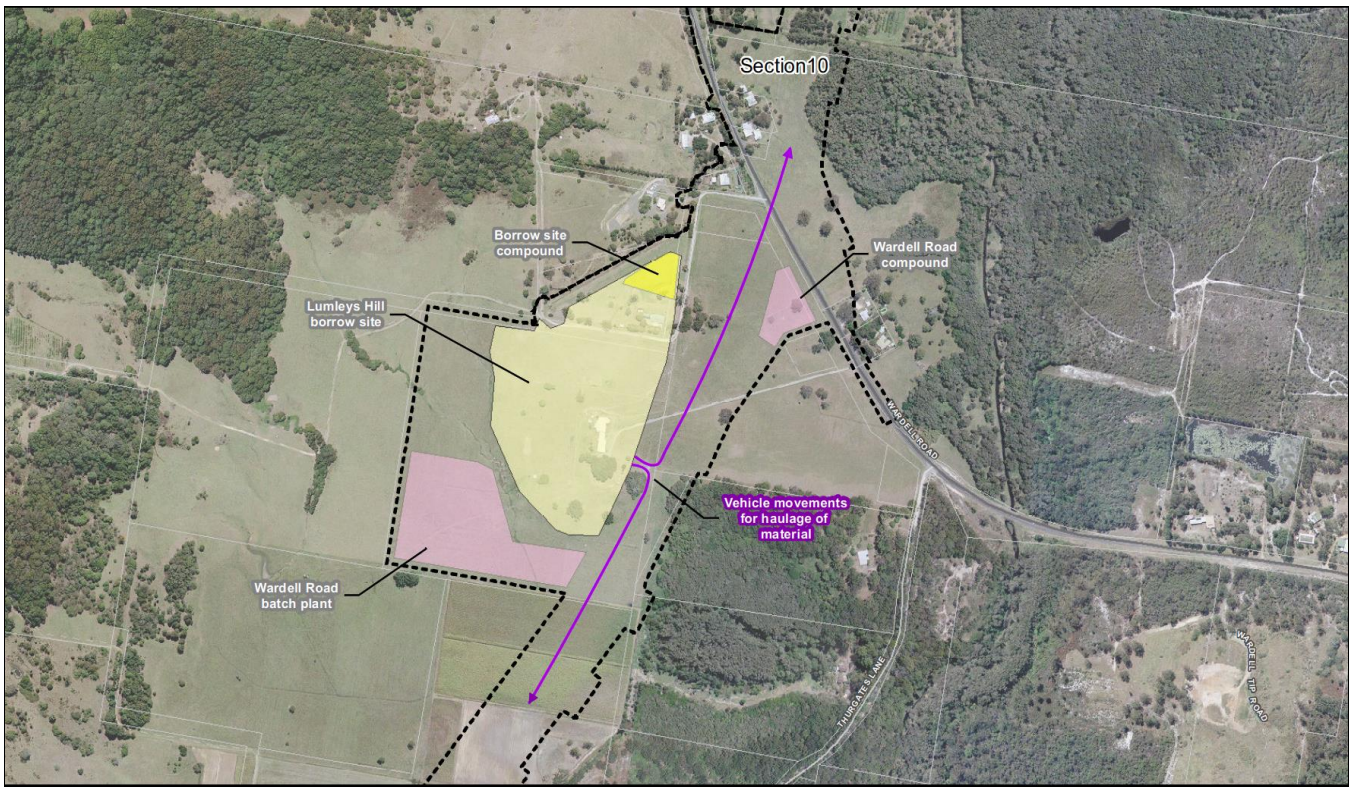
- Temporary offices with amenities for staff
- Staff car park
- Truck parking area
- Storage and stockpiling areas for equipment and materials
- Batch plant for making concrete

What to expect

Key activities:

- Establishment – installing environmental controls, minor vegetation clearing, constructing the compound and associated carpark, operating plant and equipment
- Operation – staff parking, operational machinery, material and equipment storage, stockpiling, delivery of materials, batching concrete, transporting concrete for use on the highway
- Demobilisation – removing buildings, car park and stockpiles, reinstating the area, landscaping and rehabilitation.

Proposed Wardell Road compound, batch plant and borrow site



Borrow site

We are proposing to use Lumleys Hill borrow site, located next to the project route within the project boundary, to provide materials to build the new alignment. This would reduce travel distances and the number of trucks on the existing highway and local roads, improving safety and efficiency for all road users.

It is proposed to remove about 750,000 cubic meters of material. This will be transported within the project boundary directly from the site.

To prepare for work we propose to:

- Remove isolated pockets of vegetation
- Establish site access
- Install environmental controls and site security, including fencing
- Install offices and staff amenities
- Install plant and equipment.

Operational activities would involve:

- Operating machines and equipment within the site
- Excavating
- Crushing and screening material
- Stockpiling material
- Hauling extracted material from the site along the construction corridor

How will the work affect you?

Excavation will be used to extract the material from Lumleys Hill. Controlled rock blasting may be used at the site. We will manage any noise and dust ensuring minimal impact to the community. This includes using mitigation measures like water sprays to increase the moisture content of the material, making sure equipment is serviced and maintained, placing stockpiled materials in mounds to help reduce noise as well as conducting noise monitoring in accordance with the projects approved noise management plan.

Koala management measures

As part of the project's conditions of approval, we will implement measures outlined in the Koala Management Plan, including:

- We will install temporary fencing around the site compound, batch plant and borrow site to prevent koalas entering the work area
- Speed limits on local roads will be temporarily reduced
- All workers will be inducted and trained in koala awareness and management
- Koala awareness signs will be placed on Wardell Road and within the alignment
- Predator control activities targeting wild dogs, foxes and cats
- An ecologist with suitable experience in koala handling will be available during pre-clearing surveys, clearing activities and throughout the work.

Construction traffic

Workers will use Wardell Road to access the site. As the project progresses vehicles will also travel along the construction corridor. There will be up to 300 heavy vehicle movements and up to 100 light vehicle movements per day at peak on Wardell Road for the project.

* Expected vehicle movements (one vehicle travelling in and out of the site is two movements)

Work hours

In areas where residents live more than 200 metres from the project boundary, extended work hours from 6am to 7pm weekdays may be permitted. We will notify nearby residents at least five working days in advance of any activities scheduled outside of these working hours.

How is noise and vibration managed?

There will be some noise when we are building and working at this site. To manage the impact of noise we will wherever possible:

- Establish site entry and exit points away from residential properties
- Service and maintain plant and equipment so they are in good working order
- Where practicable noise generating plant and equipment will be directed away from residential properties
- Only schedule high noise activities:
    - 8am to 5pm Monday to Friday
    - Saturdays between 8am and 1pm
    - for no longer than three hours at a time with a minimum respite time of one hour between blocks of work.
- Minimise the number of plant and equipment operating at the same time
- Monitor noise
- Use natural features and site structures to provide noise shielding.

How is traffic managed?

To manage the increase in project vehicles in the area we will wherever possible:

- Use the construction corridor for heavy vehicle movements
- Reduce the speed limit on Wardell Road at site access points for the duration of the work
- Maintain the condition of Wardell Road for the duration of the project

Next steps

We are carrying out an assessment of the proposed compound, batch plant site and borrow site against the requirements of our project approval. As part of this process we are seeking your feedback on the use of the site. You can attend a 'drop-in' session and/or use the feedback form attached to give us your feedback.

'Drop-in' session

A 'drop-in' session is being held at Wardell Hall, 49 Richmond St, Wardell**.** If you wish to:

- speak with the project team to find out more about the compound, batch plant and borrow site
- share information on wild dog or feral animal movements in the area, or register for access to your property for predator control work

please 'drop-in' **any time between 3pm and 7pm on Wednesday, 02 November 2016.**

Please fill in the feedback form attached and return it to us by **18th November 2016**.

You can return it by:

Email: W2B@pacificcomplete.com.au

Post: Please use the supplied reply paid envelope.

Alternatively, you can provide your feedback over the phone by calling **1800 778 900**.

What happens once I provide feedback?

Your feedback will help Roads and Maritime reduce the impacts of work on the community. The project team will consider your feedback and prepare responses in our assessment. You will be provided with information about the way we plan to reduce the impacts based on your feedback.

For more information

For more information about the project, please contact us on 1800 778 900, email W2B@pacificcomplete.com.au or visit the project website at www.rms.nsw.gov.au/W2B

If you need help understanding this information, please contact the Translating and Interpreting Service on 131 450 and ask them to call us on 1800 778 900.

Feedback form

Woolgoolga to Ballina batch plant site and compound site at Wardell Road

We are seeking your feedback on the proposed compound site, batch plant and borrow site at Wardell Road.

Your feedback will help us manage any specific concerns you may have during the building and operation of the compound site.

Please complete the form below and return it to us by:

Email: W2B@pacificcomplete.com.au

Post: Please use the supplied reply paid envelope or mail to Communications, PO Box 546, Grafton NSW 2460.

Name:	
Address	
Phone:	
Email:	
Signature	
Date	

Do you have any objections or comments on the proposed use of:

- A compound site at Wardell Road?

☐ Yes (if yes, please outline your comments below)

☐ No

- A batch plant at Wardell Road?

☐ Yes (if yes, please outline your comments below)

☐ No

Feedback form

Woolgoolga to Ballina batch plant site and compound site at Wardell Road

- A borrow site at Lumleys Hill?

☐ Yes (if yes, please outline your comments below)

☐ No

Would you like the project team to contact you to discuss your feedback?

☐ Yes

☐ No

Key issues raised will be included in the sites assessment. If you require further information, please contact the community team on 1800 778 900 (press 1) or email W2B@pacificcomplete.com.au

Thank you.

NSW GOVERNMENT Transport Roads & Maritime Services

Appendix E Community Consultation Report

Lumleys Hill, Wardell
Site compound, batch plant and borrow site

Community Consultation Report

March 2017

Roads & Maritime

Executive summary

This report provides a summary of the Woolgoolga to Ballina Pacific Highway upgrade team's community and stakeholder consultation for the proposed site compound (office and auxiliary services), batch plant (concrete) and a borrow site (source of general earth fill). The proposal is part of the $4.36 billion Woolgoolga to Ballina Pacific Highway upgrade, which the Australian and NSW governments are funding.

This site was assessed as part of the project's Environmental Impact Statement (EIS) in 2012 and the Submission/Preferred Infrastructure Report (SPIR) in 2013. The ancillary facility site was identified within the SPIR's Ancillary descriptions and impact statement which was produced as a Condition of Approval for the Woolgoolga to Ballina Pacific Highway upgrade.

The proposal

The Woolgoolga to Ballina team proposed to operate a site compound, batch plant and borrow site within the project boundary at Lumleys Hill, in Wardell with access via Wardell Road and Hillside Lane for about three years to support building the road in this area. The site compound involves building:

- temporary offices with amenities for staff including car parking
- storage and stockpiling areas for equipment and materials.

The batch plant involves building:

- temporary offices with amenities for staff including car parking
- truck parking area
- storage and stockpiling areas for equipment and materials
- installing machinery and equipment.

The borrow site involves:

- removing isolated pockets of vegetation
- establishing site access
- building temporary offices with amenities for staff including car parking
- installing environmental controls, fencing and site security
- installing offices and staff amenities
- installing plant and equipment
- storage and stockpiling areas for equipment and materials.

We are proposing to use Lumleys Hill as a borrow site to provide about 750,000 cubic metres of earth and rock to build the new road. The site is located next to the project route and within the project boundary. This work will involve mechanical excavation and crushing and screening of material, then hauling it from the site along the construction corridor. There is a possibly that controlled blasting may be required and if so, further consultation will be carried out. To prepare for work to start we propose to:

- remove isolated pockets of vegetation
- establish site access
- build temporary offices with amenities for staff including car parking
- install environmental controls, fencing and site security
- install offices and staff amenities

- install machinery and equipment
- create storage and stockpiling areas for equipment and materials.

The Woolgoolga to Ballina team invited feedback on this proposal from Thursday 20 October to Friday 18 November 2016, including an information session at Wardell on Wednesday 2 November. We received comments from 25 people and two organisations, with four people supporting the proposal, 20 against it and four neutral. Key matters included:

- dust
- noise
- health
- water quality
- koalas.

The project team was also invited to a meeting with some residents in the Meerschaum Vale area, who raised their concerns and received more information about the proposals and the project. This meeting was held 25 February 2017. The matters raised are addressed in the response section of this report.

We thank everyone who provided comments and the community and stakeholders for considering the proposal.

The outcome

The Woolgoolga to Ballina team has considered feedback from the community and stakeholders. The approved *Construction Environmental Management Plan* and its sub-plans provide information on many of the measures that will be put in place for the operation of these three sites to minimise impact on nearby property owners, residents and the wider community. Additionally, the *Koala Management Plan* and *Ballina Koala Plan* provide clear direction about the measures Roads and Maritime is taking to protect and manage this important native animal as we build the Woolgoolga to Ballina Pacific Highway upgrade.

The Woolgoolga to Ballina team will seek to build a site compound, batch plant and borrow site, however we will not be using Hillside Lane for access as part of this work.

The Woolgoolga to Ballina team has decided not to build the batch plant for the initial phase of construction. Concrete for this work will be provided from an off-site location and will be transported to the site via trucks. Due to the requirement for concrete operations to be in close proximity to the work to provide about 1000 cubic metres per day for the concrete paving operation, a batch plant will be needed at this location. This means the project team will seek to operate a batch plant at this location from mid-2018 to mid-2019 to provide concrete for road pavement. The plant will take about six months to build starting in early 2018 and also six months to demobilise in late-2019.

The Woolgoolga to Ballina team will continue to work with the community and stakeholders to mitigate and manage impacts of the work it needs to carry out to build the Woolgoolga to Ballina Pacific Highway upgrade.

Next steps

The Woolgoolga to Ballina team will be producing management plans for the site compound, batch plant and borrow site. These will each be submitted to the Department of Planning and Environment for approval. They will be reviewed against the Minister's Conditions of Approval to determine compliance.

The Woolgoolga to Ballina team expects the site compound and the borrow site to be operational by mid-2017, weather permitting.

The community and stakeholders will be notified in advance of this construction work. We will continue to keep the community and stakeholders informed as the project progresses.

Contents

Figures and tables

1.0 Introduction

1.1 Background

To enable the construction of the Woolgoolga to Ballina Pacific Highway upgrade, Roads and Maritime Services needs several site compounds and concrete batch plant facilities along the 155 kilometre route. For the northern section of the upgrade, we need a site compound (office and auxiliary services) and a separate batch plant (concrete). Additionally, we need a borrow site (source of general earth fill) in this area for the project. The site is at Lumleys Hill, in Wardell.

This site was assessed as part of the project's Environmental Impact Statement (EIS) in 2012 and the Submission/Preferred Infrastructure Report (SPIR) in 2013. The ancillary facility site was identified within the SPIR's Ancillary descriptions and impact statement which was produced as a Condition of Approval for the Woolgoolga to Ballina Pacific Highway upgrade.

1.2 The proposal

The Woolgoolga to Ballina team is proposing to operate a site compound, batch plant and borrow site within the project boundary at Lumleys Hill, in Wardell with access via Wardell Road and Hillside Lane for about three years to support building the road in this area.

The proposed site compound involves building:

- temporary offices with amenities for staff including car parking
- storage and stockpiling areas for equipment and materials.

The proposed batch plant involves building:

- temporary offices with amenities for staff including car parking
- truck parking area
- storage and stockpiling areas for equipment and materials
- installing plant and equipment.

The proposed borrow site involves:

- removing isolated pockets of vegetation
- establishing site access
- building temporary offices with amenities for staff including car parking
- installing environmental controls, fencing and site security
- installing offices and staff amenities
- installing plant and equipment
- storage and stockpiling areas for equipment and materials.

We are proposing to use Lumleys Hill as a borrow site to provide about 750,000 cubic metres of earth and rock to build the new road. The site is located next to the project route and within the project boundary. This work will involve mechanical excavation and possibly blasting and crushing and screening of material, then hauling it from the site along the construction corridor. To prepare for work we propose to:

- remove isolated pockets of vegetation
- establish site access
- install environmental controls and site security, including fencing

- install offices and staff amenities
- install plant and equipment.

How will the work affect you?

We will manage noise and dust ensuring minimal impact to the community. This involves using mitigation measures including water spraying to increase the moisture content of the material, ensuring equipment is serviced and maintained, placing stockpiled materials in mounds to help reduce noise as well as conducting noise and dust monitoring in accordance with the projects approved plans.

Key activities at the site will include:

- establishment – building the compound and associated parking areas, installing environmental controls, machinery and equipment and minor vegetation clearing
- operation – staff and truck parking, operational machinery, material and equipment storage, stockpiling, delivery of materials, batching concrete, transporting concrete for use on the highway
- demobilisation – removing building, parking areas and stockpiles, revegetating the area and landscaping.

We have provided a map to explain our proposal.

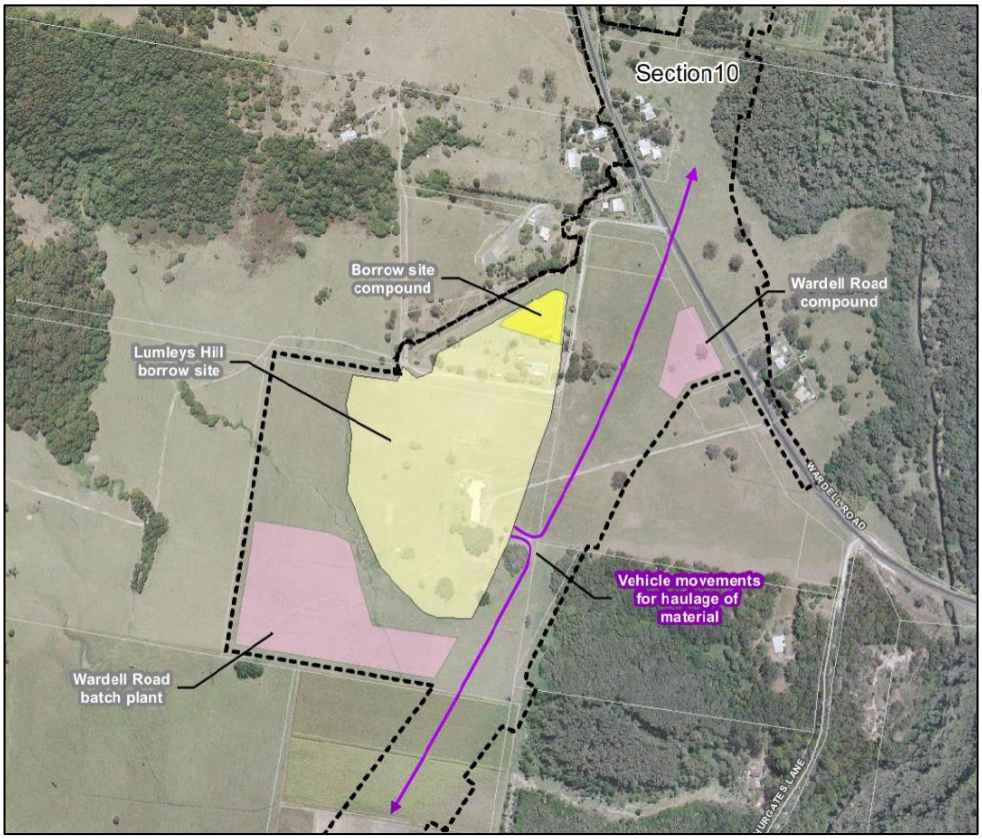


Figure 1 – The proposed site at Lumleys Hill for the site compound, batch plant and borrow site.

2.0 Consultation approach

2.1 Consultation objectives

We consulted with the community and stakeholders on the proposal to:

- seek comment, feedback, ideas and suggestions for consideration in the decision making
- build a database of interested community members which the project team could continue to engage throughout the project.

2.2 How consultation was done

The community and stakeholders were encouraged to provide feedback via an information session, mail, email or phone. Consultation was carried out from Thursday 20 October to Friday 18 November 2016, including an information session at Wardell on Wednesday 2 November 2016.

About 400 letters were delivered to local residents and businesses and stakeholders inviting feedback on the proposal (Appendix A). Copies were also provided to the NSW Member of Parliament for Ballina, Ballina Shire Council and emergency services.

3.0 Consultation summary

3.1 Overview

We received comments from 28 people and two organisations, with four people supporting the proposal, 20 against it and four neutral. The people and organisations raised 27 different matters with 21 related to the proposal. Many people provided comments on more than one topic in their feedback. Key matters included:

- dust
- noise
- health
- water quality
- koalas.

The project team was also invited to a meeting with some residents in the Meerschaum Vale area, who raised their concerns and received more information about the proposals and the project. This meeting was held 25 February 2017.

3.2 Feedback and responses

We have provided responses to all feedback received on this proposal. The responses are provided directly to the person who commented as well as being summarised in this report, which will be made available to the public. All comments have been considered to assist us in the decision making on this proposal.

A number of responses refer to the project's Construction Environmental Management Plan. Relevant appendices include:

- Construction Traffic and Access Management Plan (Appendix B1)
- Construction Flora and Fauna Management Plan (Appendix B2)
- Construction Soil and Water Quality Management Plan (Appendix B3)
- Construction Noise and Vibration Management Plan (Appendix B4)
- Construction Heritage Management Plan (Appendix B5)
- Construction Air Quality Management Plan (Appendix B6)
- Construction Waste, Resources and Energy Management Plan (Appendix B7)
- Construction Contaminated Land Management Plan (Appendix B8)
- Ancillary Facilities Management Plan (Appendix B9).

These plans are available on the Roads and Maritime website at http://www.rms.nsw.gov.au/projects/northern-nsw/woolgoolga-to-ballina/project-documents.html#ConstructionEnvironmentalManagementPlans(CEMPs)

Additional plans referenced in our responses to community and stakeholder comments include:

- Koala Management Plan
- Ballina Koala Plan
- Communications and Stakeholder Engagement Strategy.

These plans are available on the Roads and Maritime website at http://www.rms.nsw.gov.au/projects/northern-nsw/woolgoolga-to-ballina/index.html

Table 1 – Feedback Summary and The Woolgoolga to Ballina team Responses

Category	Matter raised	The Woolgoolga to Ballina team's response
Noise and vibration 15 comments	Impact on people and koalas Impact from borrow site Impact from operation of facilities and truck reversing beepers Impact from increased truck and car movements Impact on lifestyle – alternative would be to build a haul road rather than use Wardell Road Impact on lifestyle Has noise monitoring been undertaken and when and what mitigation measures are being implemented Request for additional information on noise monitoring, mitigation measures and management	Noise modelling was completed in September 2016 for the proposed facilities (the compound site, batch plant and borrow site). Modelling provides a conservative scenario for the site and is calculated based on what the maximum noise levels would be when all the equipment is operating on the entire site. The modelling has identified potential impacts above noise management levels for the area. Noise mitigation and management measures outlined in the approved *Construction Environmental Management Plan – Appendix B4 Construction Noise and Vibration Management Plan* would be implemented where appropriate to minimise and manage these impacts. The approved Koala Management Plan assessed and considered environmental impacts on Koalas including construction noise. The assessment determined that these impacts would be effectively managed through the implementation of reasonable and feasible controls as outlined in the approved *Construction Environmental Management Plan* and *Appendix B4 Construction Noise and Vibration Management Plan*. As an individual site the batch plant modelling did not return exceedances of the noise management levels during daytime construction hours. Operations of the compound (during stockpiling activities) and the borrow site are anticipated to exceed the noise management levels for the area. Noise exceedances are also expected due to cumulative impacts during operation of both the borrow site and batch plant. The sites will be managed in accordance with the approved *Construction Environmental Management Plan – Appendix B4 Construction Noise and Vibration Management Plan* and mitigation measures will be implemented to ensure that noise levels are minimised. These measures include, but are not limited to: • establish site entry and exit points away from residential properties • service and maintain plant and equipment so they are in good working order • where practicable noise generating plant and equipment will be directed away from residential properties

Category	Matter raised	The Woolgoolga to Ballina team's response
Noise and vibration continued		• only schedule high noise activities between Mondays and Fridays from 8am to 5pm and on Saturdays from 8am to 1pm for no longer than three hours at a time with a minimum respite time of one hour between blocks of work • minimise the number of plant and equipment operating at the same time • monitor noise • use natural features and site structures to provide noise shielding. The proposed batch plant is located more than 400 metres from the nearest resident. In addition to the above measures, machinery used to make concrete within the batch plant site will be located as far as possible from nearby residents. The layout of the batch plant, compound and borrow site will aim to arrange structures to decrease noise and vibration for nearby residents as much as possible. Noise background levels for the area were determined as part of the *Construction Environmental Management Plan – Appendix B4 Construction Noise and Vibration Management Plan*. Noise monitors will be set up at identified sensitive receivers before construction starts to confirm existing background levels. Ongoing monitoring will be carried out to ensure compliance with *Construction Environmental Management Plan – Appendix B4 Construction Noise and Vibration Management Plan* and the noise management levels for Meerschaum Vale and Wardell. The Woolgoolga to Ballina team provides the Environment Protection Authority with a monthly report which has results of water quality, noise and dust monitoring carried out for the project.

Category	Matter raised	The Woolgoolga to Ballina team's response
Health 12 comments	Impact on people's health - it will cause illness and death	The proposed batch plant is located more than 400 metres from the nearest resident. The batch plant, compound and borrow site layouts have been designed to minimise potential dust impacts for nearby residents as much as possible. The Woolgoolga to Ballina team acknowledges that emissions of atmospheric particulates – particularly the finer particles such as PM10 and PM2.5 – should be reduced as far as practical, and the project team will be implementing a range of dust suppression measures during the works in line with the approved *Construction Environmental Management* Plan – Appendix B6 Construction Air Quality Management Plan. Cement powder at batch plants is required to be held and transported in a sealed containment system as exposure to moisture will cause it to harden prematurely. To exclude moisture and mitigate the release of concrete dust the below measures will be implemented: • deliveries being made in enclosed road tankers with the powder fluidised and pumped from there through closed pipes • cement powder being stored in enclosed vertical silos to protect against contamination by moisture • silos having overfill protection and dust filters • transfer of concrete from silos to agitator bowl trucks ensuring dust generation is suppressed and mitigated. Roads and Maritime has an approved *Construction Environmental Management Plan – Appendix B6 Construction Air Quality Management Plan* for the project which details all measures that will be implemented where possible to manage dust and the community and stakeholder expectations in this area. Specific measures outlined in the plan relating to the operation of the batch plant include: • water carts will be used to suppress dust around batch plants (AQ26) • batch plants will be swept and cleaned to keep them in a tidy state to prevent the build-up of dust, similarly with storage of potentially dust generating material (AQ27)
	Impact on health including asthma and related conditions	
	Impact on health of residents overarching and particularly from the batch plant and borrow site	
	Accumulated impacts from vehicles, equipment, borrow site and batch plant operations, tree clearing, possibly blasting are unacceptable	
	Dust from the batch plant containing chemicals and having a negative impact on people's health	
	Overarching impact of project on the health of people and koalas in the area	
	Concrete dust contains silica which causes silicosis and lung cancer and hexavalent chromium which causes skin and respiratory allergies	
	Activities are impacting on people's mental health	

Category	Matter raised	The Woolgoolga to Ballina team's response
Health continued		• high dust emitting structures or processors in batch plants, for example conveyer belts, will have water spraying systems installed to suppress dust (AQ28) • concrete batch plants to be fitted with dust filters or similar to minimise air quality impacts from batching operations (AQ29). Other air quality management measures outlined in the Plan will also be implemented at the site. All proposed water sources for dust suppression require due diligence water testing determining if the water quality is suitable for use under the project management plans and Environmental Protection License. We understand that exposure to silica in construction materials may be considered an occupational hazard for those who work closely with these materials on a daily basis over a long period of time. Our safety management plans and safe work method statements seek to limit workers' exposure to silica as part of our regular work. To our knowledge, the World Health Organisation has not undertaken general exposure studies relating to silica due to the varied aspects of the natural occurrence and individual's different health conditions. The Woolgoolga to Ballina team take comments about mental health seriously. If members of the public are suffering from mental health problems then they should seek help from an appropriate health specialist or service. The Woolgoolga to Ballina team may on a case-by-case basis provide, if appropriate, access to a specified free mental health service if community members feel they need support due to the impact of the project.
Dust 11 comments	Impact on rain water tanks	The proposed batch plant is located more than 400 metres from the nearest resident. The batch plant, compound and borrow site layouts will be arrange to minimise dust for nearby residents as much as possible. The Woolgoolga to Ballina Pacific Highway upgrade team is committed to minimising, mitigating and managing dust through the construction of this project. Project dust impacts that have been considered include, but are not limited to, wind-blown dust, traffic-generated dust, the haulage of material on roads and dust generated through the operation of plant and machinery. All activities which take place within the proposed facilities will be managed to minimise dust.
	Impact on people's lifestyles and health	
	Request for additional information on dust monitoring, mitigation measures and management	

Category	Matter raised	The Woolgoolga to Ballina team's response
Dust continued	Dust and any other particulate matter from the facilities getting into and impacting rain water tanks which are the drinking water for many residents	Roads and Maritime has an approved *Construction Environmental Management Plan – Appendix B6 Construction Air Quality Management Plan* for the project which details all measures that will be implemented where possible to manage dust and the community and stakeholder expectations in this area. Specific measures outlined in the plan relating to the operation of the batch plant include: • water carts will be used to suppress dust around batch plants (AQ26) • batch plants will be swept and cleaned to keep them in a tidy state to prevent the build-up of dust, similarly with storage of potentially dust generating material (AQ27) • high dust emitting structures or processors in batch plants, for example conveyer belts, will have water spraying systems installed to suppress dust (AQ28) • concrete batch plants to be fitted with dust filters or similar to minimise air quality impacts from batching operations (AQ29). Other air quality management measures outlined in the Plan will also be implemented at the site. Ongoing monitoring will be carried out in accordance with the approved *Construction Environmental Management Plan – Appendix B6 Construction Air Quality Management Plan*. Dust monitors will be installed and samples analysed using the dust deposition gauge procedures (part of Appendix B of the Plan) which was prepared in accordance with the Australian Standards for sampling and analysis of ambient air. The Woolgoolga to Ballina team provides the Environment Protection Authority with a monthly report that contains results of water quality, noise and dust monitoring carried out for the project.
	Concrete dust contaminating rain water tanks and drinking water	

Category	Matter raised	The Woolgoolga to Ballina team's response
Water 12 comments	Will there be any impact on the quality and quantity of ground water currently available	Roads and Maritime has an approved *Construction Environmental Management Plan – Appendix B3 Construction Soil and Water Quality Management Plan* which details the measures to be used to manage erosion, sediment control and runoff generated at the proposed facilities. Additionally, mitigation measures will be implemented at the facilities to prevent impacts to surface and ground water. A groundwater assessment was carried out as part of the management plan for the proposed borrow site. The assessment concluded the proposed work would not have a meaningful impact on the groundwater levels, quality and on existing users in the area. Ongoing groundwater monitoring will be carried in accordance with our water quality monitoring program. Water used at the facilities will be sourced from the main water supply or brought in by truck. Bore water would only be used as a last resort. The Woolgoolga to Ballina Pacific Highway upgrade team may use water within the project footprint from Gibsons old quarry as a dust suppression agent along the project boundary provided that it meets water quality requirements outlined under the project Environmental Protection Licence.
	Impact on ground water of supply being taken from Gibsons old quarry and the Richmond River – find an alternative source	
	Impact of dust on rain water tanks which are the drinking water for many residents	
Koalas 9 comments	Impact on drinking water for koalas	All proposed water sources for dust suppression require due diligence water testing determining if the water quality is suitable for use under the project management plans and Environmental Protection License. The batch plant will operate in accordance with the project's Environment Protection Licence which provides guidelines for the discharged of water from the project into nearby waterways. Any water to be discharged will be tested to ensure it meets these guidelines. Ongoing monitoring will be undertaken in accordance with the *Construction Environmental Management Plan – Appendix B3 Construction Soil and Water Quality Management Plan.* The Woolgoolga to Ballina team provides the Environment Protection Authority with a monthly report which has results of water quality, noise and dust monitoring carried out for the project. A number of alternative locations were considered for the batch plant. The proposed site was selected because of its proximity to the construction corridor, absence of natural vegetation (including koala habitat and feed trees), distance from known koala habitat (occurring primarily between 400 metres and 500 metres southeast of the facility's boundary), absence of surface watercourses and flood immunity.
	Concrete dust contaminating rain water tanks and drinking water	
	Request for additional information on water quality monitoring, mitigation measures and management	
	Batch plant impact on koalas	
	Facilities' impact on koalas	
	Traffic impact on koalas	

Koalas continued	Request for further information about the project's koala management	The batch plant would be located in the southern-most area of the site to reduce impacts for local residents and is not located within or adjacent to an area of koala habitat or koala feed trees. To manage impacts on koalas, Roads and Maritime is implementing measures including: • speed limits on local roads will be temporarily reduced • all workers will be inducted and trained in koala awareness and management • koala awareness signs will be placed on Wardell Road and within the alignment • predator control activities targeting wild dogs, foxes and cats • an ecologist with suitable experience in koala handling will be available during pre-clearing surveys, clearing activities and throughout the work. The site will be managed in accordance with the approved *Koala Management Plan*, *Ballina Koala Plan* and the approved *Construction Environmental Management Plan*. Monitoring of nearby koala populations will be carried out in accordance with the approved *Koala Management Plan* and *Ballina Koala Plan* and the Conditions of Approval. Koala connectivity structures are being designed and will be built during the project. These structures will be opened to fauna once the permanent fauna fencing has been erected and construction in the area is complete. Planting of koala vegetation will be carried out in accordance with the *Koala Revegetation Strategy* (see *Koala Management Plan* Appendix I). This will provide additional habitat for koalas as well as links to connectivity structures. A designated koala connectivity structure will be installed on Wardell Road on the eastern side of Thurgates Lane directing fauna south of the construction footprint. Connectivity will also be maintained to known connectivity areas at Buckombil Mountain Road and Lumleys Lane. These measures will be implemented concurrently during construction. To help ensure the safety of the local koala population and meet the projects Koala Zero Harm target for construction. The proposed facility boundaries will be fenced to prevent wildlife from entering the site. The fencing features a special portion which prevents koalas from scaling and climbing over the top. Permanent koala fencing along Wardell Road will be installed in the coming months.

Category	Matter raised	The Woolgoolga to Ballina team's response
Traffic and safety 11 comments	Increase of truck and car movements	As part of the project, the Woolgoolga to Ballina Pacific Highway upgrade team is building a construction haulage road between McAndrews Lane, Pimlico and Back Channel roads, Bagotville. We expect to have this haulage road in place from November 2017. Once this is operational, the majority of construction-related traffic on Wardell Road and local roads will be project and contractor staff traveling to and from the site and deliveries. Traffic management for the proposed facilities and construction work will be implemented in accordance with the approved *Construction Environmental Management Plan – Appendix B1 Construction Traffic and Access Management Plan.* The Woolgoolga to Ballina team will investigate and consider any other required traffic management measures where the functionality of the road or intersection changes including, but not limited to, decreasing speed limits. Consultation will be carried out with local schools on traffic management, safety and impacts on school bus routes and stops. Ongoing consultation will also continue to occur with Ballina Shire Council on the use of local roads during the construction of the project. To help ensure the safety of the local koala population and meet The Woolgoolga to Ballina team's Koala Zero Harm target for construction, the proposed facility boundaries will be fenced to prevent wildlife from entering the site. The fencing features a special portion which prevents koalas from scaling and climbing over the top. Permanent koala fencing along Wardell Road will be installed in the coming months.
	Reduce speed limit on Wardell Road for safety considering increased traffic movements	
	Increased traffic impact on safety of people	
	Impact on koalas from increase of vehicle movements	

Category	Matter raised	The Woolgoolga to Ballina team's response
Alternative locations 7 comments	Request to build facilities on Whytes Lane where nobody lives in close proximity	A number of alternative locations were considered for the batch plant. The proposed site was selected because of its proximity to the construction corridor, absence of natural vegetation (including koala habitat and feed trees), distance from known koala habitat (occurring primarily between 400 metres and 500 metres southeast of the facility's boundary), absence of surface watercourses and flood immunity. The proposed batch plant is located more than 400 metres from the nearest resident. Due to the requirement for concrete operations to be in close proximity to the work to provide about 1000 cubic metres per day for the concrete paving operation, a batch plant will be needed at this location for about a year. We will operate it from mid-2018 to mid-2019 with building on site expected to start in early-2018 and demobilisation to finish in late-2019. Within the site boundaries, machinery used to make concrete will be located as far as possible from nearby residents. The layout of the site will aim to arrange structures to decrease noise and visual amenity impacts to nearby residents as much as possible. The location proposed for the batch plant was identified in the Environmental Impact Statement and the Submissions / Preferred Infrastructure Report (SPIR) for the project. The batch plant was identified within the SPIR's *Ancillary descriptions and impact statement* which was produced as a condition of approval for the Woolgoolga to Ballina Pacific Highway upgrade. The site was identified within that document as Section 10, Site 3a. No boundary or activity changes have been proposed for the facility since the SPIR was approved. The site is on Roads and Maritime land and within the project boundary and it will be rehabilitated after use of the site. A large amount of fill material is required to construct the new highway. The location of the borrow site was determined based on the type of material required for the project and the proximity to the construction work as this minimises traffic and safety impacts. The site is also located on and adjacent to predominately cleared agricultural land, minimising the need to clear native vegetation and fauna habitat. The location at Lumleys Hills was identified because it met these criteria. The quarries on Old Bagotville Road have also been identified for the extraction of material for use on the project. Consultation on these sites will be carried out shortly through a separate consultation process to this one. The site will be rehabilitated after use.
	Request an alternate site be found for the facilities – suggests Whytes Lane or old quarry on Bagotville Road	
	Borrow site and batching plant should not be built at Lumleys Hill because of noise impacts	
	Request an alternative site be found for batching plant	
	Site will impact koalas – request a different location is used	

Category	Matter raised	The Woolgoolga to Ballina team's response
Alternative locations continued		The Lumleys Hill borrow site was identified in the Environmental Impact Statement and the Submissions / Preferred Infrastructure Report (SPIR) for the project. No boundary or activity changes have been proposed for the facility since the SPIR was approved. The compound was not initially identified for use in the Environmental Impact Statement or the Submissions / Preferred Infrastructure Report (SPIR), however has been identified as an appropriate location for a compound because it is within the project boundary and proximity to the work occurring in the area. The project plan for Section 10 (Coolgardie Road to Richmond River) could not be progressed until the Conditions of Approval for managing the koala population had been met. The community was notified in September 2016 that the *Ballina Koala Plan* and *Koala Management Plan* had been approved, fulfilling the final Conditions of Approval for work to proceed in Section10. The site will be managed in accordance with the approved *Koala Management Plan*, *Ballina Koala Plan* and the approved *Construction Environmental Management Plan*.
Wildlife 6 comments	Facilities are not safe and healthy for wildlife Loss of native bird life Borrow site will destroy wildlife Impact of existing or current batch plants on wildlife	A number of alternative locations were considered for the batch plant. The proposed site was selected because of its proximity to the construction corridor, absence of natural vegetation (including koala habitat and feed trees), distance from known koala habitat (occurring primarily between 400 metres and 500 metres southeast of the facility's boundary), absence of surface watercourses and flood immunity. Due to the requirement for concrete operations to be in close proximity to the work to provide about 1000 cubic metres per day for the concrete paving operation, a batch plant will be needed at this location for about a year. We will operate it from mid-2018 to mid-2019 with building on site expected to start in early-2018 and demobilisation to finish in late-2019. The location of the borrow site was determined based on the type of material required for the project and the proximity to the construction work as this minimises traffic and safety impacts. The site is also located on and adjacent to predominately cleared agricultural land, minimising the need to clear native vegetation and fauna habitat. The site compound location was identified due to its location within the project boundary and proximity to the works occurring in the area.

Wildlife continued		The operation of the site compound, batch plant and borrow site are temporary while the new highway is being built. A decrease in the presence of wildlife is anticipated for the duration of these construction activities. The perimeter of the facility boundaries will be fenced to prevent koalas and other wildlife from entering. Roads and Maritime has an approved *Construction Environmental Management Plan – Appendix B2 Construction Flora and Fauna Management Plan*, *Construction Environmental Management Plan – Appendix B6 Construction Air Quality Management Plan* and *Construction Environmental Management Plan – Appendix B4 Construction Noise and Vibration Management Plan* which include measures to be used to manage impacts during construction and operation of the proposed facilities. The sites are on Roads and Maritime land and will be rehabilitated after use.
Amenity 6 comments	Impact our peaceful lifestyle and native surrounds Loss of peaceful surroundings Facilities' impact on rural lifestyle What compensation will there be for resident who can't cope with the impact of the facilities Impact on property values	A decrease in the visual and social amenities of the rural setting is anticipated for the duration of construction activities for the highway upgrade. The operation of the site compound, batch plant and borrow site are temporary and coincide only with the construction of the highway. Roads and Maritime has an approved *Construction Environmental Management Plan – Appendix B6 Construction Air Quality Management Plan* and *Construction Environmental Management Plan – Appendix B4 Construction Noise and Vibration Management Plan* which detail all the measures which can be used to manage the dust and noise generated during construction and operation of the facilities. Measures will be employed on site to minimise the visual amenity impact to nearby residents as much as possible. This may include, but not be limited to, orienting plant and buildings away from residents. The sites are on Roads and Maritime land and it will be rehabilitated after use. Any complaints will be dealt with in accordance with the *Communications and Stakeholder Engagement Strategy* for this project. Complaints received will be investigated and will include the review of monitoring results in the area. Additional measures will be implemented, if it identified that they are required.

Category	Matter raised	The Woolgoolga to Ballina team's response
Consultation 3 comments	Need for additional consultation and more information	The location proposed for the borrow site and batch plant was identified in the Environmental Impact Statement and the Submissions / Preferred Infrastructure Report (SPIR) for the project. The ancillary facility site was identified within the SPIR's *Ancillary descriptions and impact statement* which was produced as a condition of approval for the Woolgoolga to Ballina Pacific Highway upgrade. The site was identified within that document as Section 10, Site 3a. No boundary or activity changes have been proposed for the facility since the project approval (June 2014). The site is on land which Roads and Maritime has acquired and within the approved project boundary. The project plan for Section 10 (Coolgardie Road to Richmond River) could not be progressed until the Conditions of Approval for managing the koala population had been met. The community was notified in September 2016 that the *Ballina Koala Plan* and *Koala Management Plan* had been approved, fulfilling the final Conditions of Approval for work to proceed in Section10. Consultation on the proposed facilities was carried out from Thursday 20 October to Friday 18 November 2016 including an information session at Wardell on Wednesday 2 November 2016. About 400 letters were distributed throughout the Wardell and Meershaum Vale communities and to stakeholders. The information and process carried out for this consultation is consistent with that used for the same facilities throughout the Woolgoolga to Ballina Pacific Highway upgrade and aligns to Roads and Maritime's *Communications and Stakeholder Engagement Strategy* for this project.
	More information should have been provided in the consultation material	
	Concern the project team isn't aware of community issues	

Category	Matter raised	The Woolgoolga to Ballina team's response
Fuel and chemical storage on site 5 comments	What is the maximum and range of fuel to be stored at the site	The facilities will be offices, parking, storage and stockpiling concrete making operations, excavating and rock crushing and screening operation. Above ground fuel storage would be located at both the batch plant and borrow site. They will hold enough diesel fuel to operate site generators. The tanks will be self-contained and appropriately bunded. No bulk fuel will be stored within the site compound, batch plant and borrow site. Before establishing a batch plant, there are several risk management activities that will take place: • an occupational hygiene survey including baseline dust and noise monitoring • a workplace health and safety risk assessment for the plant operability including dust and noise management • chemical and fuel environmental risk assessment to determine appropriate management and mitigation measures. All fuel and chemical storage and labelling requirements will be carried out to meet Australian Standard 1940-2004, safety data sheets and the project's soil and water quality management plan.
	How long will the maximum amount be stored at the site	
	What will happen if there is an explosion or fire	
	What are the impacts of fuel and chemical storage at the site	
Operating hours 4 comments	Request that there be no out of hours work as it will increase disturbance of residents	The proposed facilities will be managed in accordance with the Conditions of Approval and the project Environment Protection License. The operating hours will be: • Monday to Friday from 7am to 6pm • Saturday from 8am to 5pm • Sunday and public holidays no work is carried out. Given the batch plant meets the criteria for a 'sparsely populated area' it will be operated under the augmented construction hours described in B16 which are: • Monday to Friday from 6am to 7pm • Saturday from 8am to 5pm • Sunday and public holidays no work is carried out.
	Impact of out of hours work on koalas	
	Does high noise activity from 8am include trucks, excavators, crushers and screens, loaders and blasting	
	Confirm operating hours of batch plant	

Category	Matter raised	The Woolgoolga to Ballina team's response
Aboriginal heritage 2 comments	Ongoing management of Aboriginal heritage	The proposed locations of the borrow site, batch plant and satellite compound were assessed for their Aboriginal heritage significance at the time of the Environmental Impact Statement. No artefacts or significant places were identified within these areas. The sites will be managed in accordance with the approved *Construction Environmental Management Plan – Appendix B5 Construction Heritage Management Plan* (including the Unexpected Finds Procedure Appendix B).
Operation of other batch plants 2 comments	Request for information on the location and operation of existing and previous batch plants and their effect on people and wildlife	Two borrow sites and a number of batch plants have been approved under the conditions of approval for the project. None of these are currently operational for the project (sections 3 to 11 of the Woolgoolga to Ballina Pacific Highway). Previously approved batch plants as well as the proposed batch plant near Wardell Road will be established in accordance with condition B73, which contains a number of locational criteria for ancillary facilities (including separation distances from residents). Any complaints will be dealt with in accordance with the *Communications and Stakeholder Engagement Strategy* for this project. Complaints received will be investigated and will include the review of monitoring results in the area. Additional measures will be implemented, if it identified that they are required.
Power 1 comment	How will the site be powered	The facilities will be offices, parking, storage and stockpiling concrete making operations, excavating and rock crushing and screening operation. Power is likely to be provided to the site compound, batch plant and borrow site through the use of generators.

Category	Matter raised	The Woolgoolga to Ballina team's response
Contaminated Sediment 2 comments	What is the plan for disposal of contaminated sediment from erosion control ponds	Roads and Maritime has an approved *Construction Environmental Management Plan – Appendix B3 Construction Soil and Water Quality Management Plan* which details the measures to be used to manage erosion, sediment control and runoff generated at the proposed facilities. Additionally, mitigation measures will be implemented at the facilities to prevent impacts to surface and ground water. Ongoing monitoring will be undertaken in accordance with the *Construction Environmental Management Plan – Appendix B3 Construction Soil and Water Quality Management Plan.* The Woolgoolga to Ballina Pacific Highway upgrade team does not expect to encounter contaminated soils during excavation work at the borrow site. If contaminated soil is encountered then it will be disposed of in accordance with the approved *Construction Environmental Management Plan – Appendix B7 Construction Waste, Resources and Energy Management Plan* and the *Construction Environmental Management Plan – Appendix B8 Construction Contaminated Land Management Plan*. Both plans contain protocols for the handling, stockpiling and disposal of contaminated soils and require disposal at a suitably licensed waste facility. Ongoing auditing is also required to ensure compliance with the management plans and suitability of the management measures proposed. The Lumley's Hill area will be rehabilitated in accordance with the approved *Ballina Koala Plan*.
Compound lighting 2 comments	Will compound lighting be on at night Compound lighting impact on koalas	The facilities will include offices, parking, storage and stockpiling concrete making operations, excavating and rock crushing and screening operation. They will require lighting for use and security. Given the need for security lighting at night, there is the potential for light spill from the compound during its operation. Lights within the compound would be directional and shielded to minimise the potential for light spill. Lighting within the compound would be designed and installed in accordance with *Australian Standard – Control of the obtrusive effects of outdoor lighting (AS 4282 – 1997)* and management measures presented in the approved *Construction Environmental Management Plan* and sub-plans.

Category	Matter raised	The Woolgoolga to Ballina team's response
Blasting 1 comment	Impact on residents	A Blast Management Plan will be implemented for the site to manage all blasting activities at the borrow site. The plan will include all safety measures to be implemented on site before blasting activities are carried out. If required, blasting activities will be carried out during normal operating hours and nearby residents will be notified in advance of the activities.
Low noise pavement Resident meeting	Request for low noise pavement on the new highway in section between Wardell and Coolgardie	The matter was raised during consultation and also at a meeting with some residents at Meerschaum Vale attended by the project team 25 February 2017. Subsequent to this meeting, the Woolgoolga to Ballina team committed to review the extent of low noise wearing surface on this section of the highway. The project team will continue to keep the community informed.
Outside the scope of this proposal 8 comments	Resident thinks their property should have been acquired for the project	These matters are outside the scope of this proposal. The Woolgoolga to Ballina Pacific Highway upgrade team has responded directly to residents and organisations about these matters and will continue to work with them on these where required.
	Resident wants to know the distance between the road and their property	
	Resident wants to know the height of the new highway behind their house	
	More information on recruitment of Aboriginal people on the project	
	A new footpath along Carlisle Street for safety	
	Economic benefit of the project to communities	
	Project will decrease value of property	

4.0 Decision

We thank those who provided comments and the community and stakeholders for considering the proposal.

The Woolgoolga to Ballina Pacific Highway upgrade team has considered feedback from the community and stakeholders. The approved *Construction Environmental Management Plan* and its sub-plans provide information on many of the measures that will be put in place for the operation of these three sites to minimise impact on nearby property owners, residents and the wider community. Additionally, the *Koala Management Plan* and *Ballina Koala Plan* provide clear direction about the measures Roads and Maritime is taking to protect and manage this important native animal as we build the Woolgoolga to Ballina Pacific Highway upgrade.

The Woolgoolga to Ballina team has decided to seek to build a site compound, batch plant and borrow site, however we will not be using Hillside Lane for access as part of this work.

The Woolgoolga to Ballina team has decided not to build the batch plan for the initial phase of construction. Concrete for this work will be provided from an off-site location and will be transported to the site via trucks. Due to the requirement for concrete operations to be in close proximity to the work to provide about 1000 cubic metres per day for the concrete paving operation, a batch plant will be needed at this location. This means the project team will seek to operate a batch plant at this location from mid-2018 to mid-2019 to provide concrete for road pavement. The plant will take about six months to build starting in early 2018 and also six months to demobilise in late-2019.

Subsequent to the resident meeting at Meerschaum Vale 25 February 2017, Roads and Maritime Services committed to review the extent of low noise wearing surface on this section of the highway. Roads and Maritime Services and the project team will keep the community informed about the review process.

The Woolgoolga to Ballina team will continue to work with the community and stakeholders to mitigate and manage impacts of the work it needs to carry out to build the Woolgoolga to Ballina Pacific Highway upgrade.

5.0 Next steps

The Woolgoolga to Ballina Pacific Highway upgrade team will be preparing management plans for the site compound, batch plant and borrow site. These will each be submitted to the Department of Planning and Environment for approval. They will be reviewed against the Minister's Conditions of Approval to determine compliance.

The Woolgoolga to Ballina team expects the site compound and the borrow site to be operational by mid-2017, weather permitting.

The community and stakeholders will be notified in advance of this construction work. We will continue to keep the community and stakeholders informed as the project progresses.

6.0 Appendices

Appendix A - 'Have your say' letter October 2016

Australian Government

BUILDING OUR FUTURE

NSW MAKING IT HAPPEN

October 2016

Building and working at the Wardell Road site compound, Lumleys Hill batch plant and borrow site.

The Australian and NSW governments are jointly funding the $4.36 billion Woolgoolga to Ballina Pacific Highway upgrade. As part of the project, we are seeking your feedback on building and working at a site compound at Wardell Road, and at a batch plant and borrow site at Lumleys Hill.

To build the Woolgoolga to Ballina upgrade, we will be establishing batch plants and site compounds along the 155 kilometre route. These site compounds will have different functions and will support the building of the road upgrade. We will be working at these sites throughout the project's development.

We are proposing to establish a compound, concrete batch plant and earthworks borrow site at a location within the project boundary accessed via Wardell Road and Hillside Lane. This site was assessed as part of the Environmental Impact Statement (EIS) in 2012 and the 2013 Submissions/Preferred Infrastructure Report (SPIR) and is as highlighted on the included map. If approved, we expect to start building at this site in February 2017, with the compound operational by April 2017. The site is proposed to be operational for about three years and will be rehabilitated after completion, in line with the project's conditions of approval.

Site compound and batch plant

The site compound and batch plant involves building:

- Temporary offices with amenities for staff
- Staff car park
- Truck parking area
- Storage and stockpiling areas for equipment and materials
- Batch plant for making concrete

What to expect

Key activities:

- Establishment – installing environmental controls, minor vegetation clearing, constructing the compound and associated carpark, operating plant and equipment
- Operation – staff parking, operational machinery, material and equipment storage, stockpiling, delivery of materials, batching concrete, transporting concrete for use on the highway
- Demobilisation – removing buildings, car park and stockpiles, reinstating the area, landscaping and rehabilitation.

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Customer feedback
Roads and Maritime
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Appendix F Meeting minutes – Woolgoolga to Ballina Pacific Highway upgrade Meerschaum Vale community meeting 25 February 2017

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Name of meeting	Facilitated information session re: Woolgoolga to Ballina Pacific Highway upgrade Meerschaum Vale community meeting
Location	Meerschaum Vale Hall, 1 Marom Creek Road, Meerschaum Vale
Facilitator	Denise Wilson, Id Planning
Time and date	Saturday 25 February 2017 10am – 1pm
Attendees	**Roads and Maritime Services**: Bob Higgins, Anna Andrews
	Elected representatives and staff: Member for Ballina Tamara Smith, Ballina Shire Mayor David Wright, Ballina Shire Councillor Eoin Johnston, Ria Keenan.
	Meerschaum Vale community: Susann Wiedermann, Angela Davidson, Keith Hammond, Keri Barber, Kim Jones, Andrew Steele, Nancy McAndrew, Colin McAndrew, Michael Meszarus, Peter Vere Roberts, Sue Whiteman, Debbie Clement, Maria Matthes, Robyn Smith, Jonathon Beck, Paul Tollan, Vanessa Lake, Alma Rylko, Rosenne Spackman
	Pacific Complete: Christopher Wilkinson, Chris Greenaway, Bronwyn Campbell, Matthew Wilkinson, Debbie Brown, Dave Groth
	Id Planning: Denise Wilson, Fiona Morrisby

Notes

Bob Higgins, General Manager Pacific Highway, Roads and Maritime Services, welcomed the members of the community to the meeting at the Meerschaum Vale hall and attendees introduced themselves.

Bob explained the purpose of the meeting was to address concerns raised by the members of the community about the proposal for a site compound, borrow site and batch plant at Lumleys Hill including:

- *inconsistent approaches to the Pacific Highway upgrade*
- *the construction process*
- *the consultation and communication process and*
- *where to from here.*

Bob advised the project was underway and was unlikely to be stopped because it had all relevant approvals from the Government to proceed. Bob said he will work through the issues facing the community and the project team will work more closely with neighbours as construction progresses.

Pacific Complete Programme Director Christopher Wilkinson apologised to the group for the previous performance in community relations. Christopher advised Debbie Brown, Senior Communications and Stakeholder Engagement Officer, is the key contact person for all inquiries for the Richmond River to Ballina Bypass section of the Woolgoolga to Ballina upgrade. Encouraged residents to work with Debbie to resolve issues and get information they wanted. She can be contacted on 1800 778 900 or on mobile 0439 590 869.

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Christopher informed the group that as a result of the feedback received about the proposed batch plant, and through the competitive procurement process, the project team had been able to reduce the production time required for the proposed batch plant at the Lumleys Hill site. Initially the proposal was two batch plants – one is now not going ahead because of the contractor's supply strategy to use one of their existing plants. Instead of the proposed three year requirement, the proposed batch plant will now be needed from mid 2018 for about one year. The proposed batch plant is required for construction of pavement. Christopher reiterated that the project team is here to share information and listen, and that Debbie is available to arrange follow up meetings.

Topic: Lumleys Hill

- *The Woolgoolga to Ballina project team presented a slide show to talk about the proposed operations for Lumleys Hill. The first slide was a high level plan of Lumley's Lane area where work is due to start in the third quarter of 2017, and showed the stages of work for the area until late 2019.*

Topic: Proposed Batch plant

- *The Woolgoolga to Ballina project team played some short videos to show how a batch plant operates and how construction impact is managed. The Woolgoolga to Ballina project team advised that the batch plant in the video was filmed at another section of the Woolgoolga to Ballina upgrade, and explained it is very similar to the type of batch plant that will be built and operated at Lumleys Hill.*

- A community member said that stockpiling was a major issue if material was to blow over their paddocks. They were concerned about the impact on their business. The community member reinforced they did not want a batch plant.

  The Woolgoolga to Ballina project team responded that the stockpiled material is limited to what would be used in a matter of days, and is regularly watered to minimise dust. Activities are carried out with consideration of a number of factors including weather and the concrete production needs on a daily basis. The Woolgoolga to Ballina project team confirmed that as part of the batch plant management plan there were strict measures in place to manage and mitigate impacts.

- A community member said they were concerned about the batch plant platform's location as koalas travel through the area. They asked if the proposed batch plant was definitely going ahead and if so, would there be a batch plant where the koalas are? How would the koalas be encouraged to use the crossing?

  Roads and Maritime clarified to the group that yes, there was a proposed batch plant, but that it would only be operating for one year, rather than three years as first proposed.

  The Woolgoolga to Ballina project team explained that before the proposed batch plant would be built or operated, koala fencing would be installed to mitigate the risk of strikes and stop koalas getting into areas associated with the proposed batch plant. Trees would be planted to provide habitat for the koalas and connectivity structures placed ahead of the project opening to traffic. It was explained that the measures are in line with the project's approved Koala Management Plan.

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- A community member asked how the location of the proposed batch plant at Lumley's Lane was determined?

  The Woolgoolga to Ballina project team responded that Lumley's Hill was chosen as the location for the proposed batch plant for a number of reasons including proximity to the corridor, to provide the significant quantities of concrete to meet paving requirements. The Lumley's Hill location pro flood immunity.

  Bob said he has been involved in highway construction for more than two decades and is aware no one likes batch plants. Lumley's Hill was chosen as the most appropriate location as half a kilometre of pavement had to be laid each day and the equipment needs to be fed from a well located site.

- A community member read aloud a letter from Bob sent to the member on 24 February 2017. The community member requested the location of the proposed batch plant be reconsidered and that the stockpile materials be stored elsewhere.

  The Woolgoolga to Ballina project team clarified that the location of the proposed batch plant and stockpiles at Lumley's Hill would provide a level of flood compliance that the other proposed locations could not achieve. The Lumley's Hill location also allowed for direct access onto the construction corridor, optimising project production and minimising construction traffic on local roads.

- A community member asked what was going to be done to mitigate the risk for koalas during the proposed batch plant phase?

  The Woolgoolga to Ballina project team responded that they would put up temporary fencing around the proposed compound site, batch plant, borrow site and construction areas to prevent the koalas from gaining access.

Action: Roads and Maritime Services and Pacific Complete agreed to provide the community with a plan for the temporary fencing around proposed compound site, batch plant, borrow site and construction area.

- A community member said they were not asked to be involved in the study and asked who said there were no koalas near the proposed batch plant?

  Roads and Maritime clarified with the resident there was no suggestion there were no koalas near the proposed batch plant, and that the koala study has been carried out across Section 10, which included the area of the proposed batch plant.

  The Woolgoolga to Ballina project team explained habitat was just one aspect of the studies that were carried out and that the existing connectivity corridors were assessed as part of the Koala Management Plan.

- A community member stated community members living close to the project were not being immediately compensated. They asked if any studies had been carried out on the impact of the project on the Meerschaum Vale community?

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The Woolgoolga to Ballina project team responded that the impacts of this project were assessed during the Environment Impact Statement (EIS) phase and a review of all information was carried out for the proposal and this was approved before the project could go ahead.

- A community member asked when was it determined the proposed batch plant would be located at Lumley's Hill?

  The Woolgoolga to Ballina project team responded that the initial assessment was part of the EIS which was approved in 2012. Locations were also refined during the SPIR phase completed prior to the approval of the project in 2014.

- A community member then asked why did they only find out in 2016?

  The Woolgoolga to Ballina project team said the location was continually reviewed after first being proposed as one a number of potential sites in the EIS, but further consultation on the site was not possible until the development of the ancillary facilities management plan for the site.

- A community member asked about where a proposed batch plant had been mentioned in communications?

  Bob explained the term 'ancillary facilities' was used in the EIS, which was approved in 2012. Bob added that the use of the term in the EIS included a batch plant as a listed activity for the Lumleys Hill location.

  A community member responded the term 'ancillary facilities' is not clear and that no one understood it. They said the language used needs to be changed and be clear to state "this is what will happen in your backyard". The community member reinforced this was an important take away.

  State Member for Ballina, Tamara Smith, agreed with the community about the terminology and requested Roads and Maritime Services and Pacific Complete use plain English and clear language in communications with the community.

Action: Roads and Maritime Services and Pacific Complete to ensure clear, plain English terminology is used in all reports and collateral for the Woolgoolga to Ballina Pacific Highway upgrade and more broadly for road projects in the future.

- A community member suggested the proposed batch plant location was deliberately withheld and Roads and Maritime needed to commit to carrying out the consultation process again.

  Roads and Maritime responded they were now in the assessment process and the consultation process would be complete once this meeting was held. They informed the community their feedback had been taken on board. Roads and Maritime reinforced they were still in the final stage of external approvals for the proposed batch plant location and this process for the Consistency Assessment had been carried out during the past six to nine months.

- A community member said there had been an issue with the quality of community consultation. Roads and Maritime had not done what they said they would do and relevant

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processes were not being followed. They had not followed their own policies. They were of the belief they had been misled by Roads and Maritime and that is why they had attended this meeting.

Roads and Maritime said they understood the issue of communication was a problem for the community in the past. They acknowledged that while the details about ancillary facilities were included in the EIS, they could have been specifically highlighted to members of the community. Roads and Maritime made a commitment to the community that from here on in they would ensure consultation was improved. During the coming weeks a community update would be distributed throughout the area and via email and it would provide more details about the project's progress. The project team will be working harder to inform the community of all relevant information moving forward.

- A community member asked if the proposed batch plant location had been approved as they had not seen any mention of the social impact of this location, only economic impacts?

  Roads and Maritime responded that Lumley's Hill was the preferred location and social impacts were a consideration in the EIS and the Consistency Assessment.

Topic: Proposed Borrow Site (see presentation)

The Woolgoolga to Ballina project team played a short video to show how a borrow site operates and how construction impacts are managed as part of operation. The Woolgoolga to Ballina project team advised that the borrow site in the video was filmed at another section of the Woolgoolga to Ballina upgrade, and was described as being about twice the size of what would be operate

- A community member raised concerns about the noise levels of the proposed borrow site.

  The Woolgoolga to Ballina project team advised there were noise management guidelines as part of the Construction Environment Management Plan (Noise and Vibration Plan). The plan includes direction on operating hours as well as noise management levels stated as 51 decibels. This is based on noise assessments that were undertaken during the EIS phase.

- A community member asked how far away the nearest resident was located from the proposed borrow site?

  The Woolgoolga to Ballina project team informed the community member that the nearest resident was about 200 to 300 metres away from the site.

- A community member asked what was going to be done about the 300 truck and car movements on Wardell Road which would be loud. They asked how this noise would be mitigated?

  The Woolgoolga to Ballina project team clarified there would be about 80 truck movements per day between 7am and 6pm weekdays and between 8am and 5pm on Saturdays when construction commences, with peak construction periods to result in higher numbers of truck movements. The team confirmed that the construction corridor will be used by construction vehicles, including trucks, to minimise the number of vehicle movements on local roads.

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- A community member asked about the school children's crossing on Wardell Road where kindergarten and year one children catch the bus. They asked how would their safety be maintained?

  The Woolgoolga to Ballina project team assured the community there would be construction speed limits in place near the school crossing and signage. They reinforced safety is paramount and there will be no exceptions to this. They said there would be speed limit reductions to 80 kilometres/hour on Wardell Road, with 50 kilometres/hour on unsealed roads and some to 25 kilometres/hour. The Woolgoolga to Ballina project team also informed the community some new technology currently being trialled elsewhere on the alignment which alerted the truck driver when a school bus is coming. If trials are successful, the project team will look to implement on Section 10.

- A community member asked how are the social impacts being measured?

  The Woolgoolga to Ballina project team responded they would ensure the final assessment process was consistent with the EIS and this would be distributed when complete.

Action: The Woolgoolga to Ballina project team to provide the final assessment process to community members at the meeting.

Roads and Maritime informed the group the 'Borrow Site and Batch Plant Site Management Plans' will be going to Bob Higgins for approval and he will send these out to the community for information when they go to the Department of Planning. Roads and Maritime said it would also make the 'Ancillary Facility Assessment available.

Action: The Woolgoolga to Ballina project team to provide the Borrow Site and Batch Plant Management Plans and Ancillary Facility Assessment to community members at the meeting when it is lodged with the Department of Planning.

- A community member asked if the assessments included the consultation results?

  The Woolgoolga to Ballina project team responded that community feedback was reviewed as part of the assessment process and formed part of the final assessment documents.

Topic: Dust and noise

- *The Woolgoolga to Ballina project team said dust suppression mitigation measures would be used in the proposed borrow site area and that there are noise management guidelines which need to be met as part of the Construction Environment Management Plan.*

- A community member said they were concerned the 51 decibel limit would not be adhered to.

  The Woolgoolga to Ballina project team responded they would have a range of noise mitigation measures in place and would look at their operational noise mitigation measures and review if these could be brought forward to the construction phase. Noisier

work types had been planned for and will be located as far away as possible from residents to minimise the impact.

- A community member asked if there was an independent person reviewing the noise mitigation process?

  The Woolgoolga to Ballina project team said a noise consultant would carry out at-house noise assessments and treatments. It was reiterated that the 51 decibel noise management level applied to the construction phase. There will also be an operational *noise review to test assumptions made during detailed design and this would be on a property by property basis.*

- A community member asked about recourse during construction if noise limits were exceeded?

  The Woolgoolga to Ballina project team said if noise management levels are *exceeded they would look directly at the noise source and assess which mitigation method should be applied. They said if* there is too *much noise residents would be welcome to call the 1800 number. This issue would be investigated, recorded and a response provided. A monthly report for noise, dust and other environmental issues are provided to the Environment Protection Authority in line with the project's Conditions of Approval.*

Topic: Vibration and water sources

- *The Woolgoolga to Ballina project team said that vibration management and monitoring is undertaken in a similar manner to noise monitoring and management.*
- *The Woolgoolga to Ballina project team said the water for this project would come from a few sources, including town water, rivers and creeks,* and it will be trucked in if necessary. Bore water will not be used at this stage as it is not a *preferred source for construction.*

- A community member asked where would the water for crushing rocks come from?

  The Woolgoolga to Ballina project team responded that crushing water would be sourced from town water, which will be trucked in from an approved water source.

- A community member asked how often would the groundwater levels be monitored?

  The Woolgoolga to Ballina project team said the groundwater levels will be monitored every month or every three months depending on the reporting requirement. If there were any significant issues however they would know about it before the monitoring results.

Topic: Fuel and chemical storage

The Woolgoolga to Ballina project team said Australian standards for fuel and chemical storage would be met. Bunded storage areas are provided at ancillary facilities to store fuels and chemicals.

Topic: Fauna Management

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- A community member said they have an issue with corridor connectivity and the surrounding fauna.

  The Woolgoolga to Ballina project team responded they need to maintain connectivity of vegetation for koalas in the construction phase and koala fencing would be in place. The fencing design is in the 'Fauna Connectivity Strategy' and would be publicly available.

  Bob Higgins said there would also be a section about fencing and connectivity in the Borrow Site Management Plan and Ancillary Facility Assessment for the Batch Plant.

- A community member asked how do the connectivity structures fit with the actual alignment in relation to timing?

  The Woolgoolga to Ballina project team said as part of the Koala Management Plan there is a requirement to start revegetation and build koala fences on local roads, which will be starting in the next few weeks. This is part of the overall connectivity strategy. Additional signage and reduced speed limits are also being put into place.

- A community member asked if a simple flow chart of the Koala Management Plan could be drafted with this detail?

  The Woolgoolga to Ballina project team advised this information was being prepared and there will be a map included. This will be emailed to the community members at the meeting.

  Action: The Woolgoolga to Ballina project team to email a flow chart of the Koala Management Plan to the community at the meeting.

- A community member asked where was the permanent fence on Wardell Road?

  The Woolgoolga to Ballina project team informed the community member you could see this on the printed map.

  Action: The Woolgoolga to Ballina project team to provide a copy of the map to attach to meeting notes.

Topic: Pavement

The Woolgoolga to Ballina project team advised community members they can see the pavement design on the map embedded in the presentation and in large scale on the map in the room.

- A community member asked how decisions were made regarding pavement type?

  The Woolgoolga to Ballina project team said the key factors were cost, durability, the construction process including soft soils and terrain and the friction of the surface.

- A community member asked could low noise pavement be used?

Bob said he would commit to reviewing the extent of low noise pavement in this section of the upgrade. He said this would take a few months because discussions would need to occur as part of the procurement process with The Woolgoolga to Ballina project team.

Action: Roads and Maritime committed to reviewing the use of low noise pavement in this area.

Topic: Other items raised

- A community member said they had some issues regarding the base line reports and mentioned the dilapidation (property condition) reports have errors. They requested a commitment from Bob on a number of these issues.

  The Woolgoolga to Ballina project team advised attendees that any outstanding issues from today's meeting could be directed to Debbie Brown at debbie.brown@pacificcomplete.com.au, 0439 950 869 or call 1800 778 900.

- A community member said there were some other issues they would like addressed including drinking water, reviewing other batch plant locations and the baseline air quality data.

- A community member asked about the standard hours of operation for this project?

  The Woolgoolga to Ballina project team informed the group the standard construction hours are between 7am and 6pm on weekdays and between 8am and 5pm on Saturday with one hour leeway either side for sparsely populated areas.

- A community member said they used to be a community but now Roads and Maritime have purchased eight homes in the area does this now mean we are a sparsely populated area? Also, what will be happening over the next few months? They said they had no idea of timelines.

  Roads and Maritime and The Woolgoolga to Ballina project team gave the community group a commitment to provide indicative timeframes moving forward.

Action: The Woolgoolga to Ballina project team to provide indicative project timeframes to the community members in the meeting.

- The meeting closed at 12:49pm.