

Appendix 10.2

Lang Hill Borrow Site Management Plan

Woolgoolga to Ballina (sections 3 to 11)

Pacific Highway Upgrade

NOVEMBER 2016

Document control

File name	W2B-PC0-0-ZH-PLN-00004-11
Report name	W2B Lang Hill Borrow Sites Management Plan
Revision number	5


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Revision history

Revision	Date	Description	Approval
0	18/05/16	Initial draft for internal review	Hugh Madden
1	04/07/16	Draft for RMS review	Hugh Madden
2	25/08/16	Final draft for RMS review	Andrea Zambolt
3	16/09/16	Submission to DPE	Andrea Zambolt
4	24/10/16	DPE comments	Andrea Zambolt
5	10/11/16	DPE comments (2)	Chris Greenaway

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Glossary / Abbreviations

AFMP	Approved Pacific Complete Ancillary Facilities Management Plan (sections 3 to 11)
AHD	Australian Height Datum
BSMP	Approved Pacific Complete Borrow Site Management Plan (sections 3 to 11)
CAQMP	Approved Pacific Complete Construction Air Quality Management Plan (sections 3 to 11)
CCEMP	Contractor's construction environmental management plan
CEMP	Approved Pacific Complete Construction Environmental Management Plan (sections 3 to 11)
CNVMP	Approved Pacific Complete Construction Noise and Vibration Management Plan (sections 3 to 11)
CHMP	Approved Pacific Complete Construction Heritage Management Plan
CSWMP	Approved Pacific Complete Construction Soil and Water Quality Management Plan (sections 3 to 11)
CWREMP	Approved Pacific Complete Construction Waste Resource and Energy Management Plan sections 3 to 11)
dB	Decibels
DPI	Department of Primary Industries
EEC	Endangered ecological community
EIS	Environmental impact statement
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPL	Environment Protection Licence
ESCP	Erosion and sediment control plan
EWMS	Environmental work method statements
MCoA	Minister's Conditions of Approval
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NML	Noise management level
OEH	Office of Environment and Heritage

OPP	Oxleyan Pygmy Perch
Project, the	The Woolgoolga to Ballina Project
RAPs	Registered Aboriginal Parties
Secretary	Secretary of the Department of Planning and Environment
SPIR	Submissions/ Preferred Infrastructure Report
Roads and Maritime	Roads and Maritime Services

1 Introduction

1.1 Context

This Borrow Site Management Plan (BSMP) for the Lang Hill Borrow Site forms part of the Construction Environmental Management Plan (CEMP) for the 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: the 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 Valley and New South Wales/ 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/ preferred infrastructure report (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 the 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 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 systems 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 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.

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)

Lang Hill 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 Lang 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 is to ensure that impacts associated with the borrow site are minimised within the scope permitted by the project 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 or destruction to threatened species, aboriginal and non-aboriginal sites and artefacts and sensitive ecosystems during the establishment, operation, decommissioning and rehabilitation of the site.
- 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 receives 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

2.1 Legislation

Table 2-1 lists the principal environmental legislation and regulation that applies to borrow site management.

Table 2-1 Principal legislation and regulation relevant to borrow site management

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

<i>Heritage Act 1997</i>	Provides for the conservation of buildings, works, archaeological relics and places of heritage value.
<i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Commonwealth)</i>	Enacted to specifically protect Aboriginal and Torres Strait Islander heritage.
<i>Water Act 1912</i>	Provides for the protection of groundwater in the few areas in NSW where water-sharing plans have not come into effect.
<i>Water Management Act 2000</i>	Provides for the protection, enhancement and restoration of water sources and ecosystems, ecological processes and biological diversity.
<i>Soil Conservation Act 1938</i>	Establishes controls to prevent soil erosion and land degradation.
<i>Contaminated Land Management Act 1997</i>	Provides for the investigation and remediation of contaminated land considered to post a significant risk to human health of the environment.
<i>Waste Avoidance and Resource Recovery Act 2001 (WARR Act)</i>	Supplementary legislation aimed at reducing waste and resource consumption, defining the waste hierarchy and promoting its adoption across NSW.
<i>Environmentally Hazardous Chemicals Act 1985</i>	Controls the movement, storage, and disposal of chemical waste. Administered by EPA and the Hazardous Chemicals Advisory Committee.
<i>Dangerous Goods (Roads and Rail Transport) Act 2008</i>	Ensures that dangerous goods are transported in a safe manner.
<i>Pesticides Act 1999</i>	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 Industrial Noise Policy (INP) (EPA 2000)
- Assessing vibration a technical guideline (EPA, 2006)
- Environmental Noise Management Manual (RMS, 2011)
- 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 condition 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.	Section 5
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

3 Borrow site description

Lang Hill Borrow Site is located on the south facing slope of Lang Hill, adjacent to the approved highway alignment, north east of Woodburn, in Portion C (Section 8) of the Woolgoolga to Ballina Pacific Highway Upgrade. The borrow site, consisting of an excavation area, access track and associated infrastructure, is located within the approved project boundary. The excavation area is located within the SPIR clearing boundary, the sediment basin/ containment area, crib room/amenities and the majority of the access track is located outside of the clearing boundary, however still within the approved project boundary.

Table 3-1 Site description

Item	Description
Chainage	134600 to 134900
Location	Woodburn
Lot ID	Lot 64 DP755624
Size	4 hectares

The site is predominately cleared agricultural land with scattered patches of remnant open forest. The remnant vegetation consists of Grey Gum, Pink Bloodwood and Northern Grey Ironbark. This vegetation has been classified as the biometric vegetation type, Forest Red Gum Grassy Open Forest of the Coastal Ranges of the North Coast, which is not considered to be an endangered ecological community (EEC). A small patch of Swamp Oak Forest Floodplain Forest on Coastal Floodplains, classified as ECC, is located adjacent the borrow site footprint. An unnamed waterway is located on the western side of the site and is known habitat for Oxleyan Pygmy Perch (OPP). The vegetation within and surrounding this unnamed waterway has been classified as the EEC vegetation type Freshwater Wetlands on Coastal Floodplains of the NSW North Coast. An Aboriginal artefact scatter known as Gittoes Jali is also located at the borrow site. Salvage works have been undertaken at Gittoes Jali where the borrow site excavation will occur. Exclusion fencing will be constructed around the borrow site, access track and north eastern edge of the project alignment to restrict access to the conservation area of the Gittoes Jali heritage site.

Surrounding land uses include rural residential and agriculture land. Five sensitive receivers are located within 600 metres of the site, one of these comprises two water reservoirs located uphill from the borrow site.

Figure 3-1 shows the location of the Lang Hill Borrow Site and Figure 3-2 provides an indicative layout and environmental constraints in the vicinity of the site.

3.1 Design changes

The borrow site was originally identified in the environmental impact assessment (EIS) with excavation depths to 25 metres. As outlined in the Submission/Preferred Infrastructure Report (SPIR) the design was refined due to feedback received at Aboriginal Focus Group meetings where requests were made to reduce the impacts at Lang Hill due to its Aboriginal heritage importance. The footprint of the site was significantly reduced, the proposed amount of material to be extracted was reduced from 530,000m³ to 300,00m³ and the depth of extraction was reduced to a maximum of 17 metres.

The current proposed design reduces the footprint of the excavation area from the SPIR design. After negotiations with the landowner to the north of the site, a buffer has been created between the excavation area and the property line to the north. Additionally, the original conservation zone identified in the SPIR, to the south of the site, has been increased due to the identification of an item of exceptional Aboriginal heritage significance during salvage (Refer to Section 5.5). Pacific Complete are proposing to extend the depth of excavation to 20 metres to increase the amount of material available to be extracted without expanding the footprint of the borrow site, as this would lead to impacts on the surrounding Aboriginal heritage

conservation zone. Further to this, by extending the depth to 20 metres the design refinement will also allow high quality hard rock to be extracted for the project, and therefore also limit disturbance in other areas of the Project to attain this resource. An estimated 220,000m³ is currently proposed to be extracted, a reduction of approximately 80,000m³ from the SPIR design.

Section 5 of this management plan assesses the environmental impacts of the design changes from the SPIR and discusses whether these are considered to be consistent with the approved project. No additional impacts have been identified beyond those approved under the SPIR. As there are no additional impacts, the surface area footprint will be reduced and the quantity of excavated material is proposed to be less than the SPIR design, the design refinements are considered to be consistent with the project.

Figure 5-2 illustrates the reduction in footprint of the borrow site excavation area from the EIS design, SPIR design and the current design. Figure 5-3 shows a cross section of the SPIR design and current design of the borrow site excavation area.



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Woolgoolga to Ballina

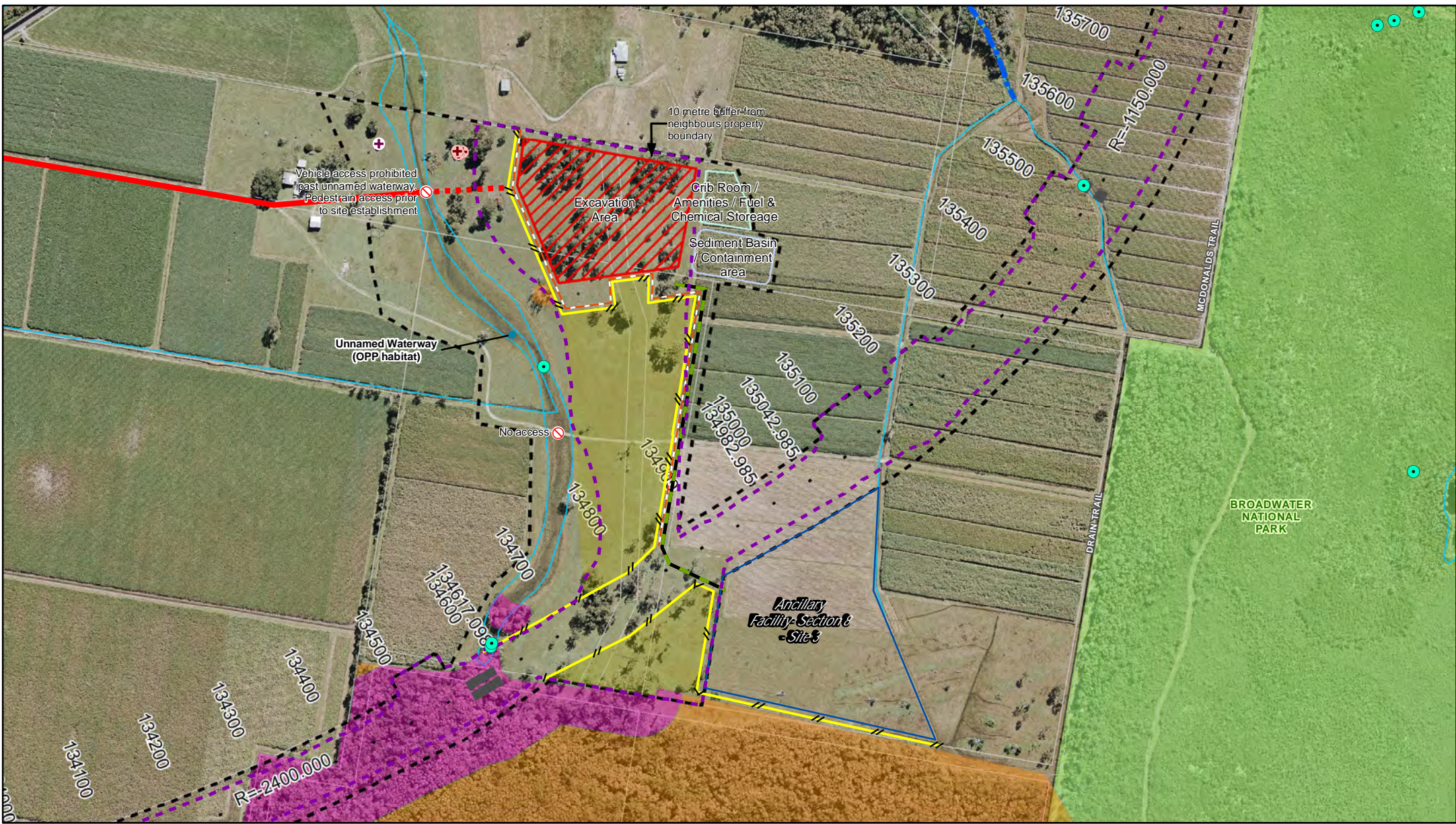
Lang Hill Borrow Site Location

Figure 3-1

- Lang Hill Borrow Site area
- Ancillary facility
- SPIR Clearing Boundary
- Approved Project Boundary Version 9
- Drainage



	1:15,000 at A4
Print Date:	23/06/2016
Author:	BORM
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Woolgoolga to Ballina

Lang Hill Borrow Site Indicative Layout

Figure 3-2

- Threatened Flora Species (Aug 2015)**
- ⊕ Rough-shelled Bush Nut, Macadamia tetraphylla
 - ⊕ Whalebone tree, *Streblus pendulus*
 - Oxleyan Pygmy Perch (OPP) records
 - ⊘ No access during construction
- Vegetation communities (EEC's)**
- Swamp Oak Floodplain Forest on Coastal Floodplains
 - Swamp Sclerophyll Forest on Coastal Floodplains
- Other Symbols:**
- Ancillary facility
 - Conservation Area/No Go Zone
 - Bridges
 - SPIR Clearing Boundary
 - Approved Project Boundary Version 9
 - Key Fish Channel
 - Access route
 - Exclusion fencing
 - Sediment fencing
 - Drainage

* This figure is indicative and not geospatially accurate. These locations will be finalised by the contractor during detailed design.



1:6,000 at A4

0 25 50 100 150 200 Metres

Print Date: 15/08/2016

Author: BORGM

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3.2 Commissioning and decommissioning

The proposed commissioning date for the site is the first quarter of 2017. The site will be in use for approximately 2 years, with decommissioning proposed to occur in the fourth quarter of 2018. Rehabilitation will occur post decommissioning and is estimated to be completed by the fourth quarter of 2019.

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

4 Material extraction

4.1 Extraction description

It is estimated that 220,000m³ of material will be extracted from the Lang Hill Borrow Site. The material to be extracted from the site is Gatton Sandstone. The material will be used predominately for select, verge and drainage material on the project. The reduction in footprint from the SPIR design to the current design has resulted in a reduction of approximately 80,000m³ of material proposed to be extracted.

4.2 Construction and extraction method

4.2.1 Construction method

Access to the site will be gained via the construction corridor for site establishment. The site clearing limits will be demarcated and clearing of the scattered remnant vegetation will be undertaken. Clearing will be staged to align with excavation activities to reduce the impacts of erosion. The top soil will be stripped and stockpiled at either the borrow site or nearby ancillary facilities along the alignment. A sediment basin/containment area will be established to the east of the excavation area to capture diverted run off. A small crib room, amenities and fuel/chemical storage will be established at the site to the east of the borrow site and north of the sediment basin/containment area. Refer to Figure 3-2 for an indicative layout of the borrow site.

A site office, material processing, stockpiling and laydown area is proposed to be located at the ancillary facility that is located on the opposite side of the alignment to the borrow site, refer to Figure 3-2. This ancillary facility was identified in the MCoA A2d document – *Woolgoolga to Ballina Pacific Highway Upgrade – Ancillary descriptions and impact assessment (RMS, 2013) as Section 8 Site 3*. Activities at the proposed ancillary facility will be assessed and managed in accordance with the approved Pacific Complete Ancillary Facilities Management Plan (sections 3 to 11) (AFMP), Appendix B9 of the CEMP.

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 for these activities would be sourced from the sediment basin/containment area at the site or nearby basins within the alignment and/or trucked in and stored at the site. Potable water will also be required for the crib room and staff amenities. The construction contractor will determine the amount of water required for the site and where the water will be sourced.

4.2.2 Extraction method

Conventional extraction methods will be used to extract the rock including dozer ripping, hammering and controlled blasting to fragment the rock for processing. Extraction will be staged east to west and the open face of the cut will be graded to allow for water to drain towards the sediment basin/containment area and away from the unnamed waterway. Diversion drains will be constructed to divert water around the site and into the sediment basin/containment area. Bunding around the site will be constructed and stabilised using seeding or other means to be above the 20 year ARI level.

Once extracted, the rock will either be processed within the footprint of the excavation area and/or transported to an ancillary facility along the alignment. 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. Material will be stockpiled at the borrow site or at an ancillary facility/stockpile site until transported for use on the project.

All blasts will be planned, executed and monitored in accordance with the Blast Management Procedure, Appendix B of the approved Pacific Complete Construction Noise and Vibration Management Plan (sections 3 to 11) (CNVMP), Appendix B3 of the CEMP, and would ensure

the overpressure and vibration limits outlined in MCoA B22 and B23 are not exceeded. This would be achieved through the preparation of a site specific blast management plan prior to any blasting which would be prepared by the contractor and would address potential risks and control measures. A detailed trial blast will be undertaken to determine the site specific blasting criteria for controlled blasting.

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
 - 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, drilling and blasting
- Material processing (crushing and screening)
- Short term stockpiling of material
- 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 may also be carried out between:

Monday to Friday: 6am to 7am and 6pm to 7pm.

Blasting will only be conducted during the hours of:

Monday to Friday: 9am to 5pm

Saturday: 9am to 1pm

Sunday and Public Holidays: no blasting.

4.4 Plant and equipment

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

Plant	Equipment
<p>Extraction operations</p> <ul style="list-style-type: none"> • 50 tonne excavator • D6-9 bulldozer • 40 tonne articulated dump truck • 50 tonne rigid dump truck • Assorted highway trucks (truck and dog) • Water carts • Drill rig and support vehicles for blasting • 10 light vehicles. <p>Crushing operations</p> <ul style="list-style-type: none"> • Generally 2-3 stage mobile plant • 1 x jaw crusher / 1 x cone crusher • 1 x screen • 30 tonne excavator 	<ul style="list-style-type: none"> • Pumps • Generator • Fuel and chemical storage • Trailers • Shipping containers • Tools.

<ul style="list-style-type: none"> • Front end loader • 5 light vehicles. <p>Rehabilitation works</p> <ul style="list-style-type: none"> • 25 tonne excavator • D6-9 bulldozer • 40 tonne articulated dump truck • Assorted highway trucks (truck and dog) • Water carts • 10 light vehicles. 	
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4.5 Chemical and fuel storage details

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

- Diesel fuel – 10KL
- Unleaded fuel – 100L
- Oils – 100L
- Grease – 100kg
- Short term storage of blasting related materials (emulsion chemicals).

5 Environmental impacts of the borrow site

An environmental assessment outlining the impacts of the Lang Hill Borrow Site was included in the Submissions/Preferred Infrastructure Report (SPIR). A summary of this information and impacts due to changes to the SPIR design 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 excavation area and the majority of the access track are located above the 20 year ARI flood limit. The sediment basin/containment area and crib room/amenities on the eastern side of the site are partially below the 20 year flood level as well a small section of the access track, refer to Appendix A. These areas will need to be raised and/or bunded to be above this flood level. The sediment basin/containment area will be designed to ensure it is located above the groundwater table. After backfilling and rehabilitation of the borrow site, the remaining void will be free-draining.

As outlined in Section 4.4.14 of the SPIR the borrow site is not anticipated to impact on the predicted flood level, duration or velocity of floodwaters that could impact Lang Hill or its surroundings during a flood.

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 (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 would be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.

5.2 Soils, sediments 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. Lang Hill is located on a small area of Gatton Sandstone which will be extracted from the borrow site. The geology surrounding Lang Hill and the site has been identified as Estuarine Plains consisting of mostly mud, silt and clay to the west and sand, silt and clay to the east. Geotechnical investigations carried out at the site identified that the sandstone at the borrow site is overlaid by a layer of weather rock, residual soil consisting of sand and clay, overlaid by a thin layer of silty, sandy, clay topsoil. As outlined in the EIS, the excavation area is considered to be in an area of no known occurrence of acid sulfate soils. The sediment basin/containment area, crib room/amenities and the northern section of the access track are located in an area identified as having a low probability of acid sulfate soils.

An unnamed waterway is located on the western side of the site that connects to the Richmond River, in the north west and to the Broadwater National Park, in the south east. The SPIR outlines that in the northern end of the unnamed waterway, close to the extraction area, the water quality is poor due to the impacts of cattle grazing that has led to siltation and potential pollution from cattle manure. Upstream, where the waterway crosses the project alignment, the waterway is considered to be in good condition.

No direct impacts to the unnamed waterway are anticipated from the borrow site activities as the site will be designed to drain towards the sediment basin/containment area and away from

the unnamed waterway. A clean water diversion bund will be established on the western side of the excavation area to divert any clean water towards the unnamed waterway to the west of the site. The bund will be stabilised and designed in accordance with the blue book and documented in the erosion and sediment control plan. Outlets of any concentrated flow would also be stabilised to ensure erosion doesn't occur. Ninetieth (90th) percentile basins/containment areas will be implemented to reduce these potential impacts. The size of the sediment basin/containment area will be determined in accordance with the Blue Book by the contractor's soil conservationist.

The excavation area is located at elevations ranging from approximately 10 to 30 metres AHD (Australian Height Datum). Geotechnical investigations carried out at the site consisted of three boreholes taken from elevations of approximately 16, 19 and 20 metres AHD to depths of approximately 32 metres. As outlined in Section 4.1, the site will be excavated to an approximate depth of 20 metres at its deepest location. The maximum excavation will occur from approximately 27.5 metres AHD to a level of approximately 7.5 metres AHD.

Two groundwater regimes are located within the vicinity of the borrow site. One associated with the shallow alluvial aquifer (Richmond River Alluvium and Richmond Coastal Sands) and a second within the Gatton Sandstone bedrock that underlies the alluvium. Two groundwater systems are sustained by the Gatton Sandstone bedrock that is located at the borrow site and will be extracted as part of the excavation works (Refer to Appendix B). These two systems consist of:

- a shallow perched groundwater system, anticipated to be located 5 metres below ground level within the thin weathered material that overlays the bedrock.
- a deeper bedrock groundwater system, potentially located below the proposed excavation depth (approximately 7.5 metres AHD) and above the surrounding alluvium water table (approximately 1 metres AHD).

The shallow system is predominately sustained by direct rainfall and is anticipated to have limited connection to the deeper bedrock system. The borehole data from the geotechnical investigations indicates that no groundwater was intercepted during drilling at the three borehole locations. The deep bedrock groundwater systems is therefore not anticipated to be intercepted and the borrow site activities are considered to have minimal impact to the deep aquifer.

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 sandstone 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.

Groundwater users surrounding the borrow site utilise the Richmond River Alluvium aquifer of the Richmond River floodplain. The Richmond River Alluvium aquifer and the Gatton Sandstone bedrock aquifer are considered to be largely separate groundwater regimes, therefore the excavation activities at the borrow site will have minimal impact to these groundwater users.

The unnamed waterway to the west of the borrow site is located at an elevation of approximately 1 metre AHD. Figure 5-1 shows a cross section from east to west across the site. It is evident that there is approximately 6.5 metres between the lowest point of excavation and the river bed of the unnamed waterway. Excavations are not proposed below the depth of

the waterway therefore it is anticipated that the borrow site will not interfere with groundwater that may feed into the unnamed waterway to the west of the site.

No direct impacts are anticipated to occur to the unnamed waterway. Indirect impacts may result from erosion and surface water runoff. The excavation will be staged east to west and graded to drain the site towards the sediment basin/ containment area on the eastern side of the site. Erosion and sediment control measures will be implemented in accordance with the approved Pacific Complete Construction Soil and Water Quality Management Plan (sections 3 to 11) (CSWMP), Appendix B4 of the CEMP. Additional mitigation measures are outlined in Section 6.

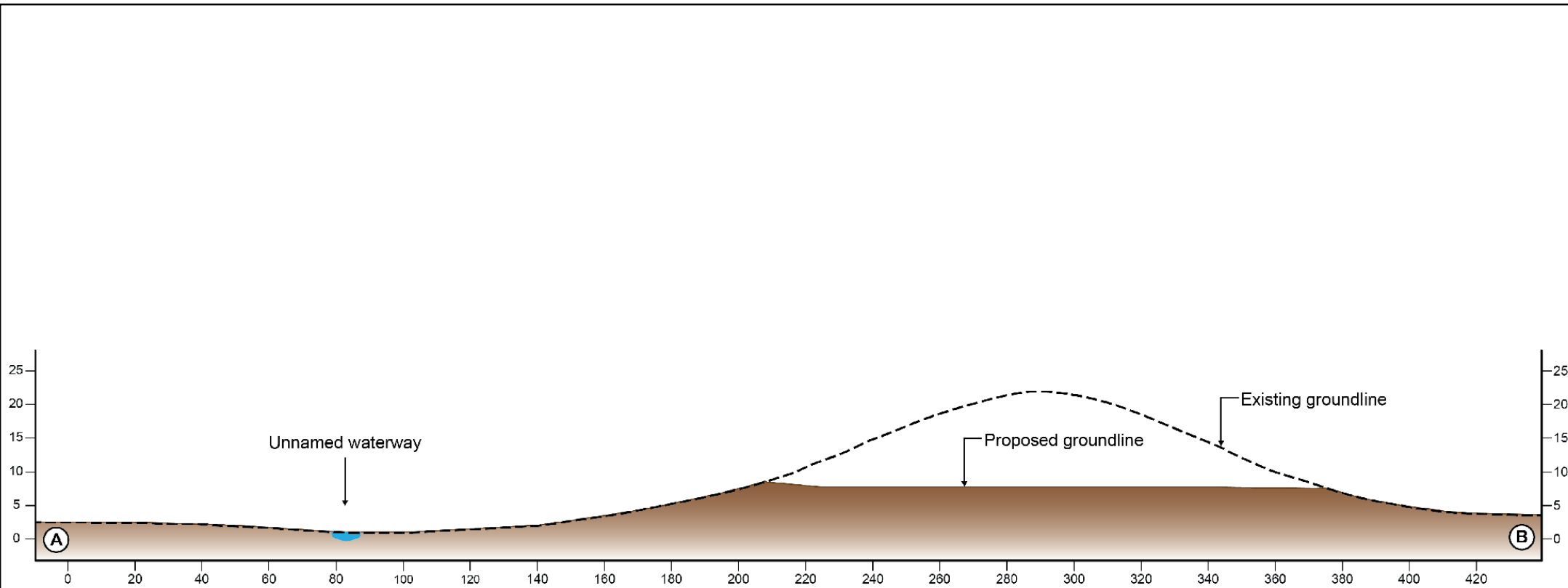
Contamination

An area to the south of the excavation area was identified in Section 9.2 of the EIS as a potential area of contamination due to its historical agricultural use. This site is identified as site 67 in the EIS and approved Pacific Complete Contaminated Land Management Plan (sections 3 to 11) (CCLMP), Appendix B8 of the CEMP. The location of this site is shown in Appendix C. A section of the access track will traverse this area of potential contamination, however no ground disturbance is anticipated during the establishment of the access track. Instead of removing topsoil, geofabric and gravel will be used to construct the access track.

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 (CCEMP) 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 would be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.



Note: Vertical exaggeration = 2

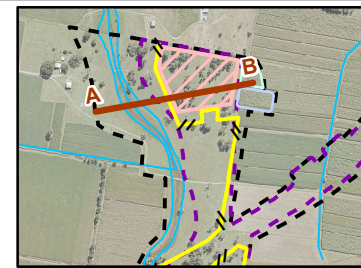
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Woolgoolga to Ballina

Indicative cross section of Lang Hill Borrow Site and the unnamed waterway

Figure 5-1



Map produced by Pacific Complete in partnership with RMS.
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Print Date: 23/06/2016

Author: BORGM

5.3 Biodiversity

The borrow site is located in predominately cleared agricultural land with scattered patches of remnant open forest. The remnant vegetation consists of Grey Gum, Pink Bloodwood and Northern Grey Ironbark. This vegetation has been classified as the biometric vegetation type, Forest Red Gum grassy open forest of the coastal ranges of the North Coast, which is not considered to be an endangered ecological community (EEC). A small patch of Swamp Oak Forest Floodplain Forest on Coastal Floodplains, classified as ECC, is located adjacent the borrow site footprint. The vegetation at the site provides some habitat for fauna species. Vegetation within the excavation area falls within the approved SPIR vegetation clearing limits for the project.

A collection of Siah's Backbone (*Streblus pendulinus*), an endangered species listed under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC)* and included in the Threatened Flora Management Plan for the project, is located adjacent to the borrow site, to the west of the excavation area. A Rough-shelled Bush Nut (*Macadmia tetraphylla*) is also located on the western side of the unnamed waterway. An exclusion fence will be constructed around the borrow site that will minimise the impacts of construction on these species. Appendix D illustrates the biodiversity constraints at the borrow site.

Aquatic biodiversity

There is an unnamed waterway to the west of the site. The vegetation within and surrounding this unnamed waterway has been classified as the EEC vegetation type Freshwater Wetlands on Coastal Floodplains of the NSW North Coast. The SPIR outlines that the northern section of the waterway, adjacent to the extraction area, is considered to be unlikely habitat or marginal habitat for Oxleyan Pygmy Perch (OPP) due to the historic impacts of cattle grazing. However, upstream at the project alignment, the waterway is in good condition and is known OPP habitat.

The Threatened Fish Management Plan (RMS, 2015) identifies records of OPP in the upstream section of the unnamed waterway (Refer to Figure 3-2 and Appendix D). OPP management areas are identified in the Threatened Fish Management Plan based on proximity to high risk activities. Lang Hill is located within one of these management areas that ranges from chainage 134,200 to 142,500. As outlined in the Threatened Fish Management Plan no high risk activities can occur within identified management areas during OPP spawning season (October to April), or on days when the relevant Bureau of Meteorology site predicts a 90% chance of 10mm of rain or more. This requirement is also outlined in MCoA B7.

High risk activities are defined in the MCoA as:

- Piling in the waterway and within the bed and banks
- Construction of temporary work platforms within the waterway
- Installation and removal of temporary waterway crossings
- Concreting of bridge abutments, deck, and parapets
- Vegetation clearing within 50 metres of Oxleyan Pygmy Perch habitat waterways
- Placing fill (bulk earthworks) on the floodplain within 50 metres of Oxleyan Pygmy Perch habitat waterways
- Lime stabilisation work within 50 metres of Oxleyan Pygmy Perch habitat waterways
- Underboring of Oxleyan Pygmy Perch habitat waterways.

The borrow site is location more than 50 metres away from the unnamed waterway and will be graded to drain the site towards the sediment basin/ containment area on the eastern side of borrow site, away from the unnamed waterway. These high risk activities are not anticipated to occur during the operation of the borrow site. If the site is being accessed via the existing access tracks prior to the establishment of the construction corridor, and adjustment to these crossings are required, the above requirement will be observed.

The management of the unnamed waterway and OPP will be managed in accordance with the approved Threatened Fish Management Plan.

Water discharge from the sediment basin/ containment area

Water captured in the sediment basin/ containment area at the borrow site will be reused for construction activities such as dust suppression and if required, would be irrigated to the adjoining cane land to the east of the site (owned by RMS). This would be carried out in accordance with requirement P1.8, under section 2, Discharges to Air and Water and Applications to Land, under the project EPL in a manner that:

- Vegetation is not damaged
- Soil erosion and soil structure damage is avoided
- Water must not pond or pool and cause waterlogging of soils
- The quality of surface water and groundwater is not adversely affected
- Water is irrigated in a manner which maximises evaporation, transpiration and infiltration and does not result in water flowing from the irrigation area into any waters.

A number of cane drains adjacent to the borrow site feed into a key OPP fish channel north east of the site (refer to Figure 3-2). As outlined in the approved Threatened Fish Management Plan, OPP are sensitive to changes in water quality and prefer well oxygenated, slightly acidic water with select ranges of temperature, conductivity and suspended sediment concentrations. The requirements above will be applied to ensure irrigation from the sediment basin/ containment area will not cause runoff into any of the surrounding waterways or drainage lines.

No direct impacts are anticipated to occur to the OPP habitat. Indirect impacts may result from erosion and surface water runoff. These impacts will be managed to be as low as reasonably practical. The excavation will be staged east to west and graded to drain the site towards the sediment basin/ containment area on the eastern side of the site. Erosion and sediment control measures will be implemented in accordance with the approved Pacific Complete Construction Soil and Water Quality Management Plan (sections 3 to 11) (CSWMP), Appendix B4 of the CEMP. Additional mitigation measures are outlined in Section 6.

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 (CCEMP) 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 would be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.

5.4 Visual

Lang Hill Borrow Site is located in a predominately flat, rural landscape on the southern facing slope of Lang Hill, approximately 500 metres south east of the existing highway and three kilometres north east of Woodburn. Lang Hill is a prominent feature in the landscape, due to the flat nature of the surrounding area. The excavation area will lower the southern section of the hillside and result in visual impacts to the landscape character and appearance of the area.

The area surrounding the site is rural residential and agricultural land. There are approximately five sensitive receivers located within 600 metres of the borrow site, therefore the impacts will be limited to a small number of visual receivers and passing traffic. One sensitive receiver is located 100 metres north of the borrow site. A 10 metre buffer zone between the borrow site and the boundary of this property will be established. The existing vegetation within this zone will remain in-situ. There is an existing gap in the vegetation that will be planted with native species, similar to the surrounding vegetation, to assist in reducing the visual impacts of the borrow site.

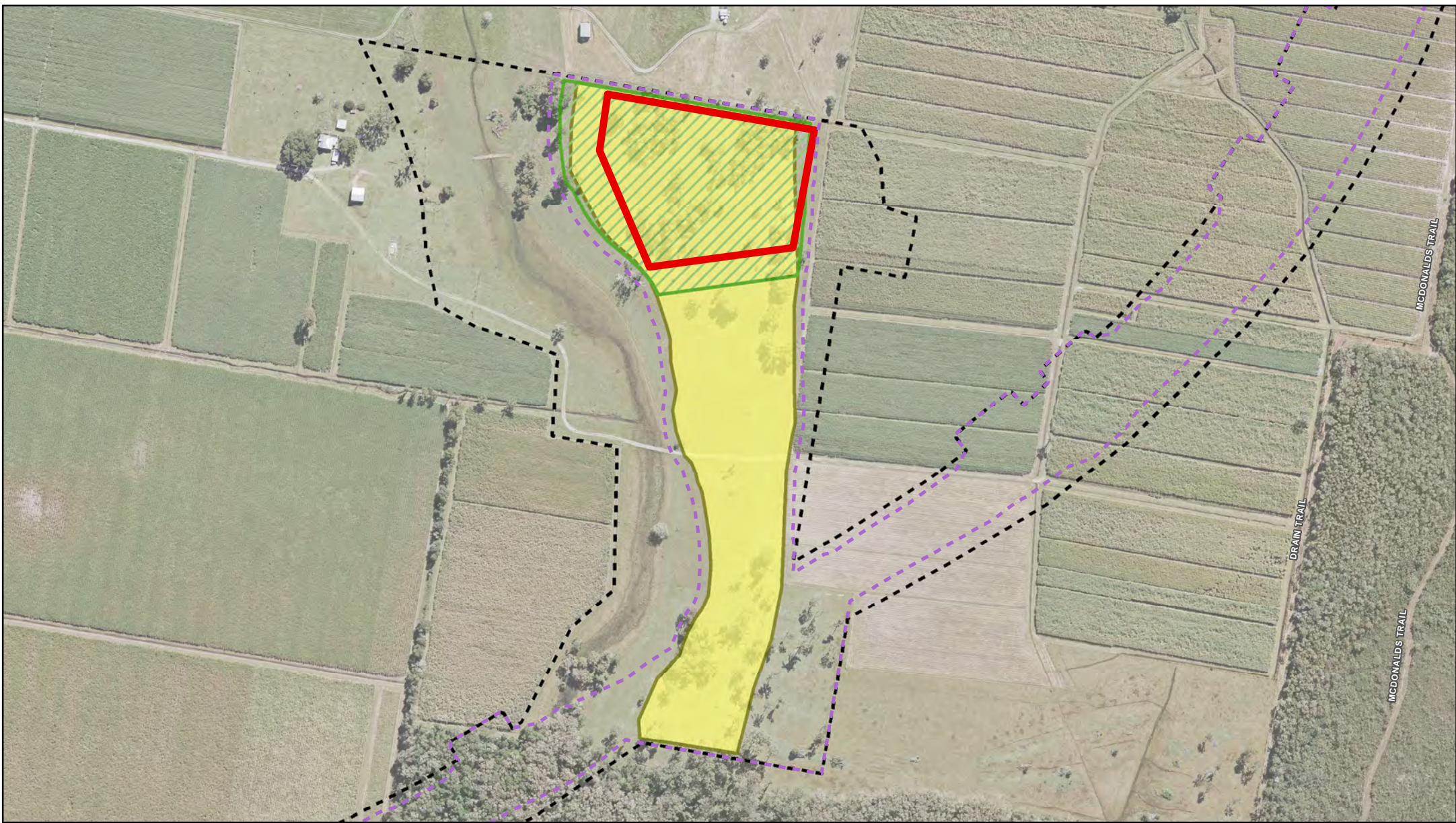
The borrow site will be excavated an additional three metres below the SPIR design, however this is not anticipated to result in any additional visual impacts as the footprint has not been expanded. Figure 5-2 illustrates the reduction in footprint of the borrow site excavation area from the original EIS design, the revised SPIR design and the current proposed design by Pacific Complete. Figure 5-3 shows a cross section of the SPIR design and the current proposed design of the borrow site excavation area. These figures are indicative only. The SPIR design is based on an interpretation of Figure 4-29 in Chapter 4 of the Pacific Highway Upgrade: Woolgoolga to Ballina Submissions/Preferred Infrastructure Report (RMS, 2013).

The rehabilitation of the site is outlined in Section 8.

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 (CCEMP) 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 would be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.








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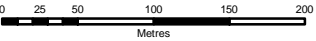
Revised Excavation Area at Lang Hill Borrow Site

Figure 5-2

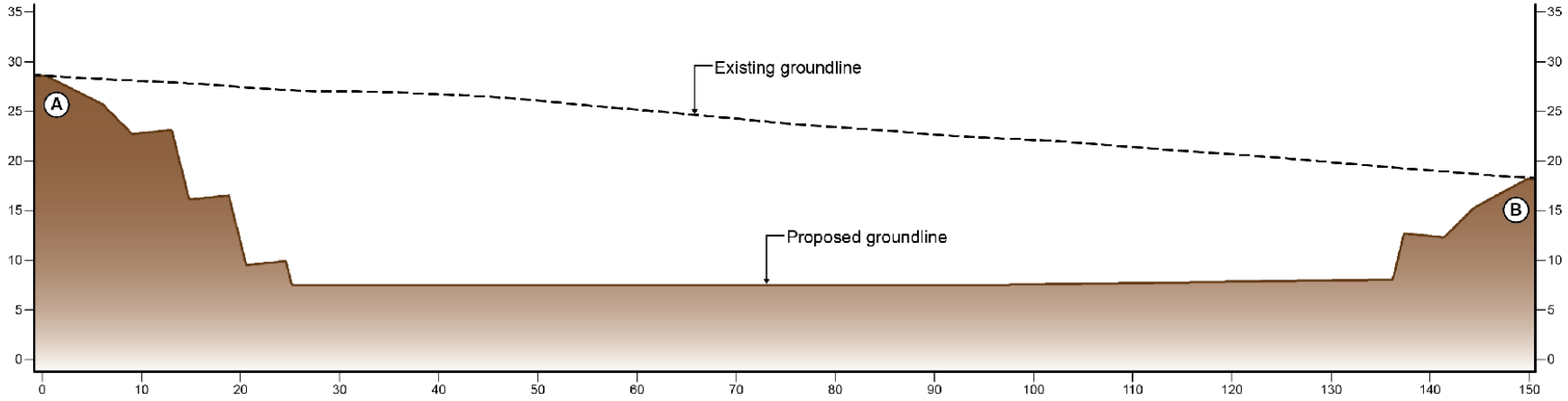
-  Current Excavation Area
-  SPIR Design - Excavation Area
-  EIS Design - Excavation Area
-  SPIR Clearing Boundary
-  Approved Project Boundary Version 9

NOTE:
 - EIS and SPIR designs sourced from Chapter 4 of the Pacific Highway Upgrade: Woolgoolga to Ballina Submissions/ Preferred Infrastructure Report (RMS, 2013).
 - This figure is indicative and not geospatially accurate.

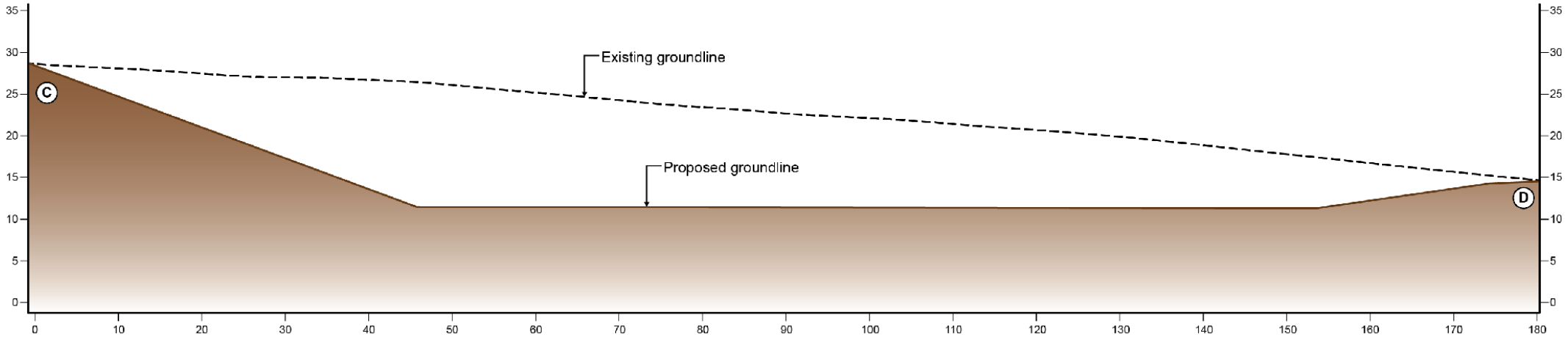


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Author:	BORGM
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CURRENT DESIGN



SPIR DESIGN



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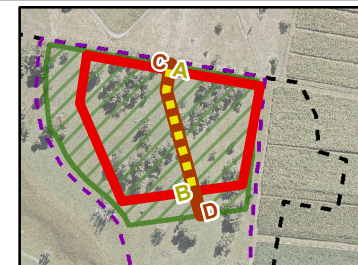
Woolgoolga to Ballina

Revised Excavation Area Cross Section at Lang Hill Borrow Site

Figure 5-3

NOTE:
The SPIR design cross section was generated from an interpretation of Figure 4-29 in Chapter 4 of the Pacific Highway Upgrade: Woolgoolga to Ballina Submissions/ Preferred Infrastructure Report (RMS, 2013)

This figure is indicative only and not geospatially accurate



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Print Date: 16/09/2016

Author: BORGM

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5.5 Heritage

5.5.1 Aboriginal

An Aboriginal artefact scatter known as Gittoes Jali is located in the area of the borrow site. Gittoes Gali is considered to have a high level of significance at a regional and potentially state level. Salvage works have been undertaken at Gittoes Jali where the borrow site excavation is proposed. The original conservation zone identified in the SPIR has been revised due to the identification of an item of exceptional Aboriginal heritage significance during salvage (refer to heritage clearance letter, Appendix E and Figure 3-2).

Exclusion fencing, in accordance with the approved Pacific Complete Construction Heritage Management Plan (sections 3 to 11) (CHMP) and the heritage clearance letter for the site (Appendix E), will be established around the borrow site, access track and north eastern edge of the project alignment, to restrict access to the unsalvaged area of the Gittoes Jali Aboriginal heritage site. The design and operation of the borrow site will ensure that no direct or indirect impacts, including erosion or vibration, will occur along the northern boundary of the conservation zone.

The paint wells and grinding rocks outlined in mitigation measure SPIR AH21 are located on the opposite side of the project alignment. These will not be impacted by the project. An exclusion zone will be established around these items, as shown in heritage clearance letter, Appendix E and Figure 3-2.

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 (CCEMP) 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 would be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.

5.5.2 Non-Aboriginal

As outlined in the SPIR, no non-Aboriginal heritage items were identified on the State Heritage Register in the vicinity of the borrow site. No impacts to non-Aboriginal heritage are anticipated, therefore the impacts are consistent with those approved under the EIS and SPIR.

5.6 Traffic, transport and access

The Lang Hill Borrow Site will be accessed via the construction corridor to the south of the site during the establishment, operation, decommissioning and rehabilitation of the site. The construction corridor will be cleared and open to construction vehicles prior to the establishment of the borrow site. Vehicles traveling to the site from the existing Pacific Highway will enter the construction corridor from Woodburn-Evans Head Road, approximately 2.5 kilometres south west of the borrow site, as shown in Appendix F. A two-way access and haul road will be established from the construction corridor to the borrow site, to the east of the heritage conservation area, as shown in Figure 3-2. As outlined in Section 5.5.1 of this management plan, exclusion fencing around the borrow site and access track will be constructed in accordance with the approved Pacific Complete Construction Heritage Management Plan (sections 3 to 11) (CHMP) and the heritage clearance letter for the site

(Appendix F). The extracted material will be hauled along the project corridor to locations within Portion C (Sections 7, 8 and 9) only and will not impact on the local road network.

An existing access track is located to the west of the borrow site. Prior to the establishment of the site, and the opening of the construction corridor, incidental traffic may access the site from this existing access track as shown in Figure 3-2. Only pedestrian access will be permitted past the unnamed waterway. If the crossing is inundated with water, access will not be permitted and the site visit will be rescheduled. This access will be prohibited once the site access from the construction corridor is established.

Traffic 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 (CCEMP) 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 would be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.

5.7 Noise and vibration

A noise assessment was completed as part of the SPIR that modelled the predicted noise levels for each activity proposed to occur at the borrow site, including;

- mobilisation and excavation
- ripping
- hard ripping (similar process to rock hammering)
- materials processing
- demobilisation and backfill.

These activities align with the activities that Pacific Complete anticipates will occur at the borrow site. The equipment used in the assessment is also similar to those anticipated to be used during the operation of the site.

The SPIR noise assessment identified six sensitive receivers within 600 metres of the borrow site and determined the noise management level (NML) for sensitive receivers to be 57 dB(A). The assessment identified that activities may result in minor exceedances, 1 to 3 dB(A) at the closest sensitive receivers, located 150 to 200 metres to the west of the site. Activities anticipated to cause the biggest exceedances include hard ripping and material processing. The cumulative impact of simultaneous activities was anticipated to result in up to 3 dB(A) for two activities occurring simultaneously. These results are based on worst case scenarios.

The sensitive receivers to the west of the borrow site have been acquired by Roads and Maritime. A new sensitive receiver is now located 100 metres to the north of the borrow site and was therefore not considered in the SPIR noise assessment. The rest of the sensitive receivers are located more than 400 metres from the site and are therefore not anticipated to experience noise exceedances, as outlined in the SPIR. Figure 5-4 shows the locations of sensitive receivers in the vicinity of the Lang Hill Borrow Site.

The new sensitive receiver is anticipated to experience some noise exceedances over the noise management level (NML). The excavations at the borrow site will be taking place down into the side of the hill. As the excavation goes deeper it is expected that the noise levels experienced by the new sensitive receiver would reduce as the walls of the borrow site void

will begin to act as a noise barrier. It is therefore anticipated that the noise levels experienced by the new sensitive receiver will be at their peak at the start of the excavation works.

As outlined above, hard ripping and material processing is predicted to cause the largest noise exceedances. Section 4.2 of this borrow site management plan outlines that material processing will occur either at the ancillary facility on the opposite side of the alignment and/or within the void of the excavation area. If material processing is to occur within the void, crushing and screening plant will be positioned and orientated to cause the least impact.

The contractor will carry out ongoing noise monitoring as outlined in Section 8.3 of the approved Pacific Complete Construction Noise and Vibration Management Plan (sections 3 to 11) (CNVMP), Appendix B3 of the CEMP that will include:

- 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 to determine if the actual construction noise levels are appropriate.
- 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 manufactures specifications.

Noise monitoring for Lang Hill Borrow Site will be undertaken at the start of the works at the closest sensitive receiver to establish the noise levels that they will experience. Periodic monitoring will occur at progressive depths to assess whether noise reductions are being experienced. Based on the outcomes of this monitoring, additional mitigations will be implemented if required. These measures will be implemented in consultation with the receiver and may include measures such as the establishment of noise attenuation mounds, the repositioning of plant and equipment and restricting the times that noise intensive activities occur.

MCoA B18 states:

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 standard construction hours.

The borrow site is located in a rural landscape, considered to be a sparsely populated area due to the minimal number of residents in the vicinity of the borrow site and the closest township being approximately 3 kilometers from the site. The above activities will therefore occur within the approved construction hours for the project outlined in MCoA B15, and referred to in Section 4.3.

Noise and vibration 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 (CCEMP) 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 would be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.

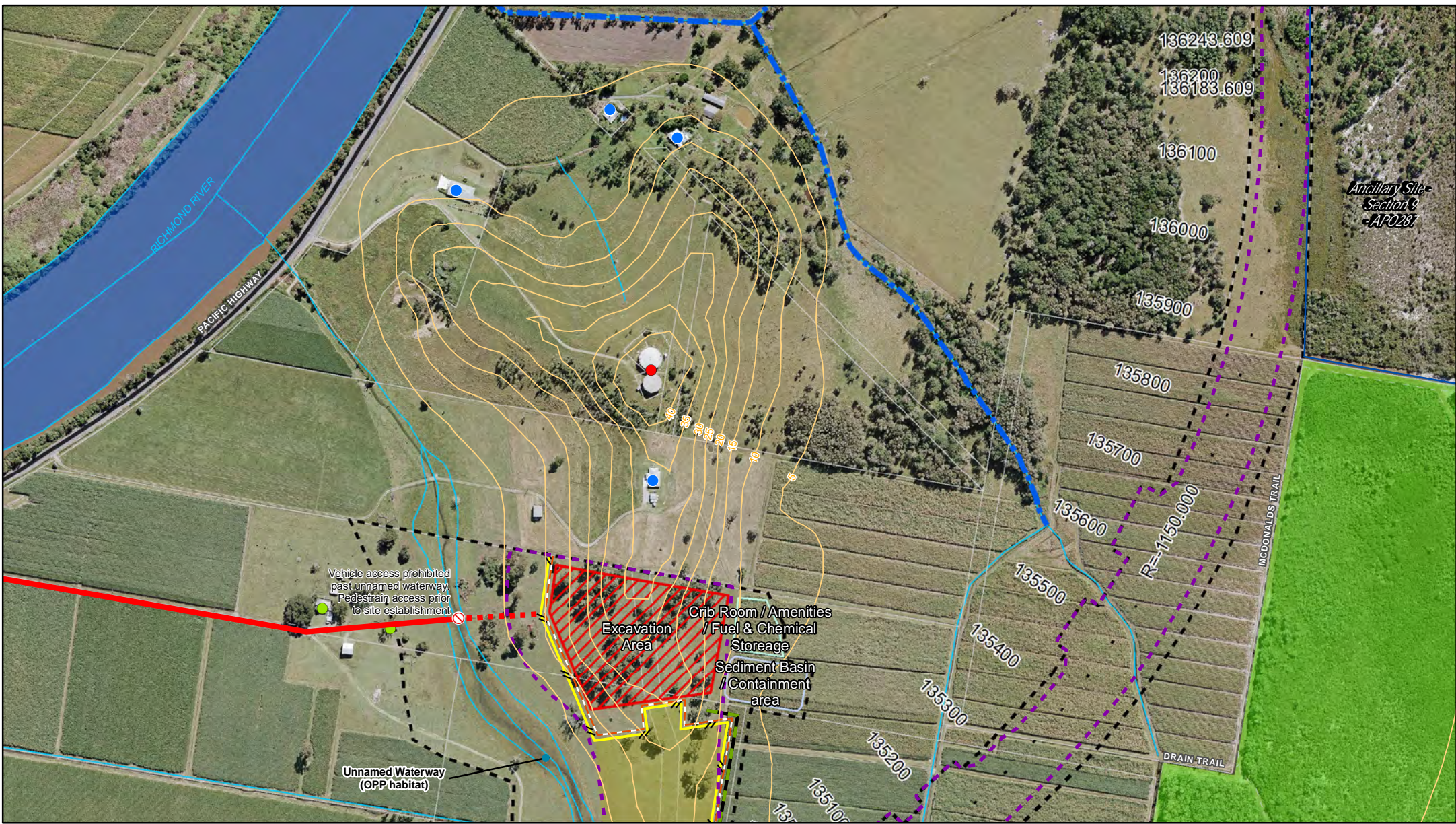
5.7.1 Blasting

All blasts will be planned, executed and monitored in accordance with the Blast Management Procedure, Appendix B of the CNVMP and will ensure the overpressure and vibration limits outlined in MCoA B22 and B23 are not exceeded. This will be achieved through the preparation of a site specific blast management plan prior to any blast. A trial blast will be undertaken to determine the site specific blast criteria. Each blast will have a specific blast design which will be prepared by the contractor and will address potential risks and control measures.

Rous Water reservoirs are located 200 metres north of the proposed borrow site. As outlined in MCoA B23, ground vibration limits for infrastructure service structures, such as pipelines, powerlines, cables and reservoirs will be determined by structural design methodology in consultation with the infrastructure service provider.

Pacific Complete has consulted with Rous Water and have agreed that the blast management plans will include an engineering assessment to determine the impacts of blasting on nearby water infrastructure. This assessment will include a dilapidation survey of the above ground structures owned by Rous Water. As agreed with Rous Water blasting activities will not exceed 25 millimetres per second (mm/s) for water mains and 15mm/s for reservoirs. Appropriate mitigation measures will be implemented to reduce the impacts of blasting on Rous Waters assets.

Blast vibration monitoring will take place at Rous Water infrastructure during blasting activities. Rous Water will be notified 24 hours prior to each blast in accordance with Section 5.4 of the approved Pacific Complete Construction Noise and Vibration Management Plan (sections 3 to 11) (CNVMP), Appendix B3 of the CEMP.



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PACIFIC HIGHWAY UPGRADE

Woolgoolga to Ballina

Sensitive Receivers near Lang Hill Borrow Site

Figure 5-4

- | | |
|---|--|
| <ul style="list-style-type: none"> ● Residential receiver ● Rous Water Reservoirs ● Residential receiver (acquired by RMS) ⊘ No access during construction Key Fish Channel Access route Exclusion fencing Sediment fencing Contours 5 m | <ul style="list-style-type: none"> Drainage Conservation Area/No Go Zone Crib Room / Amenities / Fuel & Chemical Storage Sediment Basin / Containment area Excavation Area Ancillary facility SPIR Clearing Boundary Approved Project Boundary Version 9 Richmond River Access prior to establishment (vehicles) Access prior to establishment (pedestrian) |
|---|--|

* This figure is indicative and not geospatially accurate. These locations will be finalised by the contractor during detailed design.



	1:6,000 at A4
Print Date:	15/08/2016
Author:	BORGM
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5.8 Air quality

Activities at the borrow site that may impact on air quality include excavation activities, blasting, crushing and screening, vehicles movements and emissions. The EIS outlines that the common wind direction for Section 8 is from the south east to south-south east. The closest sensitive receiver is located 100 metres north of the site, with other receivers located more than 400 metres to the north and north west of the site. These receivers may be impacted by dust generated from the site, however it is anticipated that Lang Hill will act as a buffer between the borrow site and the majority of the receivers that are located on the other side of Lang Hill. 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 minimal.

To assist in monitoring the sites impact on air quality, a dust deposition gauge would 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 (CCEMP) 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 would 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 Lang Hill Borrow Site would be established, operated, maintained and decommissioned in accordance with the requirements included in the approved Pacific Complete Construction Environmental Management Plan (sections 3 to 11) (CEMP) 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 (CCEMP) 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 would be developed by the contractor for the Lang Hill Borrow Site. Management measures identified in this borrow site management plan would be incorporated into site or activity specific Environmental Work Method Statements (EWMS) prepared by the contractor.

A draft EWMS was prepared as part of the SPIR. These mitigation measures have been included in Table 6-1 with additional notes to refine the mitigation measures.

Specific measures and requirements to address environmental impacts from the Lang 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				
LHBS 1	Temporary security fencing will be installed around the perimeter of the site. Fencing to remain on site until the site has been demobilised and rehabilitated. <i>Note: Security fencing will be installed around the excavation area and the associated infrastructure. Shade cloth of a suitable colour to blend into the surrounding landscape will be installed on the fencing to reduce dust and visual impacts of the borrow site. Do not enter signage will also be placed on the security fencing.</i>	Project Contractor's Project Engineer/ Foreman	Pre-construction Construction	Draft SPIR EWMS

	Measure/Requirement	Responsibility	Timing/frequency	Reference
	<i>Security fencing will also act as a barrier to stop fauna entering the site. Fencing will be selected to ensure no gap is left between the fence and the ground and the dimension of holes is adequate to stop koalas entering the site. No barbed wire will be placed around the top of the fence.</i>			
LHBS 2	Extraction to be staged east to west and graded to the west to drain the site towards sedimentation basin away from the unnamed waterway. Vegetation clearing/topsoil removal will only be undertaken for that section of land subject to that stage of excavation. <i>Note: Extraction will be staged east to west and graded towards the sediment basin/containment area, (not to the west) and away from the unnamed waterway. Vegetation clearing/topsoil removal will only be undertaken for that section of land subject to that stage of excavation.</i>	Project Contractor's Project Engineer/ Foreman	Construction	Draft SPIR EWMS
LHBS 3	Exclusion zones to be fenced to exclude entry by people or plant. Clearly delineate construction vehicle and plant access to the area to prevent disturbance/damage to adjacent vegetation and heritage sites. Fencing to remain on site until the site has been demobilised and rehabilitated.	Project Contractor's Project Engineer/ Foreman	Pre-construction Construction	Draft SPIR EWMS
LHBS 4	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.	Pacific Complete Construction Personnel Project Contractor's Project Engineer	Pre-construction Construction	MCoA B79
BIODIVERSITY				
LHBS 5	The Lang Hill Environmental Work Method Statement (EWMS) will be further developed and implemented by the contractor during the use and rehabilitation of the borrow site. <i>Note: Agencies will be consulted during the development of this EWMS.</i>	Project Contractor's Environment Representative	Pre-construction Construction	SPIR B59

	Measure/Requirement	Responsibility	Timing/frequency	Reference
LHBS 6	<p>Erosion and sediment controls will be installed to the west of the borrow source (extraction area) and east of the identified aquatic (OPP) habitat to avoid sediment entering the waterway.</p> <p><i>Note: Note: erosion and sediment control fencing will be installed along the western and southern boundary of the extraction area as well as along the access track as shown in Figure 3-2.</i></p>	Project Contractor's Environment Representative/ Project Engineer/ Foreman	Pre-construction Construction	Draft SPIR EWMS
LHBS 7	<p>Property access tracks from the west that cross over the unnamed waterway are not to be used.</p> <p><i>Note: The use of the existing access track on the western side of the borrow site as shown in Figure 3-2 will only be used prior to the establishment of the borrow site and opening of the construction corridor. Access beyond the unnamed waterway will be limited to pedestrians. If the crossing is inundated with water, access will not be permitted and the site visit will be rescheduled. This access will be prohibited once the site access from the construction corridor is established and will not be used for the establishment, operation, decommissioning or rehabilitation of the site.</i></p>	Project Contractor's Project Engineer/ Foreman	Construction	Draft SPIR EWMS
LHBS 8	<p>Haulage of material across the unnamed waterway on the project alignment will not occur until the permanent crossing structure has been constructed. Appropriate controls and procedures will be implemented for the main alignment construction within 25 metres of the unnamed waterway.</p> <p><i>Note: If alternative access is required, this will be considered in consultation with the relevant government agencies.</i></p>	Pacific Complete Construction Personnel Project Contractor's Project Engineer/ Environment Representative Foreman	Construction	Draft SPIR EWMS
LHBS 9	<p>Regular inspections and toolbox talks will be carried out to ensure that access to the site is not gained via existing structures across the unnamed waterway.</p>	Pacific Complete Construction Personnel Project Contractor's Project Engineer/ Environment	Construction	Draft SPIR EWMS

	Measure/Requirement	Responsibility	Timing/frequency	Reference
		Representative Foreman		
LHBS 10	<p>The creek line on the 'Lang Hill' property will be fenced off from cattle to allow for the regeneration of riparian vegetation and to improve the habitat conditions downstream.</p> <p><i>Note: The property has been acquired by RMS and cattle have been removed. The activities associated with the borrow site will not occur in the vicinity of the unnamed waterway therefore no further impacts to riparian vegetation are anticipated. If cattle is to be returned to the site post decommissioning, fencing of the unnamed waterway will be considered during rehabilitation.</i></p>	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction Operation	SPIR B60
	The unnamed waterway will be managed in accordance with the approved Threatened Fish Management Plan (RMS, 2015)	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Pre-construction Construction Operation	Threatened Fish Management Plan
ABORIGINAL HERITAGE				
LHBS 11	<p>Salvage excavations of the Aboriginal heritage site that would be directly impacted would be undertaken in consultation with the registered Aboriginal parties and in accordance with the heritage management plan, Appendix B5 of the CEMP.</p> <p><i>Note: salvage at Gittoes Jali has been completed, refer to Appendix E.</i></p>	Pacific Complete Environment Manager	Pre-construction	Draft SPIR EWMS
LHBS 12	<p>For the Gittoes Jali (09-1-0204, 09-1-0205, 09-1-0203) site:</p> <ul style="list-style-type: none"> • Where possible, impacts on the Gittoes Jali site will be reduced or avoided. Avoided areas will be protected by an exclusion fence as per management measure AH2. If avoidance is not an option, then extensive salvage will be undertaken as per the methodology detailed in the Ancillary facilities and design change CHAR (refer to Appendix E of the Submissions/ Preferred Infrastructure Report). • Any sediment from the site to 0.6 metre depth proposed to be used outside the site will be sieved to remove any cultural material. <p>Paint wells and grinding rock:</p>	Pacific Compete Environment Manager	Pre-construction Construction	SPIR AH21

	Measure/Requirement	Responsibility	Timing/frequency	Reference
	<ul style="list-style-type: none"> Residue analysis will be undertaken to determine if any pigment is found within the wells. This will be undertaken by a suitably qualified consultant. The location of these paint wells will be accurately plotted and drawn. If the paint wells cannot be avoided, they will be relocated; this requires consultation with the registered Aboriginal stakeholders. <p>Geomorphology assessment:</p> <ul style="list-style-type: none"> A geomorphology assessment will be undertaken. The assessment will be non-invasive, but could use observations of the machine salvage excavation. <p>Borrow site:</p> <ul style="list-style-type: none"> Haul routes from the project formation to the borrow source that limit direct impacts to Aboriginal heritage will be confirmed in consultation with Registered Aboriginal Parties. <p><i>Note: The paint wells on the opposite side of the alignment to the borrow site will not be impacted by the project. Exclusion fencing will be installed in accordance with the Construction Heritage Management Plan (sections 3 to 11) (CHMP), Appendix B4 of the CEMP and the clearance letter attached in Appendix E. The residual analysis and geomorphology assessment are currently being undertaken by Navin Officer. The clearance letter for the site will be amended to include weed management controls for the conservation area. The management plan will be updated when the amended clearance letter is received.</i></p>			
LHBS 13	The design and operation of the borrow site will ensure that there are no inadvertent impacts, such as erosion or vibration, along the northern boundary of the conservation zone.	<p>Pacific Complete Environment Manager</p> <p>Pacific Complete Construction Personnel</p> <p>Project Contractor's Project Engineer/Environment</p>	Pre-construction Construction	Clearance Letter – Navin Officer (Appendix E)

	Measure/Requirement	Responsibility	Timing/frequency	Reference
		Representative/ Foreman		
LHBS 14	High visibility construction webbing or similar fencing with 'Do Not Enter' signage will be established around the borrow site, access track and north eastern edge of the project alignment, as outlined in Figure 3-2, to restrict access to the unsalvaged area of the Gittoes Jali heritage site. A representative of the Local Aboriginal Land Council will be present during establishment of the fencing.	Pacific Complete Construction Personnel Project Contractor's Project Engineer/ Environment Representative/ Foreman	Pre-construction Construction	Clearance Letter – Navin Officer (Appendix E)
LHBS 15	Where feasible fencing should be constructed with the largest distance possible from the conservation zone to minimise impacts to the remaining heritage items. Fencing should be constructed in consultation with representatives from the local Aboriginal community, and checked by the project archaeologist prior to construction commencing.	Pacific Complete Construction Personnel Project Contractor's Project Engineer/ Environment Representative/ Foreman	Pre-construction Construction	Clearance Letter – Navin Officer (Appendix E)
LHBS 16	If any investigation, such as geotechnical pits, or the establishment of ancillary infrastructure is required outside the project boundary, additional heritage assessments will be required. This may result in the need for additional salvage works. Any additional investigations should be undertaken in consultation with representatives of the Aboriginal community.	Pacific Complete Construction Personnel Project Contractor's Project Engineer/ Environment Representative/ Foreman	Pre-construction Construction	Clearance Letter – Navin Officer (Appendix E)
LHBS 17	The Aboriginal heritage exclusion fencing would be regularly inspected and maintained.	Project Contractor's Project Engineer/	Construction	Draft SPIR EWMS

	Measure/Requirement	Responsibility	Timing/ frequency	Reference
		Environment Representative/ Foreman		
SOIL, SEDIMENT AND WATER				
LHBS 18	An erosion and sediment control plan (ESCP) will be prepared prior to works on site. <i>Note: This will be prepared by the appointed contractor's soil conservationist 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.</i>	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Pre-construction	Draft SPIR EWMS
LHBS 19	Sediment basins (90 th percentile) and sediment fences will be implemented to avoid sediment flowing into the waterway. <i>Note: The sediment basin/ containment area will be designed and sized in accordance with the Blue Book to be above the groundwater table by the contractor's soil conservationist.</i>	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Pre-construction Construction	Draft SPIR EWMS
LHBS 20	The access track will be sealed and runoff will be captured and diverted to sediment basins/ containment area. <i>Note: Pacific Complete does not propose to seal the access track. The track will be graded, compacted and maintained and runoff will be managed in accordance with the approved Pacific Complete Construction Soil and Water Quality Management Plan (sections 3 to 11) (SWQMP), Appendix B4 of the CEMP and the project Environment Protection Licence.</i>	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Pre-construction Construction	Draft SPIR EWMS
LHBS 21	Bunding around the site will be stabilised through seeding or other means and have a finished height above the 20 year flood level.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Pre-construction Construction	Draft SPIR EWMS

	Measure/Requirement	Responsibility	Timing/frequency	Reference
LHBS 22	Compact earth platform will be constructed above the 20 year flood level. <i>Note: this includes the portion of the sediment basin/ containment area, crib/amenities and section of the access track that falls below the 20 year flood level.</i>	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Pre-construction Construction	Draft SPIR EWMS
LHBS 23	No ground disturbance will occur during the construction of the access track to ensure the potential contaminated site is not disturbed. Instead of removing topsoil, geofabrics and gravel will be used to construct the access track.	Project Contractor's Project Engineer/ Foreman	Construction	Good practice
LHBS 24	Chemicals and fuel will be stored in an appropriately bunded storage facility above the ARI 20 year limit.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Good practice
LHBS 25	Surface and groundwater monitoring will occur during the use of the site. <i>Note: Surface and groundwater monitoring will be carried out in accordance with the approved Water Quality Monitoring Program – sections 3 to 11 (Geolink, 2015). A number of surface and groundwater monitoring locations are in the vicinity of Lang Hill, including along the unnamed waterway to the west of the borrow site.</i>	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Draft SPIR EWMS
LHBS 26	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	Construction	SPIR SSW39
LHBS 27	Erosion and sediment controls will be implemented to the west of the extraction area and east of the unnamed waterway.	Project Contractor's Project Engineer/	Construction	Draft SPIR EWMS

	Measure/Requirement	Responsibility	Timing/frequency	Reference
	<i>Note: Note: erosion and sediment control fencing will be installed along the western and southern boundary of the borrow site as well as along the access track as showing in Figure 3-2.</i>	Foreman/ Environment Representative		
LHBS 28	The sediment basin/ containment area will remain maximum possible distance from waterway bank.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Draft SPIR EWMS
LHBS 29	Stockpiles will be constructed along the contour as low, flat elongated mounds, with, where possible, no greater in height than 2 metres: <i>Note: Stockpiles will be established and managed in accordance with the approved Pacific Complete Construction Soil and Water Quality Management Plan (sections 3 to 11) (SWQMP), Appendix B4 of the CEMP.</i>	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Draft SPIR EWMS
LHBS 30	Diversion drains will be established upslope to divert water around the site. <i>Note: Diversion drains will be established to divert water towards the sediment basin/ containment area to the east of the borrow site.</i>	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Draft SPIR EWMS
LHBS 31	The water from the sediment basin/containment area would be used for dust suppression and if required, would be irrigated on adjoining cane land (owned by RMS) to empty the sediment basin/ containment area. <i>Note: Irrigation to the adjoining cane land (owned by RMS) will be carried out in accordance with P1.8 in the approved project EPL (EPL number 20713) in a manner that:</i> <ul style="list-style-type: none"> • <i>Vegetation is not damaged</i> • <i>Soil and erosion and soil structure damage is avoided</i> • <i>Water must not pond or pool and cause waterlogging of soils</i> 	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Draft SPIR EWMS

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

Lang Hill Borrow Site Management Plan

	Measure/Requirement	Responsibility	Timing/frequency	Reference
	<ul style="list-style-type: none"> The quality of surface water and groundwater is not adversely affected Water is irrigated in a manner which maximises evaporation, transpiration and infiltration and does not result in water flowing from the irrigation area into any waters. 			
LHBS 32	<p>Sediment and erosion controls (including bunding and sediment basins/ containment areas) will be monitored daily to maintain effectiveness of controls. A formal environmental inspection, including sediment control inspections, will occur weekly using a project specific checklist.</p> <p>Formal inspections will occur within 24 hours of the commencement of any rainfall event (>10 millimetres) and every 24 hours during any prolonged period of rainfall. A review should also occur when it has been identified that control measures are not performing effectively.</p>	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Draft SPIR EWMS
LHBS 33	The sediment levels in sediment basins/ containment areas will be regularly inspected. Where this is approaching 30 percent of the sediment storage capacity, the basin would be cleared. Sediment would be placed in an appropriately bunded temporary stockpile.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Draft SPIR EWMS
LHBS 34	<p>Sediment fences will be regularly inspected for undercutting, sagging and overtopping, general condition of the fence and repaired immediately. Where appropriate, gravel will be applied to the base of sediment fencing where potential undercutting or end running has been observed.</p> <p>If a sediment fence fails, the catchment area and flow type (concentrated or sheet) will be reviewed to determine if the fence and flow controls are appropriate or require to be modified.</p>	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Draft SPIR EWMS
LHBS 35	If excavation works at the site encounter a permanent water table in the bedrock sandstone to a depth in excess of 5m, review and management measures should be considered, and these would 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	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Groundwater memorandum

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

Lang Hill Borrow Site Management Plan

	Measure/Requirement	Responsibility	Timing/frequency	Reference
	Complete Construction Soil and Water Quality Management Plan (sections 3 to 11) (CWQMP), Appendix B4 of the CEMP.			
URBAN DESIGN AND LANDSCAPE				
LHBS 36	The extent of excavation and the landscaping 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	Pre-construction	SPiR UD10
LHBS 37	A row of tall Grevillia's will be included in the property adjustment plan for the property to the north of the borrow site. These will be planted prior to the works commencing at the site to reduce the visual impacts of the site of the receivers.	Pacific Complete Construction Personnel	Pre-construction	Agreement with landowner
LHBS 38	<p>Any backfilling of the Lang Hill and West of Wardell borrow sites will be undertaken with available surplus material from the project. Rehabilitation of the sites will be undertaken in accordance of the landscape strategy (UD3), design principles (UD5) and the intended future land use of the sites.</p> <p>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 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.</p> <p>UD5 (UD4 in the SPiR) – The built form of the project, including consideration of the height, bulk, scale, materials and finishes for:</p> <ul style="list-style-type: none"> – 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 	Pacific Complete Construction Personnel Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	SPiR UD11

	Measure/Requirement	Responsibility	Timing/frequency	Reference
	<p>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.</p> <p><i>Note: The site will be rehabilitated in accordance with the following principles outlined in section 6.8 of the Urban Design and Landscape Plan for sections 7 to 9 (RMS, 2016):</i></p> <ol style="list-style-type: none"> 1. <i>Establish landowner requirements and identify rehabilitation objectives</i> 2. <i>Consideration of the location context and amenity requirements</i> 3. <i>Integrate rehabilitation with adjacent landform, topography</i> 4. <i>Consider fauna connectivity and wildlife corridors and enhance where possible</i> 5. <i>Apply landscape treatments consistent with the project UDLP to ensure an integrated outcome.</i> 			
NOISE AND VIBRATION				
LHBS 39	Noise monitoring will be undertaken at the start of the works at the closest receiver to establish the noise levels that they will experience. Periodic monitoring will occur at progressive depths to assess whether noise reductions are being experienced. Based on the outcomes of this monitoring additional mitigations will be implemented if required.	Project Contractor's Project Engineer/ Foreman/ Environment Representative	Construction	Good practice
LHBS 40	Vibration and blast assessments will be undertaken at sensitive receivers (including the Rouse Water Reservoirs) within 200 metres of any blast.	Contractor's Environment Representative	Pre-construction	Draft SPIR EWMS
LHBS 41	The construction contractor will prepare detailed site specific blast management plans prior to each blast in accordance with the Blast Management Procedure, Appendix B of the Pacific Complete CNVMP.	Pacific Complete Construction Personnel Project Contractor's Environment Representative/	Construction	Pacific Complete CNVMP

	Measure/Requirement	Responsibility	Timing/frequency	Reference
		Project Engineer/ Foreman		
LHBS 42	Where a blast location is predicted to impact on a sensitive receiver, a series of trials will be undertaken at a reduced scale to determine site specific blast response characteristics to define allowable blast sizes.	Project Contractor's Environment Representative/ Project Engineer/ Foreman	Construction	Draft SPIR EWMS
LHBS 43	Blast management plans will include an engineering assessment, including dilapidation survey of above ground structures owned by Rous Water, to determine the impacts of blasting on nearby water infrastructure. Blasting activities will not exceed 25 millimetres per second (mm/s) for water mains and 15mm/s for reservoirs. Appropriate mitigation measures will be provided to reduce the impacts of blasting on Rous Waters assets.	Pacific Complete Construction Personnel Project Contractor's Environment Representative/ Project Engineer/ Foreman	Construction	Correspondence with Rous Water
LHBS 44	Blast vibration monitoring will take place at Rous Water infrastructure during blasting activities. Rous Water will be notified 24 hours prior to each blast in accordance with Section 5.4 of the approved Pacific Complete Construction Noise and Vibration Management Plan (sections 3 to 11) (CNVMP), Appendix B3 of the CEMP.	Pacific Complete Construction Personnel Project Contractor's Environment Representative/ Project Engineer/ Foreman	Construction	Correspondence with Rous Water
LHBS 45	Heavy vibratory rollers will not be used within 5 metres of the centre link of a main unless otherwise approved in consultation with Rous Water. Use of light roller (18T or less) or other non-vibratory compaction equipment is permitted within 5 metre of a main, provided that the main has the minimum cover. The contractor will consult with Rous Water to determine if the relevant main has the minimum cover.	Project Contractor's Environment Representative/ Project Engineer/ Foreman	Construction	Correspondence with Rous Water

	Measure/Requirement	Responsibility	Timing/frequency	Reference
LAND USE AND PROPERTY				
LHBS 46	Consultation will be undertaken with Rous Water and local Aboriginal stakeholders before the removal of part or any of the abandoned pipelines through Lang Hill.	Project Contractor's Project Engineer	Pre-construction	SPIR LU32
LHBS 47	Excavation and relocation of underground utilities, where required for the use of the site to be undertaken in consultation with Rous Water.	Pacific Complete Construction Personnel Contractor's Project Engineer	Pre-construction	Draft SPIR EWMS
SOCIAL AND ECONOMIC				
LHBS 48	Landowners/ community members who may be affected by the works will be notified prior to work commencing.	Contractor's Project Engineer	Pre-construction	Draft SPIR EWMS
REHABILITATION				
LHBS 49	The borrow site will be filled with surplus material to the greatest extent possible from surrounding project sections. The landform would aim to mimic the existing landform. <i>Note: Any available backfilling material will be used to smooth out the transition between the void walls and the adjacent landforms and decrease the incline of the batter slopes to form a more natural appearance.</i>	Pacific Complete Construction Personnel Contractor's Project Engineer/ Foreman	Post construction	Draft SPIR EWMS
LHBS 50	Shaped areas will be covered with appropriate level of topsoil, using where possible, the previously stripped topsoil, then revegetated with grass and ground cover plantings as per the Landscape and Urban Design Strategy. <i>Note: The site will be rehabilitated in accordance with the following principles outlined in section 6.8 of the Urban Design and Landscape Plan for sections 7 to 9 (RMS, 2016):</i> 1. Establish landowner requirements and identify rehabilitation objectives 2. Consideration of the location context and amenity requirements 3. Integrate rehabilitation with adjacent landform, topography	Contractor's Project Engineer/ Foreman/ Environment Representative	Post construction	Draft SPIR EWMS

	Measure/Requirement	Responsibility	Timing/frequency	Reference
	<p>4. Consider fauna connectivity and wildlife corridors and enhance where possible</p> <p>Apply landscape treatments consistent with the project UDLP to ensure an integrated outcome.</p>			
LHBS 51	Mulch may 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.	Contractor's Project Engineer/ Foreman/ Environment Representative	Post construction	Good practice
LHBS 52	<p>Material identified for backfilling would 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:</p> <ul style="list-style-type: none"> Excavated Natural Material Exemption 2014 (EPA, 2014) Guidelines on Resource Recovery Exemptions – Land Application of Waste Materials as Fill (2011, DECCW). 	Contractor's Project Engineer/ Foreman/ Environment Representative	Post construction	Pacific Complete CWREMP
LHBS 53	<p>Stockpiles, exposed batters and drainage lines are to have a 50 percent groundcover equivalent within a month of inactivity. This can be achieved using a combination of vegetation cover or lining.</p> <p><i>Note: Stockpiles, exposed batters and drainage lines are to be stabilised in accordance with the relevant specifications (including but not limited to RMS specifications G38 and R178 and the Blue Book).</i></p>	Contractor's Project Engineer/ Foreman/ Environment Representative	Post construction	Draft SPIR EWMS
LHBS 54	<p>The unnamed waterway would be fenced to exclude fauna and allowed to regenerate to improve water quality and stream bed quality.</p> <p><i>Note: The property has been acquired by RMS and cattle have been removed. The activities associated with the borrow site will not occur in the vicinity of the unnamed waterway, therefore no further impacts to riparian vegetation are anticipated. If cattle</i></p>	Contractor's Project Engineer/ Foreman/ Environment Representative	Post construction	Draft SPIR EWMS

	Measure/Requirement	Responsibility	Timing/frequency	Reference
	<i>is to be returned to the site post decommissioning, fencing of the unnamed waterway will be considered during rehabilitation.</i>			
LHBS 55	Appropriate riparian plant species will be incorporated into the rehabilitation of the already disturbed OPP habitat. <i>Note: Pacific Complete will inspect the creek and identify disturbed areas for rehabilitation.</i>	Contractor's Project Engineer/ Foreman/ Environment Representative	Post construction	Draft SPIR EWMS
LHBS 56	Sediment controls will not be removed from the area until the site vegetation cover has been reinstated to 70 percent ground cover.	Contractor's Project Engineer/ Foreman/ Environment Representative	Post construction	Draft SPIR EWMS
LHBS 57	Rehabilitation of the site (including rehabilitation of the waterway) would be monitored until the vegetation has stabilised. <i>Note: A maintenance plan will be implemented until the area is stable and full groundcover has been achieved.</i>	Contractor's Project Engineer/ Foreman/ Environment Representative	Post construction	Draft SPIR EWMS
LHBS 58	Areas of the borrow site must be suitably remediated to ensure long-term conservation, including the land surface and deposits stability of the northern section of the heritage conservation zone.	Contractor's Project Engineer/ Foreman/ Environment Representative	Post construction	Clearance Letter – Navin Officer (Appendix E)

7 Consultation

7.1 Community

7.1.1 During the preparation of the EIS and SPIR

Roads and Maritime project team attended community information sessions during the EIS and SPIR process where the Lang Hill Borrow Site was discussed. The main information session where the SPIR design refinements for the Lang Hill Borrow Site were presented was at Woodburn Memorial Hall on 17 January 2013, with an additional display held at Woodburn Memorial Hall on 11 February 2013.

Consultation with directly impacted or adjoining landowners was also undertaken.

7.1.2 Post SPIR and project approval

Consultation was carried out with residents located within a 750 metres radius of the borrow site. Letter and feedback forms were distributed through face-to-face meetings with the five residents located within 750 metres of the site on Thursday 28 July 2016 and Monday 1 August 2016. The letter and feedback form distributed is included in Appendix G. Residents were given until 11 August 2016 to provide feedback. The resident closest to the site provided feedback in relation to the visual impacts of the borrow site. Refer to Appendix H for the comment received and Pacific Complete's response. Pacific Complete have agreed for a row of tall Grevillia's to be included in the property adjustment plan for the property to the north of the borrow site. These will be planted prior to the works commencing at the site. No other comments were received from the community.

7.2 Registered Aboriginal Parties

7.2.1 During the preparation of the EIS and SPIR

The Registered Aboriginal Parties (RAPs) were presented the SPIR design refinements at an Aboriginal Focus Group (AFG) meeting on 7 February 2013, at Wardell Hall, Wardell. Two options were presented at this meeting including:

- Option 1 – Project alignment as per EIS design, no borrow site, and mitigation limited to some archaeological salvage of stone artefacts.
- Option 2 – Reduced borrow site cutting within the northern part of the site only (this area has a lower density of artefacts). Mitigations will include extensive salvage excavations, providing the Aboriginal community ownership of the parcels of land where the borrow site is located, and potential provisions for a keeping place.

Parties present preferred option one, however after consideration, Roads and Maritime selected option two as the preferred option due to the need to obtain material for the project and that most of the significant archaeology will be avoided.

7.2.2 Post SPIR and project approval

The design refinements to increase the depth of excavation at the borrow site to 20 metres was discussed at an AFG meeting on 16 June 2016 in Broadwater. No issues were raised by those who attended the meeting.

Consultation letters were provided to the relevant registered Aboriginal stakeholders in August 2016 with an opportunity to provide feedback. No comments were received.

7.3 Rous Water

Pacific Complete have consulted with Rous Water due to the close proximity of their infrastructure to the borrow site. Section 6 outlines vibration management measures that will be implemented to protect Rous Water's assets. Ongoing consultation will occur as required.

7.4 Government agencies

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

8 Rehabilitation

8.1 Existing landscape

Lang Hill is located in a predominantly flat, rural landscape with surrounding land uses consisting of rural residential and agricultural sugar cane farms. The Broadwater National Park is located to the south and east of the borrow site, on the opposite side of the approved highway upgrade alignment. Lang Hill is a prominent feature in the landscape, due to the flat nature of the surrounding area.

The borrow site will be located on the southern facing slope of Lang Hill approximately 250 metres from the new highway alignment. The existing highway is located approximately 500 metres north west of the site.

8.2 Visual impacts

As outlined in Section 5.4, due to the location and elevation of the site, the borrow site activities are anticipated to result in impacts to landscape character and visual appearance. The borrow site will involve the removal of the southern corner of the hill which will cause long term changes to the visual character of the local landscape. Approximately five sensitive receivers are located within 600 metres of the borrow site, therefore the impacts will be limited to a small number of visual receivers and passing traffic.

8.3 Rehabilitation

After the material extraction is complete, if surplus material is available from the project, the excavation area will be partially backfilled. The site will be rehabilitated in accordance with the design principles outlined in the Urban Design and Landscape Plan for section 7 to 9 (RMS, 2016). Any available surplus material will be used to smooth out the transition between the void walls and the adjacent landforms and decrease the incline of the batter slopes to form a more natural appearance. The design of the benches will be in accordance with relevant guidelines and legislation.

Where possible, topsoil initially stripped from the borrow site will be used to assist in the rehabilitation of the site. The topsoil will be spread on the site and grasses and ground cover species will be planted.

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 few 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 8-1 illustrates an indicative cross section of the borrow pit void post excavation and an indicative cross section of the assumed final landform that will exist post rehabilitation, depending on the availability of surplus material. Appendix I includes an indicative 3D model and digital figures that illustrate the wider context of the borrow site and its visibility from the new highway alignment. These figures are indicative only, the ground conditions encountered during the excavation works may result in changes to the shape of the void depicted in Figure 8-1 and Appendix I. The final landform will also be dependent on the shape of the void and available surplus material.

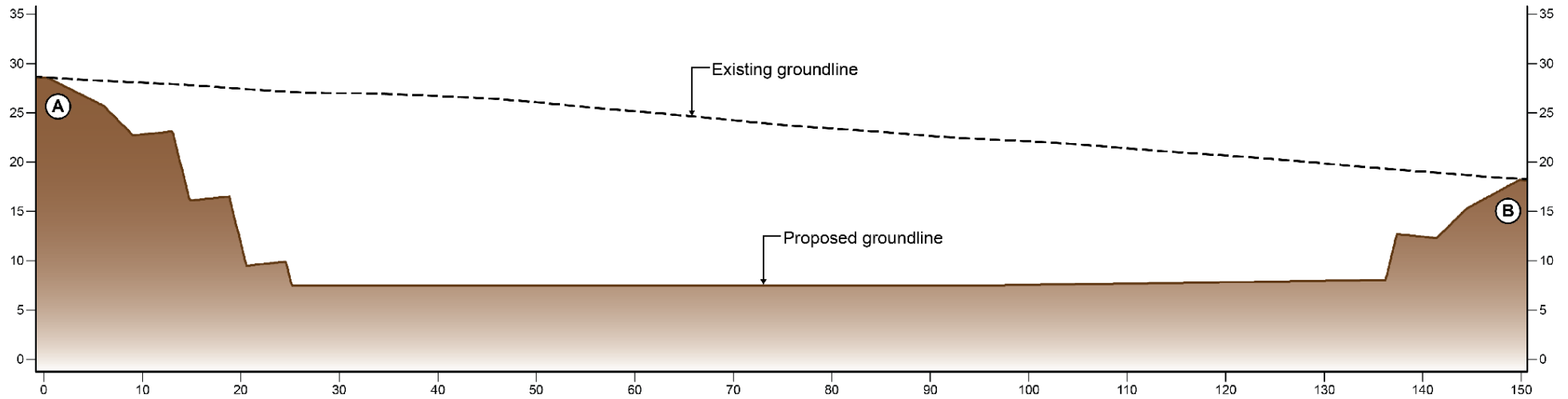
Riparian species will be planted to assist in the rehabilitation of the unnamed waterway on the western side of the site.

Sediment controls will remain operational on the site until the site vegetation cover has established 70 percent ground cover. Monitoring of the site and waterway will continue until the vegetation has stabilised.

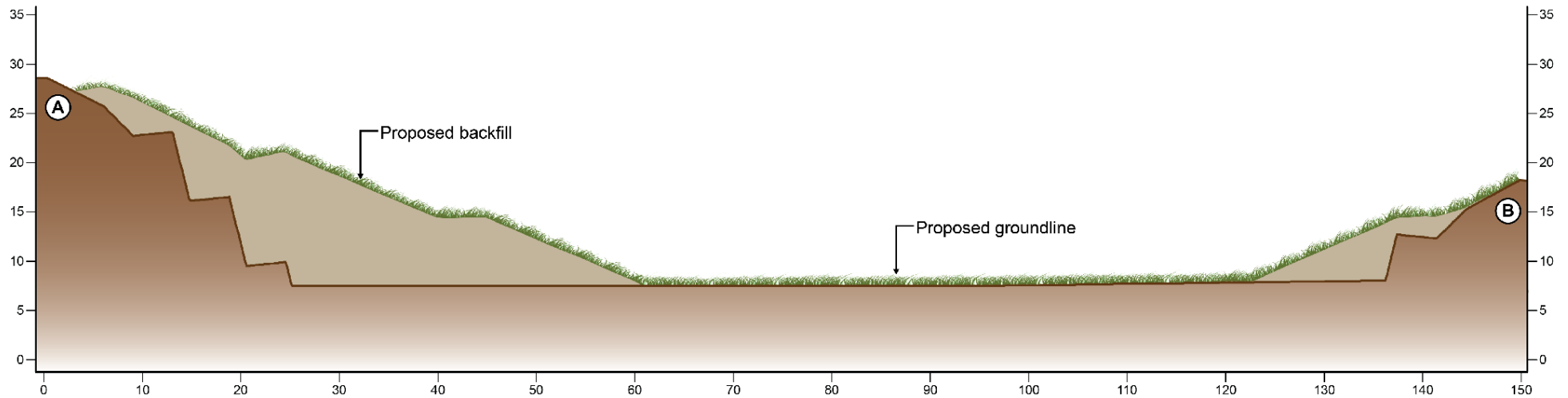
Material identified for backfilling would be managed in accordance with the following documents as outlined in the approved Pacific Complete Construction Waste, Resource and Energy Management Plan (sections 3 to 11) (CWREMP), Appendix B7 of the CEMP:

- Excavated Natural Material Exemption 2014 (EPA, 2014)
- Guidelines on Resource Recovery Exemptions – Land Application of Waste Materials as Fill (2011, DECCW).

PROPOSED EXCAVATION



PROPOSED BACKFILL



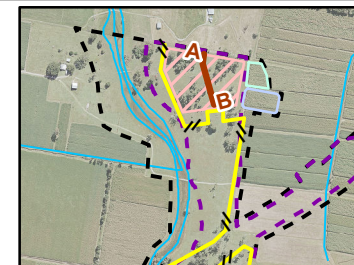
PACIFIC COMPLETE


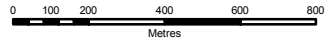
PACIFIC HIGHWAY UPGRADE

Woolgoolga to Ballina

Indicative cross section of Lang Hill Borrow Site

Figure 8-1



	1:20,000 at A4
	
Print Date:	23/06/2016
Author:	BORGM
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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.

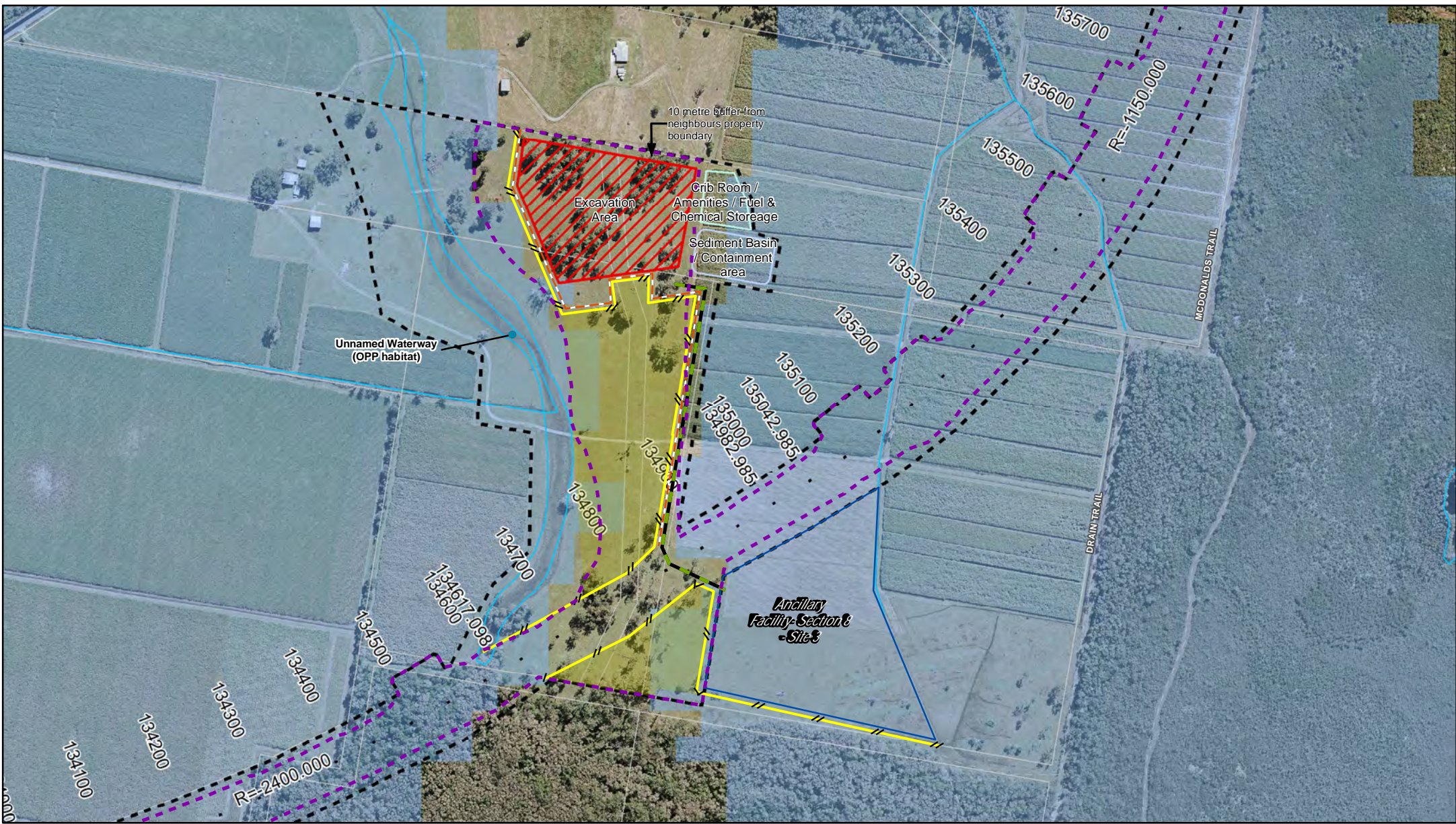
9.2 Borrow Site Management Plan update and amendment

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

Any revisions to the Lang 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 Flooding constraints map



PACIFIC COMPLETE

PACIFIC HIGHWAY UPGRADE

Woolgoolga to Ballina

Flooding Potential at Lang Hill Borrow Site

- Access route
- Exclusion fencing
- Sediment fencing
- Drainage
- ARI 20 year flood limit
- Ancillary facility
- Conservation Area/No Go Zone
- Crib Room / Amenities / Fuel & Chemical Storage
- Sediment Basin / Containment area
- Excavation Area
- SPIR Clearing Boundary
- Approved Project Boundary Version 9



1:6,000 at A4

0 25 50 100 150 200 Metres

Print Date: 15/08/2016

Author: BORM

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Appendix B Groundwater memorandum

MEMORANDUM

TO:	Hugh Madden – Planning and Approvals Lead	FUNCTION:	Environment
FROM:	Ray Hatley – Capability Executive Hydrogeologist	FUNCTION:	Environment
CC:	Georgia Harney	DATE:	19 August 2016
REF:		NO. OF PAGES:	15
SUBJECT:	W2B Lang Hill Borrow Site/ Groundwater		

Abstract/Summary

This review of the groundwater systems present in the vicinity of the proposed Lang Hill borrow pit area, indicates that two (2) groundwater regimes operating there, one associated with the shallow alluvial aquifers (Richmond River Alluvium and Richmond Coastal Sands) and a second within the Gatton Sandstone bedrock underlying the alluvium.

The Gatton Sandstone bedrock, 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 bedrock groundwater system (potentially below the final proposed depth elevation of the borrow pit (~6 mAHD) but above the surrounding alluvium water table (~1 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 investigation bore airlift reports) 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 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 site (south) can be anticipated (Figure 6). 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 penetrate this water table, to a depth in excess of 5m, a review of management measures shall be undertaken, and these will include re-evaluation of the groundwater impact (in light of the additional data gathered during operation of the quarry) and 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 *Lang 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 Lang 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 Lang 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 Lang 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 Lang Hill Borrow site fulfils these needs in this section of the W2B project.

The selected Lang Hill Borrow site is located within the project boundary (Approved Project Boundary Version 9) and is therefore included in the EPL boundary for the project (EPL number 20713). Topographically, it is situated on a low hill (Lang Hill) between the Richmond River to the west and the proposed highway upgrade alignment to the east (Figure 1). Spatially, it is located some 8.1 km northeast the township of Woodburn and 7.5 km southwest of Broadwater, and 7.0 km northwest of Evans Head.

It is anticipated that approximately 220,000 m³ of material would be excavated from the proposed borrow site to an approximate depth of 20 metres below the existing ground level (bgl) at its deepest location (north-western corner). The material to be extracted from the site is *Gatton Sandstone (GS)*. The material will be used predominately for select, verge and drainage material on the project.

Access to the site will be gained via the construction corridor for site establishment, operation, decommissioning and rehabilitation (Figure 2). The site clearing limits will be demarcated and clearing of the scattered remnant vegetation will be undertaken. Clearing will be staged to align with excavation activities to reduce the impacts of erosion, and surface and groundwater impacts. The top soil will be stripped and stockpiled at either the borrow site or nearby ancillary facility. A sediment basin/ containment area will be established to the east of the excavation area to capture diverted run off.

A small crib room, amenities and fuel/ chemical storage will be established at the site to the east of the borrow site and north of the sediment basin/ containment area. Refer to Figures 2 and 3 for an indicative layout and profile of the borrow pit site (Approved Project Boundary Version 9).

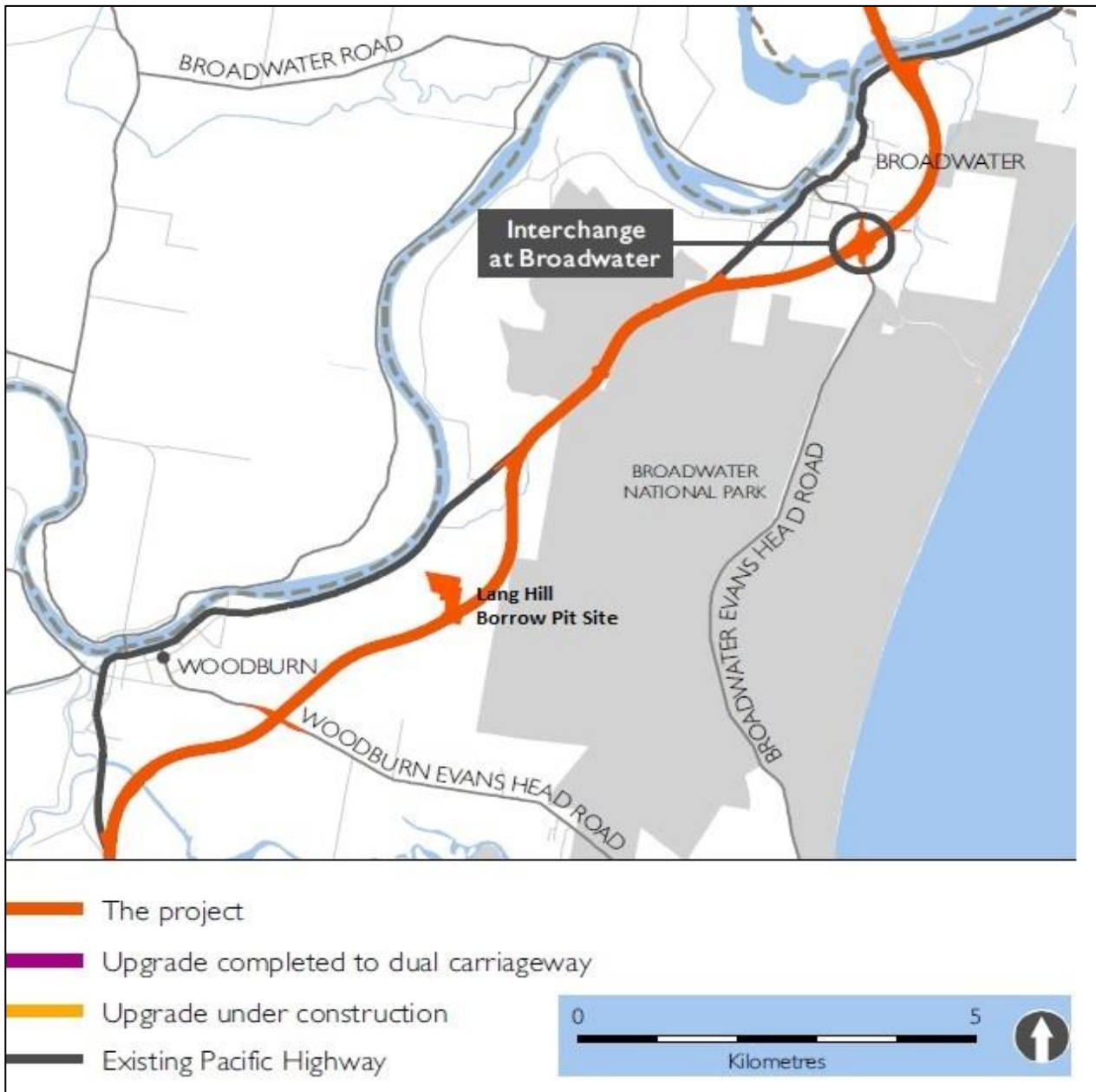


Figure 1 – Location of proposed Lang Hill Borrow Site

Bunding around the site will be constructed and stabilised using seeding or other means to be above the 20 year ARI level.

A site office, material processing, stockpiling and laydown area will be positioned at the proposed ancillary facility that is located on the opposite side of the alignment to the borrow site, refer to Figure 2.

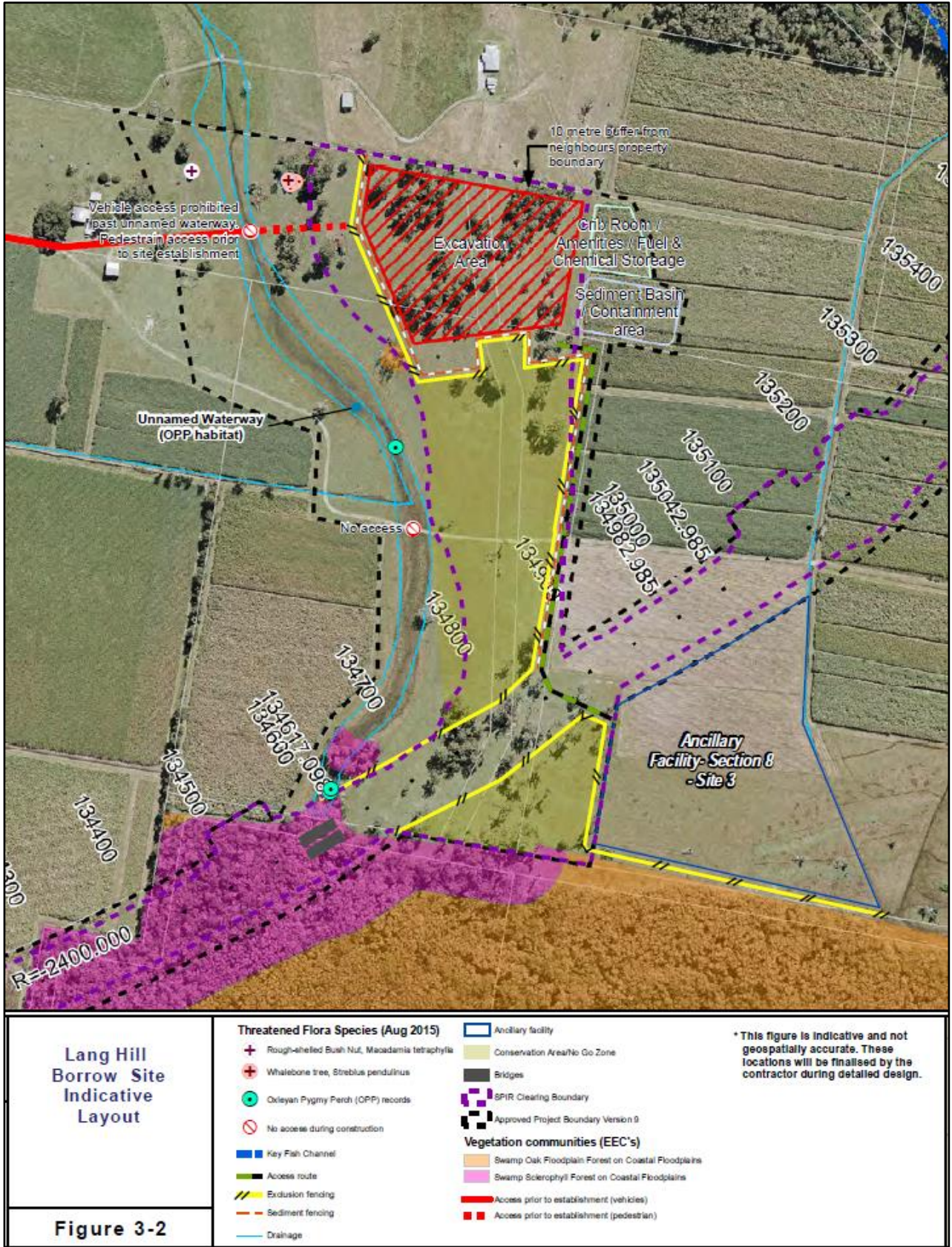
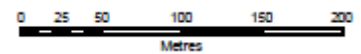


Figure 2 – Layout and extent of the proposed Lang Hill Borrow Site



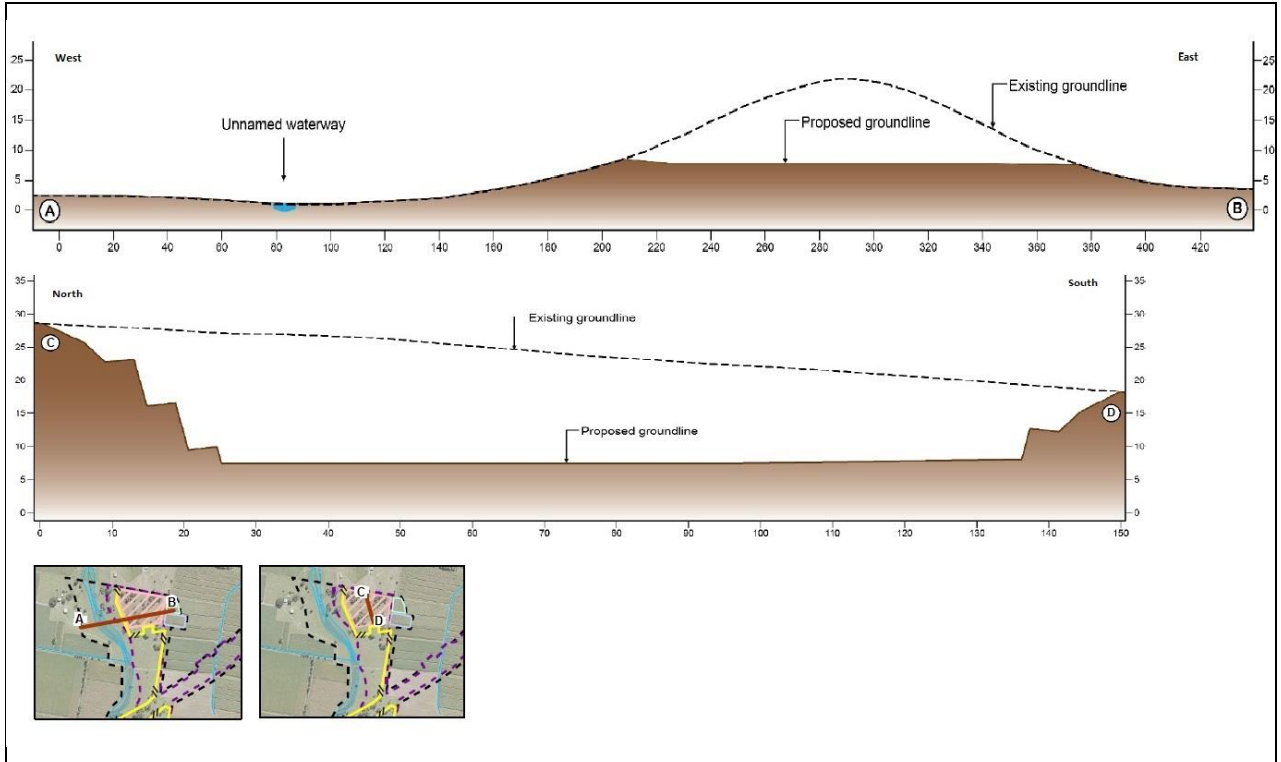


Figure 3 – Cross sections through extents of the proposed Lang Hill Borrow Site, north-south, and west-east, resp.)

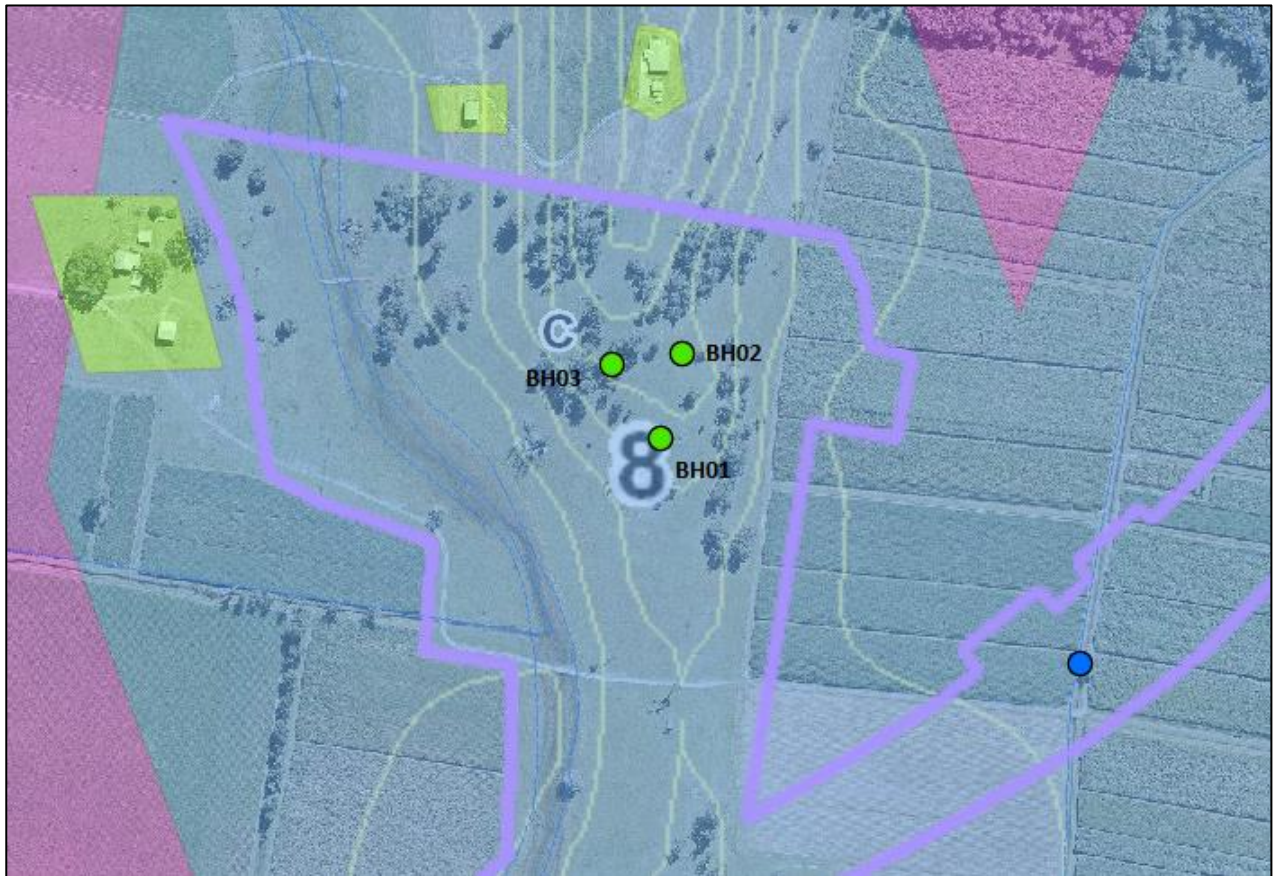


Figure 4 - Geotechnical investigation drill sites (shown by green dots)

Hydrogeology

Three groundwater regimes are present at and surrounding the Lang Hill Borrow Pit site and include: Richmond River Alluvium; Richmond Coastal Sands and underlying Gatton Sandstone bedrock systems. Table 1 summarises the key features of the Richmond River Alluvium and Richmond Coastal Sands aquifer system, while the bedrock materials are not considered as an aquifer/s.

Table 1: Section 8 - Groundwater and related characteristics

Underlying aquifers (GMU)	Clarence-Moreton Basin; Richmond River Alluvium; Richmond Coastal Sands.
Water Sharing arrangements	Richmond River Area Alluvial Aquifer Water Sharing Plan.
Acid sulfate soils	Majority of section mapped as having a high probability of occurrence and is located close to the boundary of low and high probability areas to the north of Woodburn. Southern extremity of route mapped as having no known occurrence of acid sulfate soils.
Groundwater levels	Shallow watertables across the floodplains, deepening in higher areas.

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

Gatton Sandstone Unit (Aquitard)

The indurated nature of the bedrock rockmass means that the primary porosity and permeability of the Gatton Sandstone inlier is very low, and is dominantly associated with 2^o porosity textures (defects) in the sandstone. However, the inferred overprint of fracturing and jointing defects provide minimal improvement in porosity, permeability and storage. As such groundwater flow within the fresh rockmass is limited and the Gatton Sandstone bedrock is considered as an *aquitard* at this location. A shallow perched ephemeral groundwater system is inferred for the thin weathered regolith profile on the bedrock surface.

Unconsolidated Sediments (Aquifer)

The surrounding unconsolidated sediments comprising Holocene estuarine mud-silt-clay basin associated with the Richmond River to the north-east are considered low permeability aquitards, while the older Pleistocene coastal plan beach/foredune ridge and estuarine sediments (sand and minor gravels; and silt, clays) of the Broadwater National Park to the south east are considered mixed higher permeability aquifer beds (referred to here as: Richmond River Alluvium (RAA); Richmond Coastal Sands (RCS)).

Water Table Levels and Groundwater Flow

The local groundwater table is anticipated to mimic the topography, but at a lower elevation and in a subdued manner. That is, the inferred groundwater levels in the unconsolidated sediments are likely to be located at a shallow depth, while the low permeability bedrock materials they are likely to be at a deeper depth. Minor perched groundwater system/s are inferred to be present within the soil/weathered profile on the Lang Hill inlier.

The unconsolidated sediments of the RAA aquifer are associated with the Richmond River floodplain that are present to the west - north of the borrow pit site. Together with the low lying alluvial and beach/dune sediments, Richmond Coastal Sands, present to the east and southeast, these sedimentary units sustain shallow groundwater systems. They are intimately hydraulically connected with the surface water system of the Richmond River (Figure 5), and is considered entirely separate from the Gatton Sandstone bedrock groundwater system. In the Borrow Pit area these water table systems are typically found between 1-3 m below ground level (mbgl).

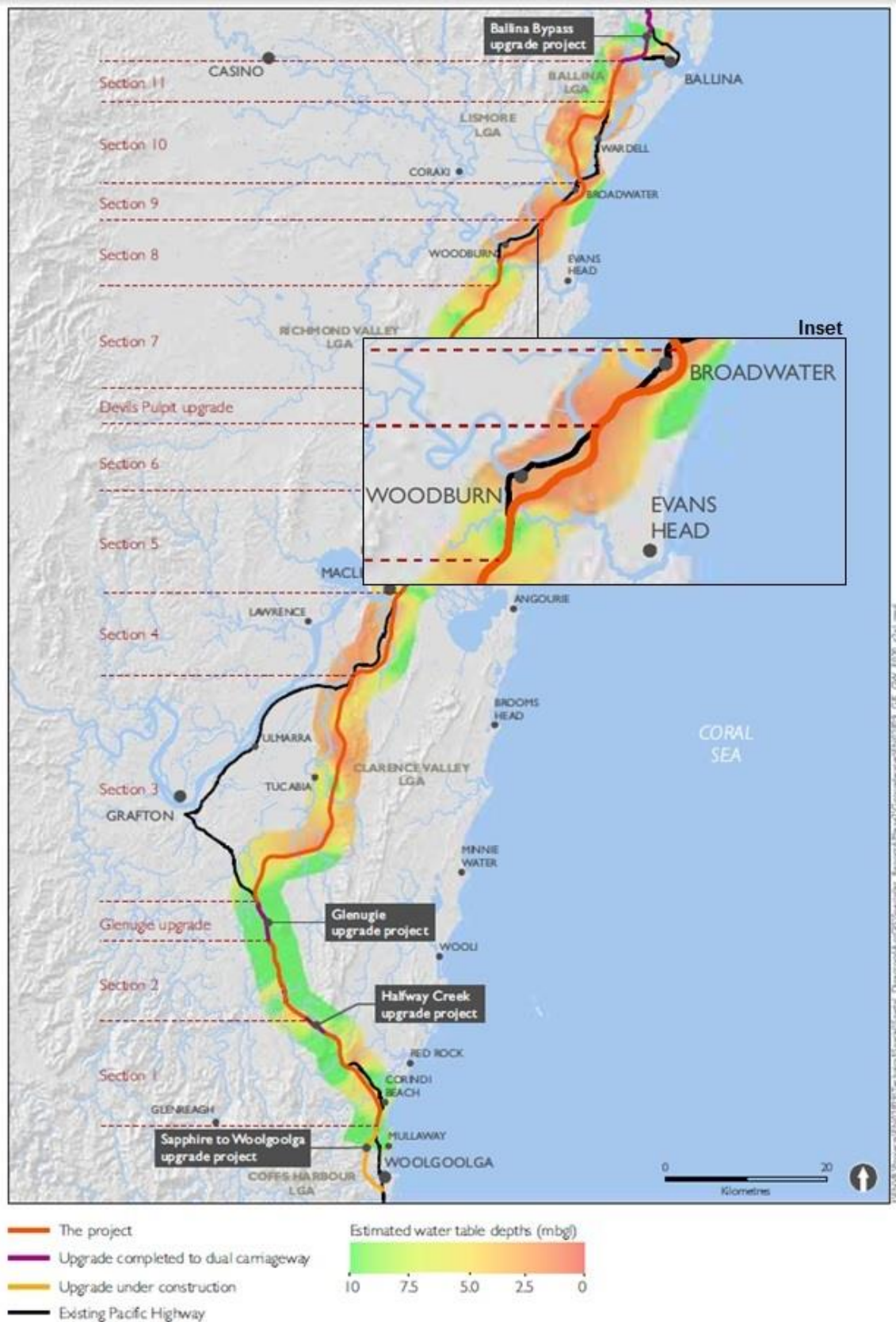


Figure 5 – inferred depth to water table (reflecting the Richmond River Floodplain alluvial aquifer – 2-3 m depth) (Taken from EIS (RMS, 2012))

Groundwater flow beneath the proposed borrow pit site is inferred to be radially outward from the topographic high-point of Lang Hill, resulting in a mildly mounded groundwater system in the bedrock inlier (following the topographic slope). This would imply that beneath the borrow pit site (located some 360 m south of the Lang Hill topographic high), bedrock groundwater flow direction/s will be largely south, south-east and south-west (radial flow). This bedrock groundwater flow will recharge the shallow groundwater systems of the recent alluvials/dune deposits at their mutual subcrop boundaries.

Groundwater recharge to the bedrock groundwater system is via rainfall infiltration at the topographic surface through the shallow unsaturated sandstone profile down to the deep water table (the saturated zone). Rainfall on the land surface will both discharge as surface runoff and infiltrate to the subsurface. In the case of the latter, the thin soil-weathered rock veneer (the regolith zone) will facilitate rapid horizontal flow within a shallow perched system, supported on top of the low permeability Gatton Sandstone aquitard beneath. Limited vertical infiltration from this perched system sustains the deeper water table in the Gatton Sandstone aquitard.

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 Gatton Sandstone bedrock; and
- *Deep bedrock aquitard*: a deeper Gatton Sandstone aquitard system, located at depth beneath the proposed borrow pit footprint (and potentially beneath the pit floor elevation, see below).

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 (including the 'Langs Hill Canal' to the west) and the recent unconsolidated alluvial aquifers. 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, 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 groundwater is not expected to be intercepted during the operational life of the borrow pit (the excavations are not proposed below the depth of the waterway). As such, it is anticipated that the borrow site is not expected to interfere with groundwater that may feed into the unnamed waterway (Lang Hill Canal) to the west of the site. It is noted however that recharge in the footprint of the excavation may increase infiltration to the groundwater system, thereby enhancing the groundwater mound beneath, and hence discharge to that drainage alignment. 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 open forest. The remnant vegetation consists of Grey Gum, Pink Bloodwood and Northern Grey Ironbark. This vegetation has been classified as the biometric vegetation type, Forest Red Gum

grassy open forest of the coastal ranges of the North Coast, which is *not* considered to be an endangered ecological community (EEC). Vegetation within the excavation area falls within the approved SPIR vegetation clearing limits for the project.

The BSMP also reports that small patches of (1) Siah's Backbone, (2) Rough-shelled Bush Nut and (3) Swamp Oak Forest Floodplain Forest are located *adjacent* the borrow site and are considered threatened/ endangered communities potentially sustained by groundwater. The vegetation at the site provides some habitat for fauna species. An exclusion fence will be constructed around the borrow site that will minimise the impacts of construction on these threatened/endangered species.

The borrow site is located more than 50 m away from the unnamed waterway (Langs Hill Canal) and the vegetation within and surrounding this waterway has been classified as the EEC vegetation type Freshwater Wetlands on Coastal Floodplains of the NSW North Coast. The site will be graded to drain the site towards the sediment basin/ containment area on the eastern side of borrow site, away from the waterway.

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 site (south) can be anticipated (Figure 6) by virtue of the removal of the recharge land-surface of the regolith aquifer up-gradient of this southern slope 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 the 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

Groundwater users within 2.5 km of the proposed borrow pit site are shown in Figure 7. Seven (7) bores (GW044873, GW046447, GW305855, GW305868, GW305933, GW305934 and GW305935) are located within the immediate vicinity of the pit site, of which two (2) are utilised as domestic and stock bores (GW044873, GW046447). Both these bores lie within the Lang Hill Borrow Pit site boundary (Approved Project Boundary Version 9), adjacent to the Langs Hill Canal and exploit the groundwater resource within the Richmond River Alluvium aquifer of the Richmond River floodplain (Appendix A). As such, the localised impacts associated with the proposed borrow pit (limited mounding beneath the pit footprint) will not affect the 4 user's access to the groundwater supply, since the Richmond River Alluvium and the Gatton Sandstone bedrock aquifer are considered largely hydraulically separate.

The Rous Water Borefield at Woodburn is located just outside this 2.5 km limit (adjacent to Woodburn-Evans Head Road at 2.6 km from the pit site, Figures 7 and 8) and exploits the Woodburn Sands aquifer at depth in the Richmond River Alluvium. Rous Water currently hold three licences for water supply bores with a combined licenced volume of 242 ML a year (Parsons Brinckerhoff, 2011). The current water supply bores range in depth from 16.5 to 22.0 metres below ground level (mbgl) with bore yields ranging from 6 to 19 L/s. Groundwater levels are expected to be shallow (< 5 mbgl).

No meaningful impact of the Lang Hill borrow pit on these bores can reasonably be anticipated because of: (a) the lack of 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, (c) the elevation of base of the borrow pit (being above the water level in the alluvium aquifer) and (d) the considerable distance of the proposed pit and from the Rous Water Borefield bores (≥ 2.6 km).



Figure 6 – Aerial photography of proposed Lang Hill Borrow Pit site showing vegetation distribution surrounding the site and evidence of localised flooding of tributary waterways



Figure 7 – Register water bores within vicinity of the proposed Lang Hill Borrow Pit site (≤ 2.5 km) (DPI-Water, Pinneena database).

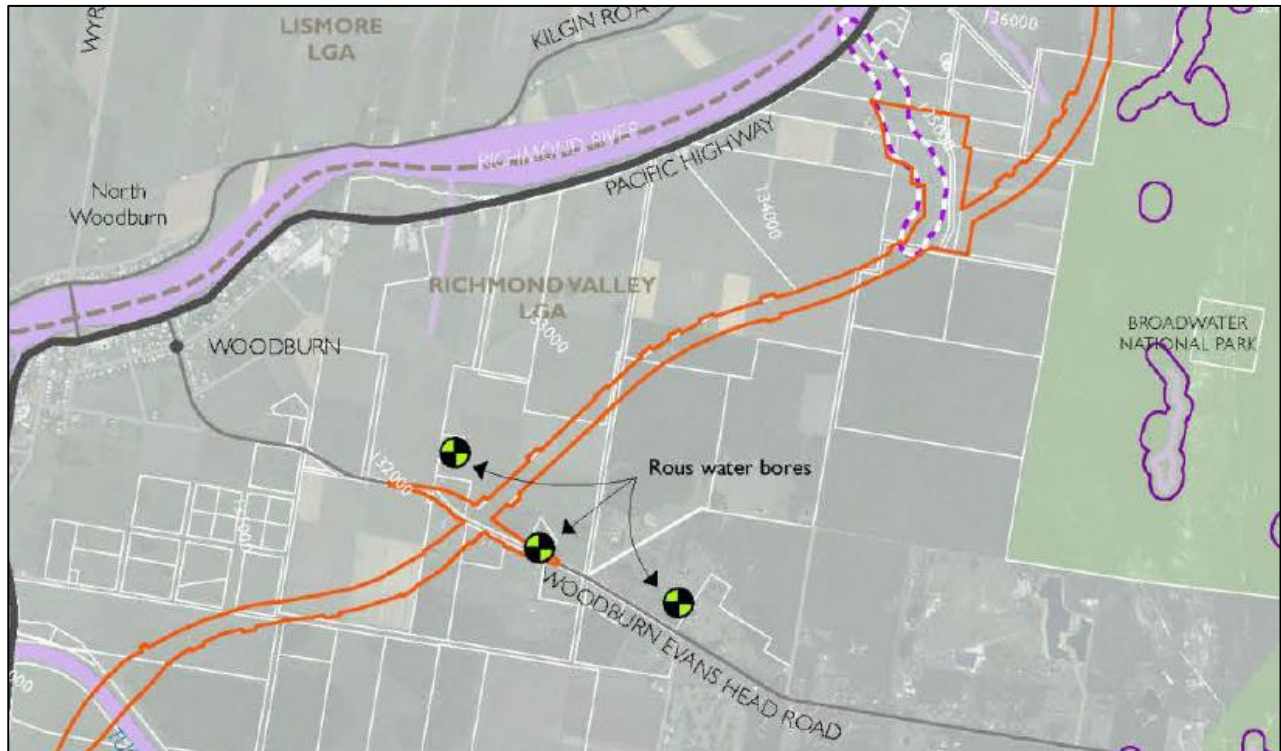


Figure 8 – Location of the Rous Borefield at Woodburn (2.6 km for Lang Hill Borrow Pit Site). (Coffey (2006) Additional Hydrogeological Studies near Rous Water's Woodburn Borefield. Coffey Geosciences Pty. Ltd.)

Conclusion

This review of the groundwater systems present in the vicinity of the proposed Lang Hill borrow pit area, 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 Richmond Coastal Sands) and a second within the Gatton Sandstone bedrock underlying the alluvium.

The Gatton Sandstone 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*: 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 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 investigation bore airlift reports) 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 groundwater flow flux to the downgradient side of the site (south) can be anticipated (Figure 6). 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 penetrate this water table, to a depth in excess of 5m, a review of management measures shall be undertaken, and these will include re-evaluation of the groundwater impact (in light of the additional data gathered during operation of the quarry) and 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.

Attachment A – Groundwater Users with 2.5km of the Borrow Site

Groundwater users

BORE	STATUS	PURPOSE	LATITUDE	LONGITUDE	DEPTH
GW044873	Active	Stock	-29.0648	153.38329	6.1
GW046447	Active	Stock	-29.0623	153.38163	6.1
GW305855	Active	Monitoring bore	-29.0711	153.37596	19.0
GW305868	Active	Monitoring bore	-29.0608	153.39096	11.0
GW305933	Active	Monitoring bore	-29.0658	153.38392	8.1
GW305934	Active	Monitoring bore	-29.0664	153.38399	8.0
GW305935	Active	Monitoring bore	-29.0668	153.38378	8.0

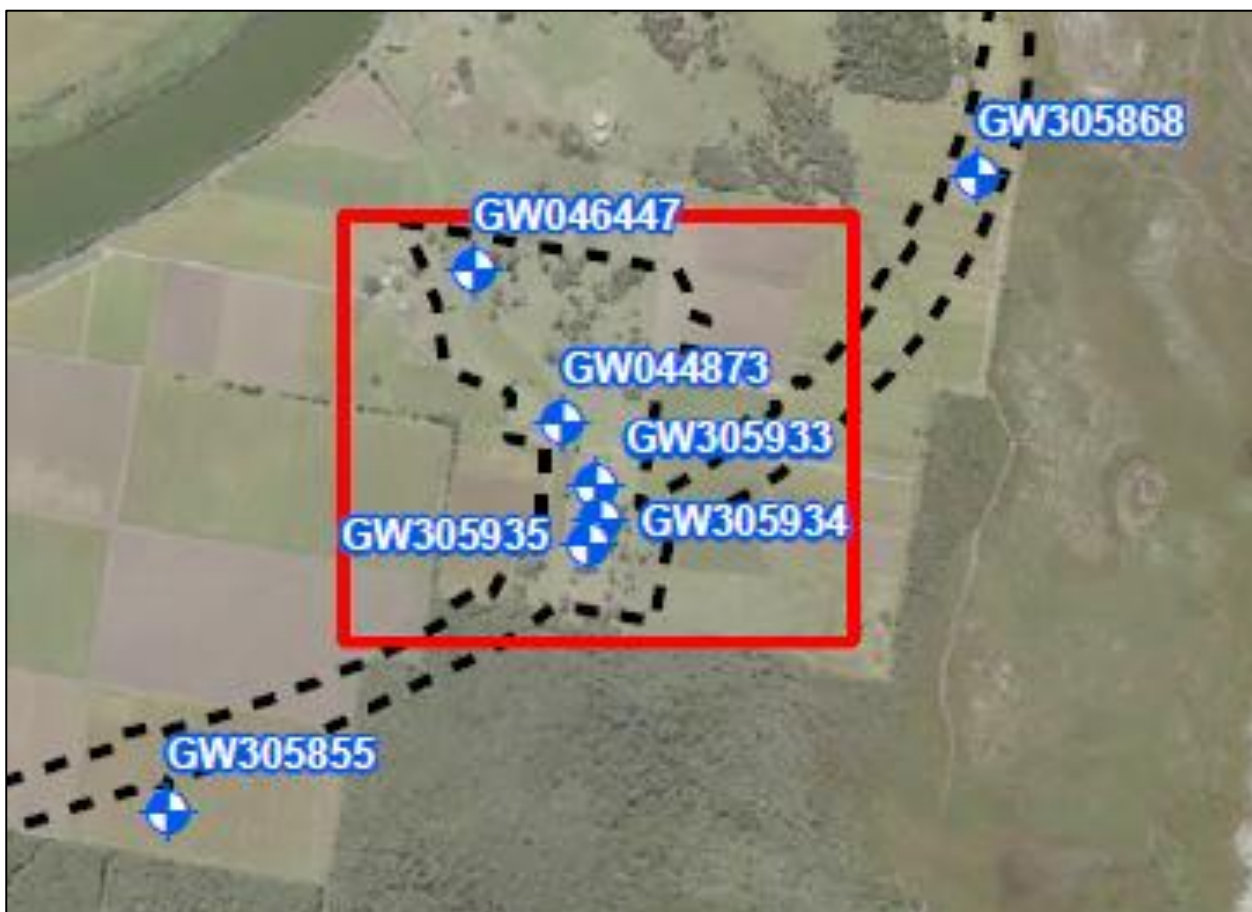


Figure B-1 – Location of existing water bore users within 1.0 km of the borrow pit site

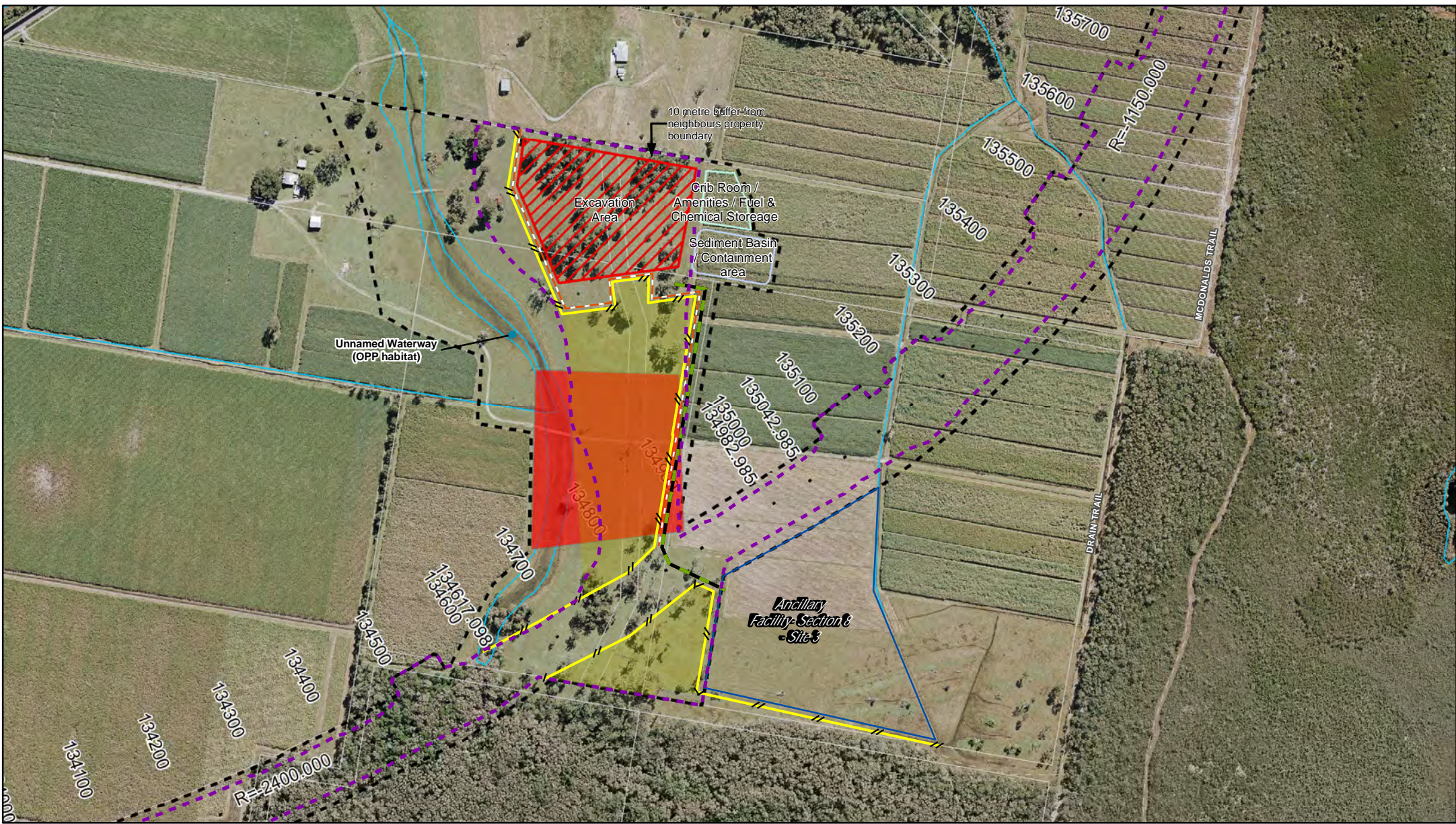
Borehole data (extracted from DPI-Water, Pinneena database, August 2016).

Bore	Depth from (m)	Depth to (m)	Drillers log	Rock type
GW044873 (Stock)	0.00	1.22	Soil	Soil
	1.22	3.66	Clay Sandy	Clay
	3.66	5.94	Sand	Sand
	3.66	5.94	Clay Lenses	Clay
	5.94	6.10	Sand White Water Supply	Sand
GW046447 (Stock)	0.00	1.22	Soil	Soil
	1.22	3.66	Clay	Clay
	3.66	5.79	Clay Sandy Sand	Clay
	5.79	6.10	Sand White Water Supply	Sand
GW305855 (Monitoring bore)	0.00	0.80	Clay, silty, dark brown, fine grained, stiff	Clay
	0.80	2.50	Sand, silty, pale grey, fine grained, dense	Sand
	2.50	19.00	Sand, pale grey, fine grained, moderately dence	Sand
GW305868 (Monitoring bore)	0.00	5.00	Sand, pale brown, fine grained, dense	Sand
	5.00	11.00	Sand, grey & brown, fine-coarse grained, dense	Sand
GW305933 (Monitoring bore)	0.00	0.80	Silty sand, brown, fine, med dense	n/a
	0.80	1.50	Sandy clay, brown, fine to medium, grained hard	n/a
	1.50	8.10	Sandstone, brown, fine to coarse grain, medium strength fractured	Sand
GW305934 (Monitoring bore)	0.00	1.20	Silty clay, brown, fine hard	n/a
	1.20	7.95	Sandstone, brown, fine to med, grained massive hard	Sand
GW305935 (Monitoring bore)	0.00	0.80	Sandy clay dark brown, fine grained, hard	n/a
	0.80	8.00	Sandstone, grey / brown, fine to coarse grain, fractured	Sandstone

Note:

n/a - not available

**Appendix C Potential contamination constraints
map**



PACIFIC COMPLETE

PACIFIC HIGHWAY UPGRADE

Woolgoolga to Ballina

Contamination at Lang Hill Borrow Site

- Access route
- Exclusion fencing
- Sediment fencing
- Drainage
- Ancillary facility
- Conservation Area/No Go Zone
- Crib Room / Amenities / Fuel & Chemical Storage
- Sediment Basin / Containment area
- Excavation Area
- SPIR Clearing Boundary
- Approved Project Boundary Version 9
- Potential contamination at Lang Hill Borrow Site identified in the EIS



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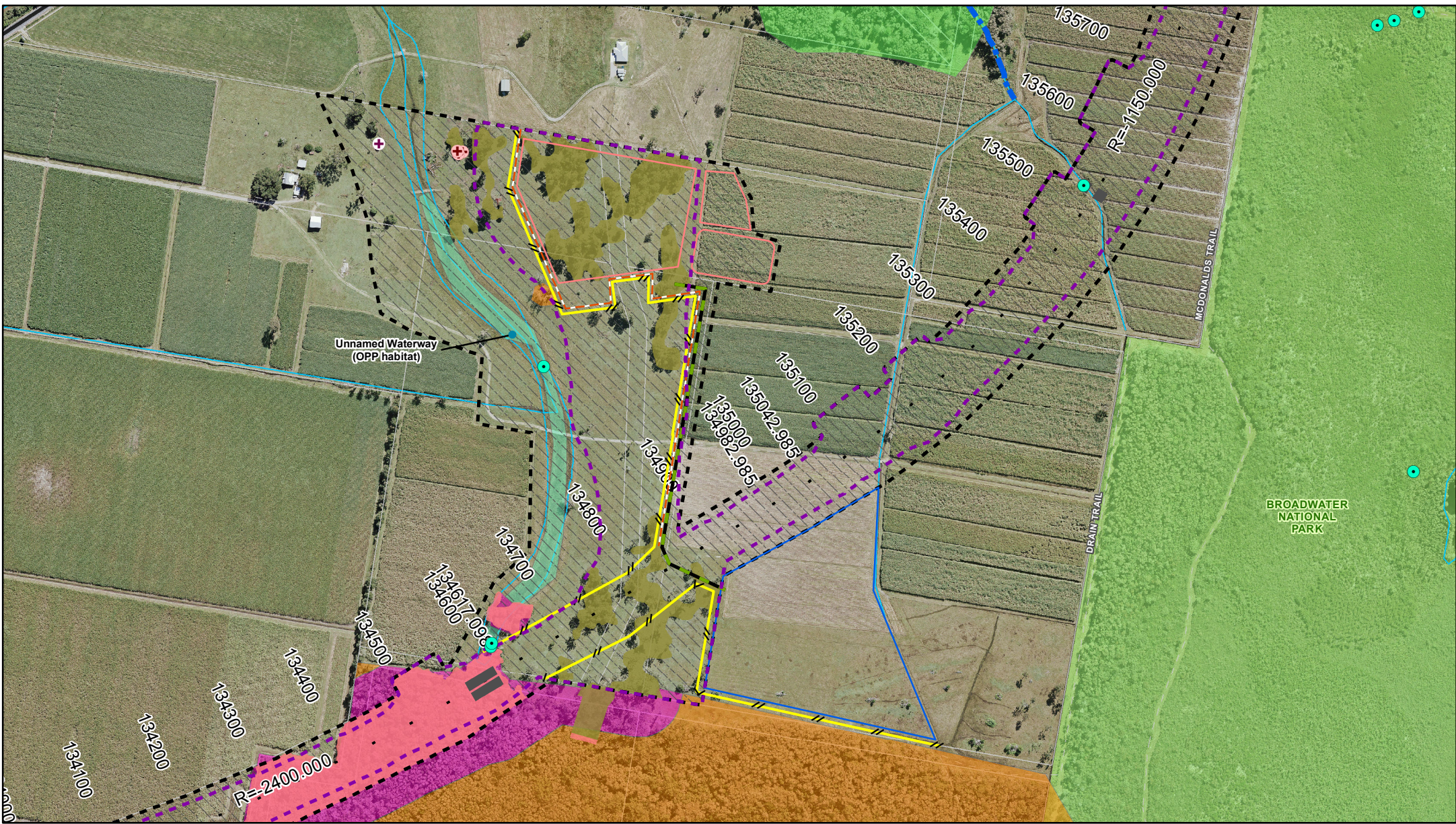
0 25 50 100 150 200 Metres

Print Date: 15/08/2016

Author: BORM

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Appendix D Biodiversity constraints map



PACIFIC COMPLETE

PACIFIC HIGHWAY UPGRADE

Woolgoolga to Ballina

Biodiversity constraints at Lang Hill Borrow Site

- Threatened Flora Species (Aug 2015)**
- Rough-shelled Bush Nut, Macadamia tetraphylla
 - Whalebone tree, Streblus pendulinus
 - Oxleyan Pygmy Perch (OPP) records
- Infrastructure**
- Ancillary facility
 - Borrow Site Excavation Area and Associated facilities
 - Bridges
 - SPIR Clearing Boundary
 - Approved Project Boundary Version 9
- Access and Fencing**
- Key Fish Channel
 - Access route
 - Exclusion fencing (indicative)
 - Sediment fencing
 - Drainage

- Vegetation Communities - Biometric (Oct 2015)**
- Biometric**
- Forest Red Gum grassy open forest of the coastal ranges of the North Coast
 - Paperbark swamp forest of the coastal lowlands of the North Coast
 - Cleared/Modified
- Vegetation communities (EEC's)**
- Swamp Oak Floodplain Forest on Coastal Floodplains
 - Swamp Sclerophyll Forest on Coastal Floodplains
 - Freshwater Wetlands on Coastal Floodplains
 - Subtropical Coastal Floodplain Forest on Coastal Floodplains



1:6,000 at A4

0 25 50 100 150 200 Metres

Print Date: 23/06/2016

Author: BORGM

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Appendix E Gittoes Jali – Site Clearance Document

Gittoes Jali – Site Clearance Document

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

Navin Officer Heritage Consultants Pty Ltd

3 March 2016

Overview

The salvage works at Gittoes Jali 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 Gittoes Jali. (Chainage 134700 and 134900). 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 west of Chainage 134700 and east of Chainage 134900, unless otherwise covered by a site clearance document.

Methodology

The methodology employed for the salvage of Gittoes Jali was in accordance with the *Strategy for Salvage and Storage of Aboriginal Objects, Iluka Road to Ballina Section* (NOHC 2014).

Salvage excavations at Gittoes Jali comprised a two phase approach:

- Phase 1 involved mechanical excavation across a series of test locations within the proposed impact area at the site in order to further refine the locations where Phase 2 excavations would take place; and
- Phase 2 excavations comprised broad area hand and/or mechanical excavation in and around areas where significant archaeological deposits had been identified through the combined results of the previous subsurface testing programs and the Phase 1 salvage excavations.

The *Strategy for Salvage and Storage of Aboriginal Objects, Iluka Road to Ballina Section* (NOHC 2014) outlined that Phase 1 excavations at Gittoes Jali would be conducted across up to nine transects which varied between 50 to 200m in length, a minimum of 100m² was suggested for this component of excavations.

The methodology further outlined that at least 50-100m² of hand excavation and 20m² of mechanical excavation would be undertaken during Phase 2 salvage investigations.

Salvage Excavation Results

Excavations at Gittoes Jali initially consisted of Phase 1 mechanical excavations which allowed areas of interest and those areas likely to contain large deposits to be identified. Phase 1 investigations comprised six transects, four across the highway alignment in the south and two across the borrow pit area in the north. The planned investigations across the central part of the site were not undertaken as this area has been identified as a conservation zone (refer to Figure 1).

- **Phase 1 Mechanical** – 56 mechanical pits approximately 1m² in size (total of 56m² salvaged)

Subsequently, four Phase 2 units (Units A, B, C and D) were salvaged at Gittoes Jali. Units B, C and D were salvaged by hand excavation, Unit A was salvaged by both hand and mechanical excavation.

- **Phase 2 Unit A** – an area of 110m² recovered by hand excavation and 20 m² recovered by mechanical excavation
- **Phase 2 Unit B** – an area of 75m² recovered by hand excavation
- **Phase 2 Unit C** – an area of 61m² recovered by hand excavation
- **Phase 2 Unit D** – an area of 15m² recovered by hand excavation

The salvage excavations successfully met the requirements as set out in the methodology (NOHC 2014). The number and locations of the Phase 1 transects varied slightly to those suggested, however these variations were consistent with the broader aims and triggers outlined in the aforementioned methodology.

The Phase 2 excavations included a higher proportion of hand excavation to mechanical salvage than initially recommended in the methodology. This change to a higher proportion of hand excavation was in accordance with the triggers set out in the methodology (NOHC 2014).

The results of the Phase 2 excavations at Unit C have prompted a further revision of the conservation zone across the central portion of the site. The conservation zone between the highway and the borrow pit has been extended to include Unit C (Figure 1). The Unit C excavation has been backfilled and re-instated to conserve the heritage site for posterity. It is of exceptional Aboriginal heritage significance. No impacts must register to the land surface, or subsurface, in that area.

Recovery of Previously Recorded and Reburied Artefacts

Salvage included the recovery of artefacts that had been previously recorded and reburied following past subsurface testing at this site. All artefacts that could be relocated have been recovered.

Surface Artefact Collection

Surface artefacts were located within the project boundary. These were collected and bagged with GPS coordinates, a sketch map and photographs.

Site Fencing – Conditions for Construction

Two conservation zones have been identified at Gittoes Jali (refer to Figure 1); these comprise an area south of the highway alignment, and an area to the north of the highway alignment, between the highway and the borrow pit. The second area includes a buffer zone around Unit C.

The conservation zones are no-go areas that should not be used for vehicle access, material stockpiling or any other associated construction activity. Furthermore, engineering and design for the borrow pit must ensure that there are no inadvertent impacts (such as from vibration or erosion) along the northern margin of the conservation zone that includes Unit C. This area must be conserved throughout the construction period. Areas of the borrow pit must be suitably remediated to ensure long-term conservation, including the land surface and deposits' stability within Unit C, after extraction from the borrow pit ends.

Site fencing has yet to be installed at Gittoes Jali.

Site fencing will need to be installed prior to the commencement of construction activities. This is in order to protect as much of the site as possible from inadvertent impact. Site fencing should be installed between Chainage 134700 and 134900 on the northern and southern sides of the highway alignment. Where possible this fencing should be placed as far in as possible in order to maximise the conserved area of the site. Particular care must be taken with the southern boundary to ensure that the identified paint wells have an adequate buffer zone around them.

Site fencing should be installed in consultation with representatives of the Aboriginal community, and checked by the project archaeologist prior to commencement of construction activities.

In the event that ancillary infrastructure, or associated investigations such as geotechnical pits, is planned outside the project boundary between Chainage 134700 and 134900, 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

Gittoes Jali has been successfully salvaged with the collection of surface artefacts, recovery of previously reburied artefacts and salvage excavation of an area of 337m². Construction within this site may commence subject to the conditions outlined in this document 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.

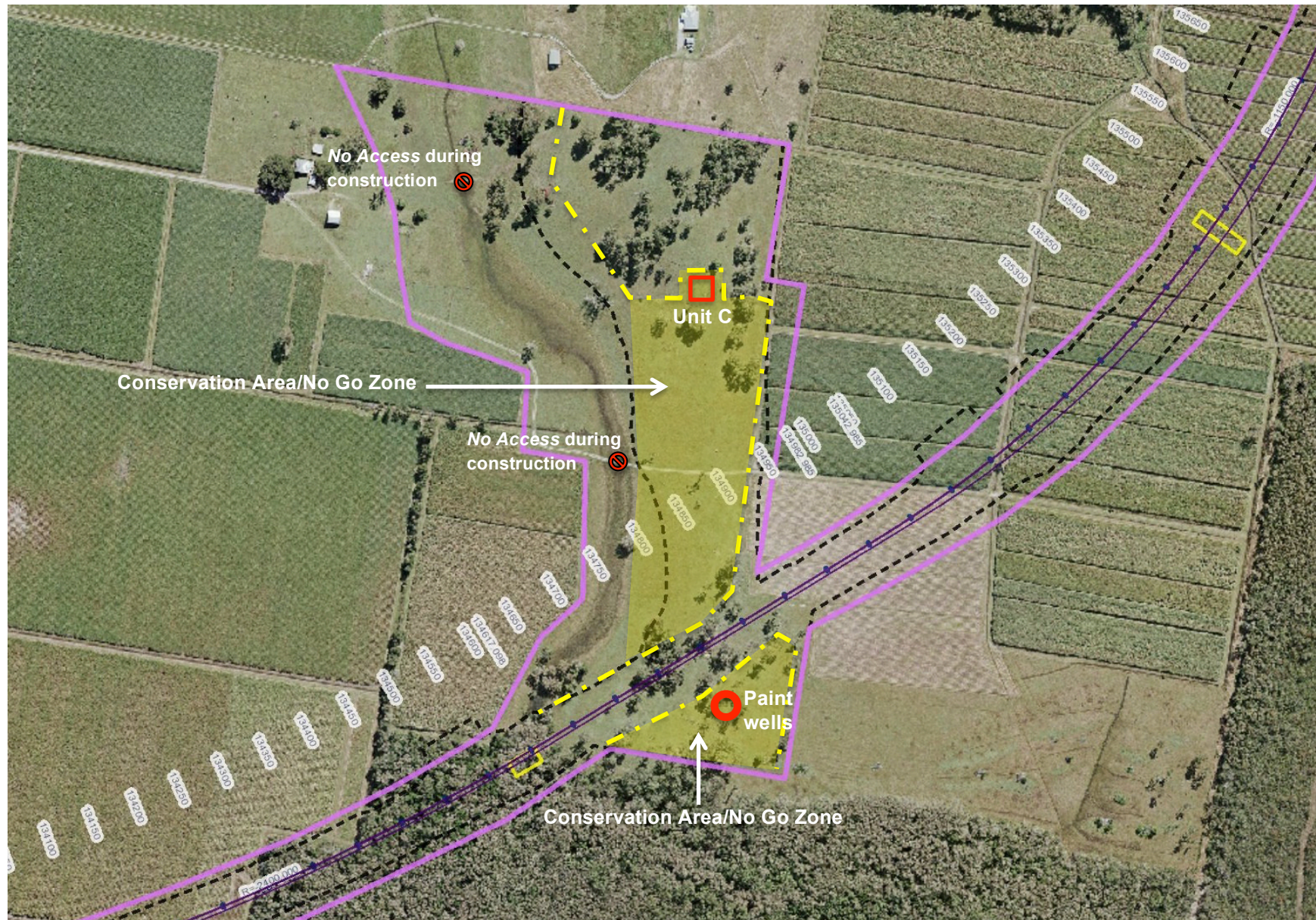


Figure 1 Gittoes Jali with Unit C and the Paint Wells marked within the two shaded conservation areas (No-go zones)
NB Yellow dotted lines show indicative locations of necessary fencing.



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.

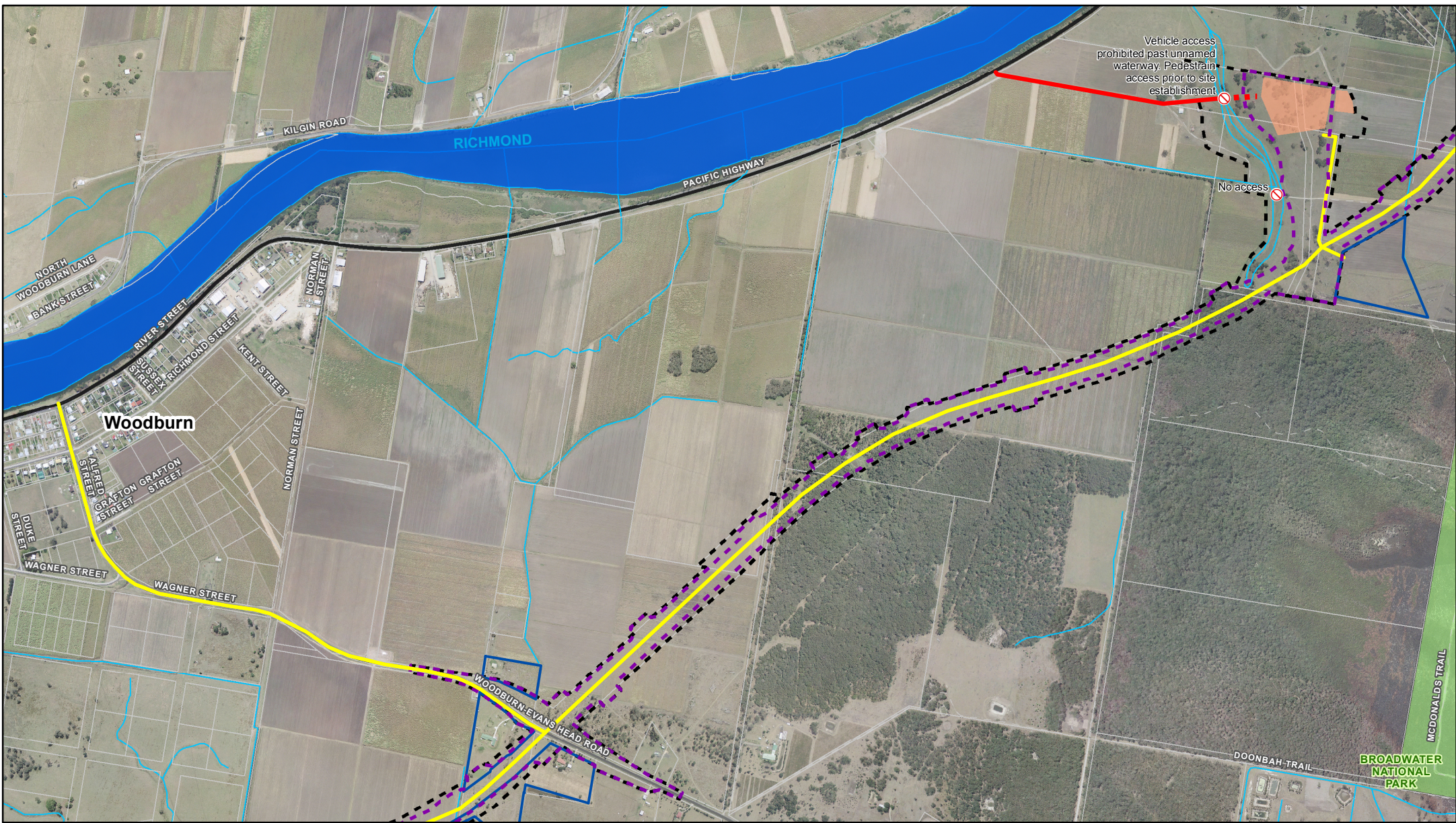
In the event that the proponent continues an active role in the evaluation and/or management of the find(s), via a direction or advice from the Police, Coroner and/or the OEH or Heritage Council, then all or some of the following steps *may* be conducted:

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:



- 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.

Appendix F Traffic access map



Vehicle access prohibited past unnamed waterway. Pedestrian access prior to site establishment

No access



PACIFIC HIGHWAY UPGRADE

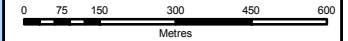
Woolgoolga to Ballina

Lang Hill Borrow Site Site Access

- Access during establishment and operation
- Access prior to establishment (vehicles)
- - - Access prior to establishment (pedestrian)
- Lang Hill Borrow Site area
- Ancillary facility
- SPIR Clearing Boundary
- Approved Project Boundary Version 9
- Drainage



1:15,000
at A4



Print Date: 16/08/2016
Author: BORM

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**Appendix G Community notification letter and
feedback form**



Australian Government

BUILDING OUR FUTURE



July 2016

Using rock from Lang Hill to build the Woolgoolga to Ballina upgrade

The Australian and NSW governments are jointly funding the \$4.36 billion Woolgoolga to Ballina Pacific Highway upgrade.

Rock material for the highway is available from the south facing slope of Lang Hill next to the project route and falls within the approved project boundary. Roads and Maritime Services own this land and it was identified in the environmental impact assessment as a suitable location to extract material for the upgrade. Using material from this site to build the road will reduce travel distances and the number of trucks on the existing highway, improving safety and efficiency for all road users.

What are we proposing?

We will remove about 220,000 cubic metres or the equivalent of 88 Olympic swimming pools of Gatton sandstone and have approval to remove up to 300,000 cubic metres from the site. The rocks and earth will be transported within the project boundary directly from the site.

To prepare for work we need to:

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

Operational activities involve:

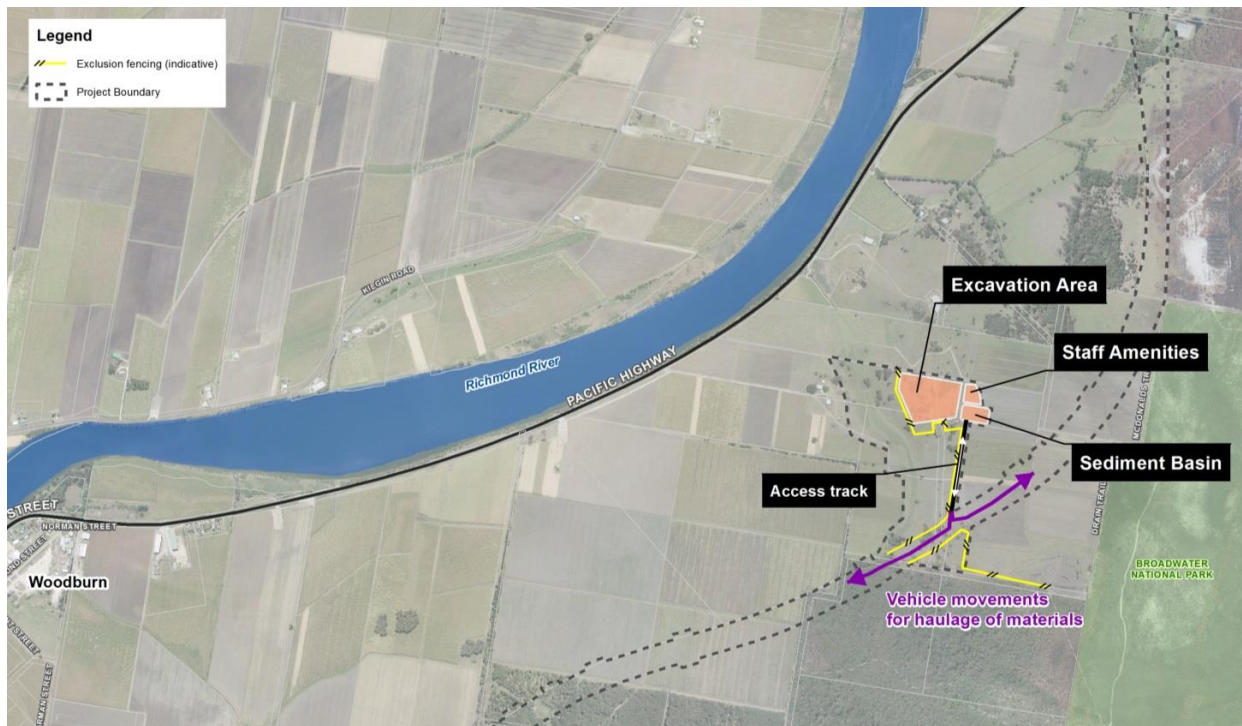
- Operating machines and equipment within the site
- Excavating, drilling and blasting
- Crushing rock material
- Hauling extracted material from the site along the construction corridor.

The map on the next page helps explain our work location. The design for the site has been refined to reduce the footprint of the excavation area. We are working with the Aboriginal community to minimise the impact and will install exclusion fencing to protect the cultural heritage. Work will start from late 2016 and the site will be operational for about two years. Once work is finished the area will be restored and revegetated.

How will the work affect you?

Excavation, drilling and blasting techniques will be used to extract the material from Lang Hill. The material will then require crushing and screening to make it a uniform size and shape that meets road building specifications. It is proposed to set up a crushing and screening operation within the site area.

Noise and dust will be managed to reduce the impact to the community. This will include using mitigation measures like water sprays to increase the moisture content of the material, making sure equipment is serviced and maintained, using non tonal reversing beepers, placing stockpiled materials in mounds to help reduce noise as well as noise monitoring.



Proposed Lang Hill site

Hours of Work

Approved work hours are 7am to 6pm on weekdays and Saturdays from 8am to 5pm.
Approved hours for blasting are 9am to 5pm weekdays and Saturdays from 9am to 1pm.

Next Steps

We are seeking your feedback on use of the Lang Hill site and any concerns you may have on its operation. Your feedback will help Roads and Maritime Services reduce the impact 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.

Please fill in the feedback form attached and return it to us by **Thursday 11 August 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 (dial 1)**.

For more information

If you have any questions, please call the Woolgoolga to Ballina project toll free line on 1800 778 900 dial 1, email W2B@pacificcomplete.com.au or visit the project website 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



Australian Government

BUILDING OUR FUTURE



Woolgoolga to Ballina – Lang Hill site

Feedback form

We would like to confirm your agreement with our approach to the Lang Hill site, as outlined in the attached letter.


- Yes I agree
- No I don't agree – If you don't agree would you please provide feedback on your key concerns.

Would you like to project team to contact you to discuss your concerns?

- Yes
- No

Name:	
Address	
Phone:	
Email:	
Signature	
Date	

Key issues raised will be included in the site's assessment which will be provided to the Department of Planning and Environment.

 131 450	<p>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</p>
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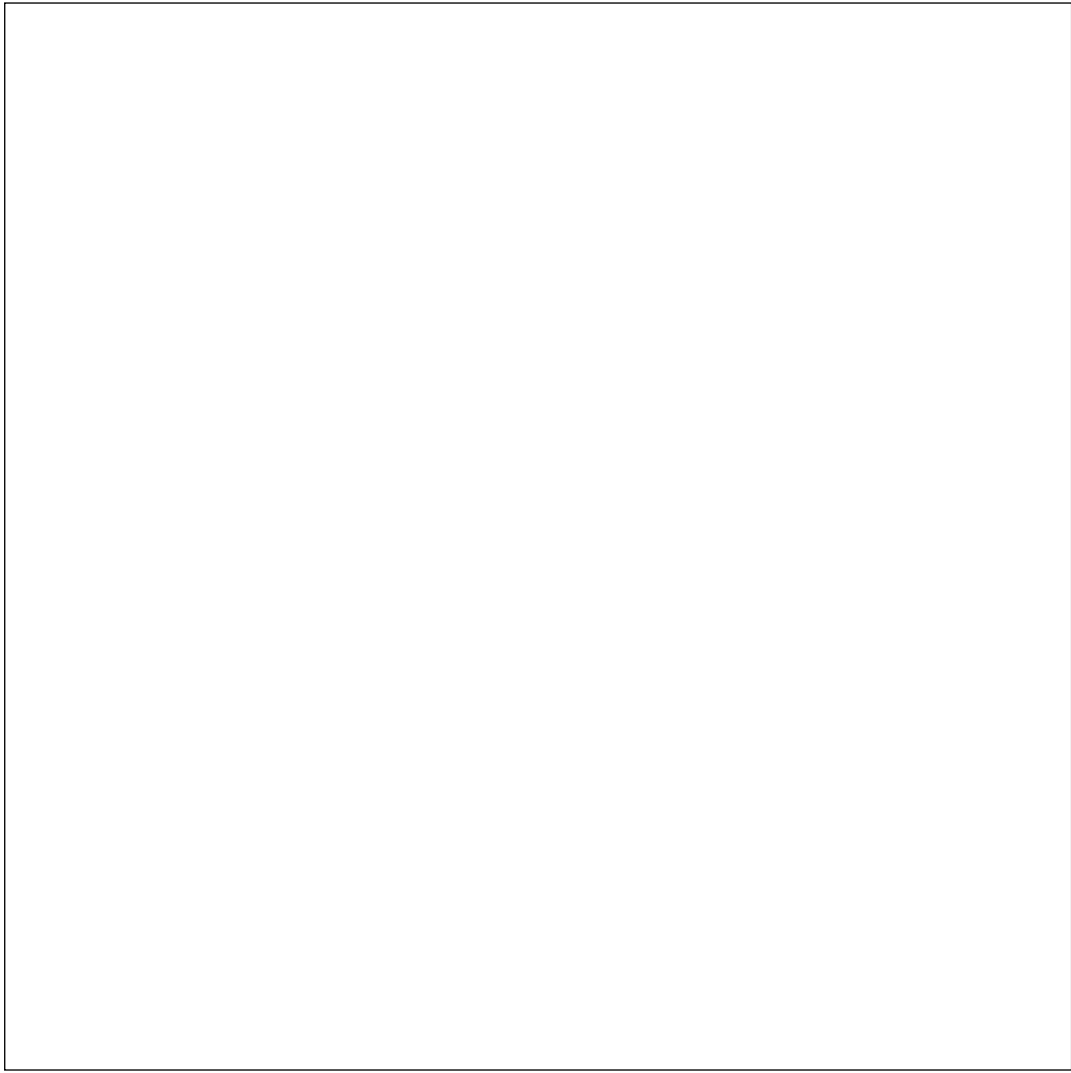
Appendix H Community consultation responses

**APPENDIX B10.2 – LANG HILL BORROW SITE MANAGEMENT PLAN
COMMUNITY COMMENTS
WOOLGOOLGA TO BALLINA (SSI-4963)**

Feedback	Issue category	Summary of issue	Verbatim	Pacific Complete Response
W2B-LHBS-FF-001. Address: 9830 Pacific Highway Woodburn 2472	Visual impact	Concerned about the visual impact of the borrow site.	We agree to the attached letter (Lang Hill borrow site notification letter) subject to planting of trees along our boundary where the proposed borrow site is.	Pacific Complete will include a row of Tall Grevillia plants in the property adjustment plan for this property to be planted in advance of the borrow commencing.

Appendix I 3D model and digital figures of Lang Hill Borrow Site

Open in Adobe to view the 3D model. Click on the centre of the page and use the mouse to move the model around to view the site from a variety of angles.



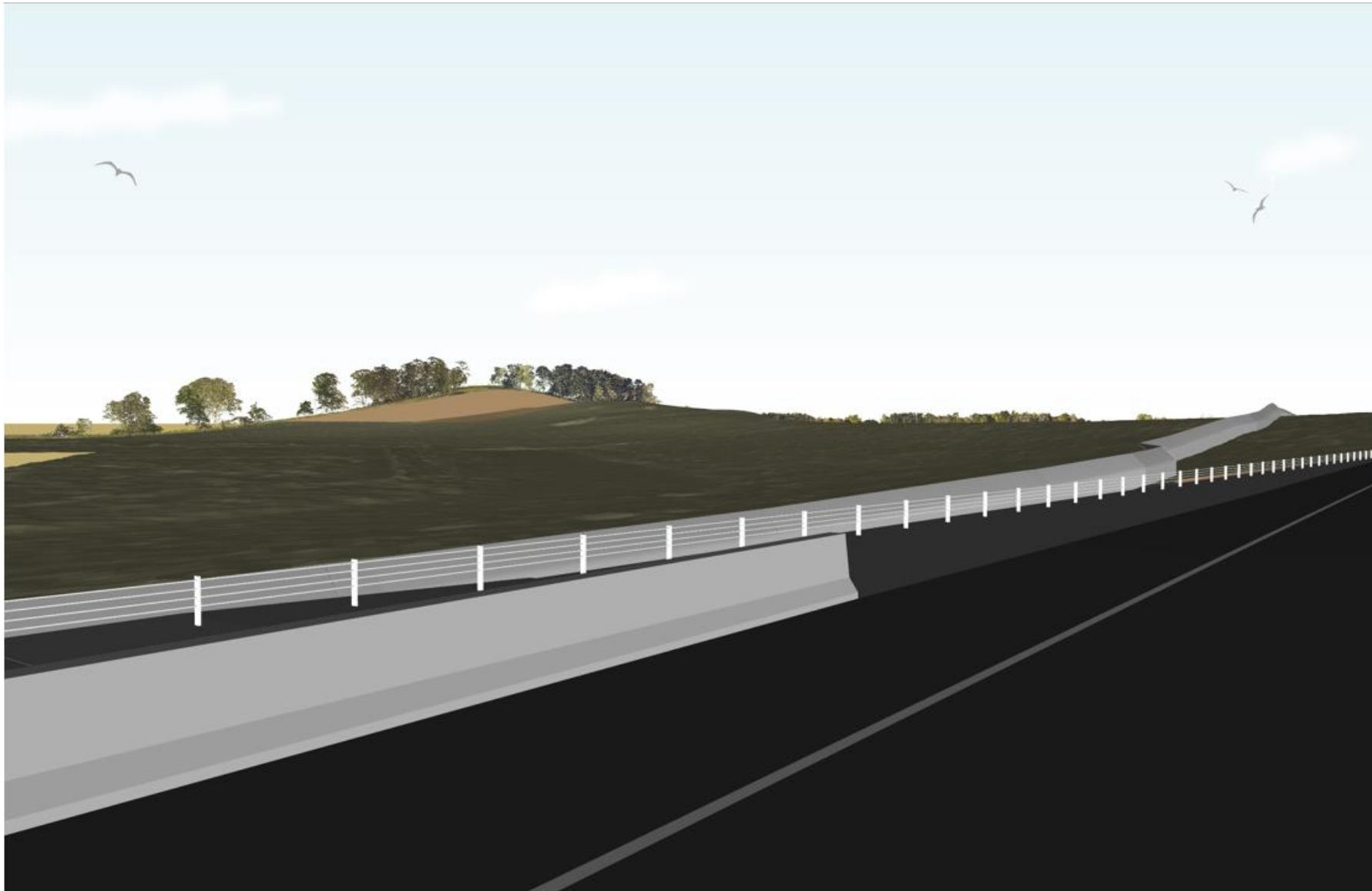


Figure: View from the new highway alignment looking north towards the Lang Hill Borrow Site cut. The excavation area is shown in light brown on the front of the hill. Note – existing vegetation in the foreground is currently not shown.

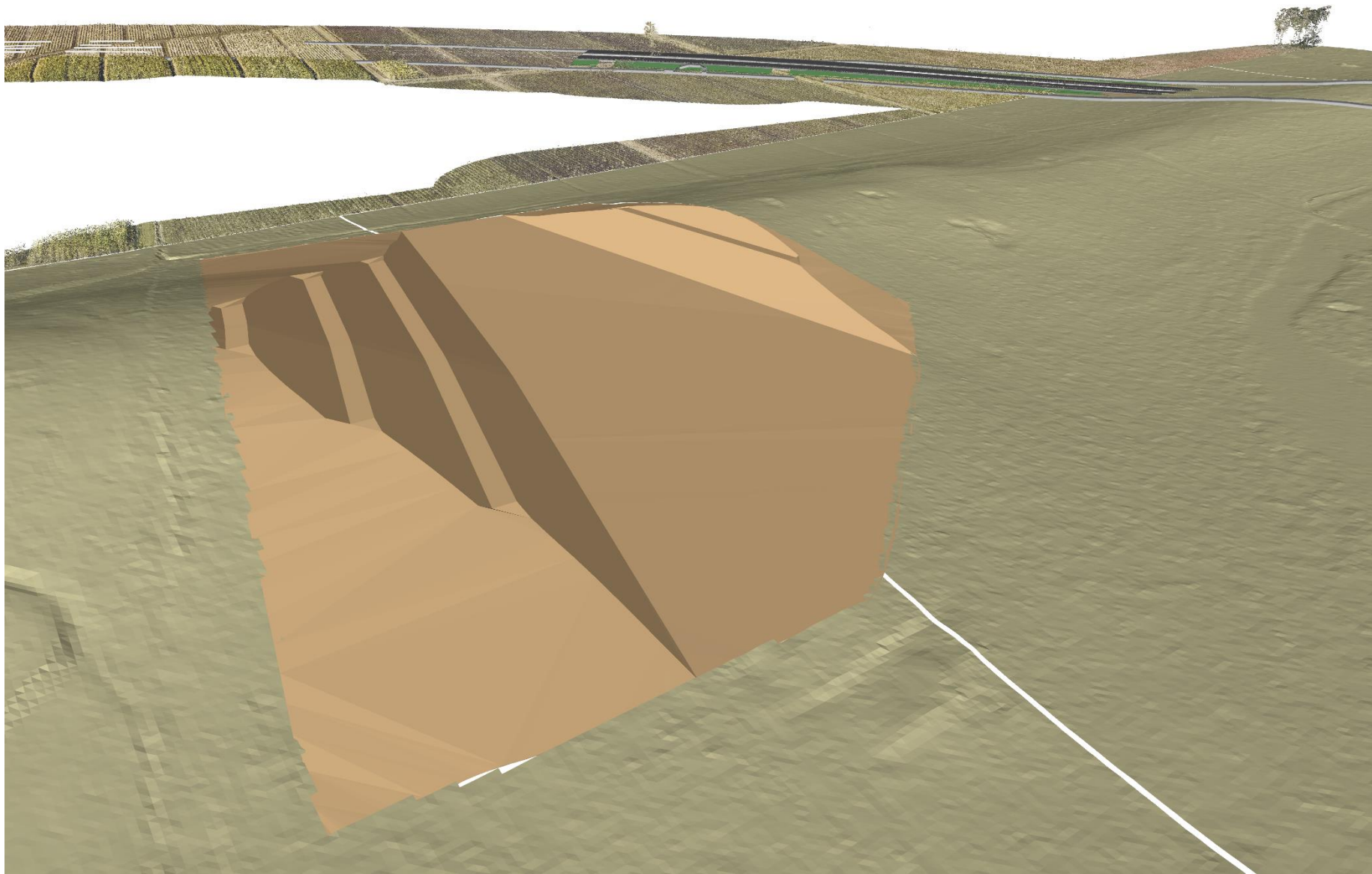


Figure: The Lang Hill Borrow Site after propose backfilling looking east towards the new highway alignment.