



Old Mill Road Bridge Replacement

Review of Environmental Factors

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About this document

This document is based on the REF template developed by EMAP Consulting for local councils in NSW as part of the Local Government NSW (LGNSW) Council Roadside Reserves Project. This Project, funded by the NSW Environmental Trust, worked to build the capacity of councils to improve the management of their roadside environments.

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Executive Summary

The environmental assessment and determination of the proposal has been undertaken in accordance with Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

For this proposal, Eurobodalla Shire Council is both a public authority proponent (EP&A Act s5.3) and the determining authority (EP&A Act s5.1). The REF has been prepared in accordance with Clause 228 of the EP&A Regulation (2000).

An impact assessment of biodiversity was undertaken and 2 protected fauna species and 2 protected flora species were identified, assessed as being at low risk of potential negative impact.

There were no threatened ecological communities or migratory species mapped in the vicinity of the proposed site.

It is considered that the project poses very low risk to biodiversity as all construction is proposed inside the existing footprint of the bridge and roadway, with minimal disturbance to surrounding vegetation. The proposed construction works will not produce significant noise impacts outside of normal daily operating hours, as work will be carried out during designated construction times (7am-6pm, Monday to Friday; 8am-1pm Saturday). No ongoing noise emissions would occur.

Findings and recommendations of the geotechnical investigation undertaken indicate that the analysed samples are potential acid sulfate soils, and the preparation of an Acid Sulfate Soil Management Plan will be required following additional testing.

Additional work required includes:

- Part 7 permit under the FM Act is required.
- Bridge design will form part of the Construction Environmental Management Plan (CEMP) to be provided to Fisheries a minimum of two weeks prior to any works commencing.
- Acid Sulfate Soil Management Plan (ASSMP) that outlines the appropriate and necessary management measures to be put in place.



1. Introduction

This project involves the activities necessary for the design and construction of a modern equivalent of a timber bridge. The existing timber bridge is approaching the end of its lifecycle and has been identified as being due for renewal. The construction of a modern equivalent of a timber bridge will reduce to risk for future disruption for surrounding residents.

The environmental assessment and determination of the proposal has been undertaken in accordance with Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). For this proposal, Eurobodalla Shire Council is both a public authority proponent (EP&A Act s5.3) and the determining authority (EP&A Act s5.1). The REF has been prepared in accordance with Clause 228 of the EP&A Regulation (2000). Table 1 below outlines the proponent contact details.

Table 1: Proponent details

Project Name	Old Mill Road Bridge Renewal
Proponent (Council) Name	Eurobodalla Shire Council
Project Manager	Jason Heffernan
Position	Project Management Consultant
Contact Details	jason@taprojects.com.au

1.1. Project Description and Background

1.1.1. Detailed Scope of Works

The proposed works include the activities necessary for the design and construction of a modern equivalent of a timber bridge. Bridge design will form part of the Construction Environmental Management Plan (CEMP) to be provided to Fisheries a minimum of two weeks prior to any works commencing.

An indication of works staging is outlined below:

Stage 1 - Design Phase

a) Initial Conceptual Design

- Develop an initial design that aligns with local council regulations, Australian Bridge Standards, and aesthetics of the surrounding area.

b) Detailed Design

- Perform structural analysis and detailed design of the bridge and its components.
- Prepare the Bill of Quantities (BOQ).
- Develop detailed design reports, including all assumptions and methodologies used.

c) Design Review

- Review the design against Australian Bridge Standards and T44 load requirements.
- Adjust design as necessary in response to feedback.



Stage 2 Construction Phase

a) Pre-construction

- Prepare and submit a construction management plan, which should include safety protocols, traffic management, waste management, and other site-specific issues.
- Secure necessary approvals and permits.
- Procure necessary materials in accordance with the design specifications and BOQ.

b) Demolition

A brief outline of the demolition is below:

Plant & Equipment

- 55t mobile crane
 - 14t excavator with hydraulic grabs
 - Power tools - Heavy Duty Impactor
 - Cutting Tools - Grinder, Oxy Set
1. Initially all bolts will be unscrewed from the decking and handrails. Any bolts that cannot be removed will be cut using a grinder / oxy cutting, ensuring all controls are in place whilst carrying out these works i.e. fire extinguishers, etc.
 2. The transverse decking will be removed in mattress like sections. The mattress sections will be approx. 3m long x width of the bridge. They will be disconnected from the bearers and craned out of position
 3. The longitudinal bearers will then be removed using the mobile crane. The bearers will be disconnected from both existing abutments and lifted out of position individually.
 4. Abutments will then be removed and excavated for the new abutments.

This sequence allows us to dismantle rather than demolish the bridge, keeping as many components as possible of the existing bridge in good condition for Council to reuse later.

Requirements for notification to WorkSafe are below, both requirements extracted direct from WorkSafe website.

Demolition notification requirements will apply to:

- *a structure, or a part of a structure that is load-bearing, or otherwise related to the physical integrity that is over 6 meters high*
- *load shifting machinery on a suspended floor*
- *explosives*

Requirement for a restricted demolition license are below:

You need this license to demolish or partly demolish any structure or part of a structure that is loadbearing or otherwise related to the physical integrity of the structure and:

- *is between 6-15 meters high*
- *involves using load-shifting machinery on a suspended floor, such as bulldozers, cranes, excavators, front-end and skid-steer loaders*

The contractors are not proposing to put any load shifting equipment or plant on the bridge deck and the bridge deck to riverbed measurement (taken from site at pre-tender meeting) was 4.6m.

Considering this, the contractors do not fall into the category of the requirement to notify work safe or the requirement to have a restricted demolition license.



(c) Construction

Abutment Preparation and Scour Rock:

Both abutment location areas will be trimmed to level and the front face/creek side of the abutment batter will be shaped and scour rock placed. This will avoid the need to work around the piles after they have been placed and also help stabilize the working platform for pile installation.

Piling

The UC columns will be driven using our excavator with hydraulic grabs, mobile crane, and Dawson impact hammer. The piles will then be cut-off at the required level, leaving the required projection into the abutment as per the design drawings and top plates welded to piles. Pile lengths are in accordance with provided geotechnical reports for rock level /siltstone on both sides of the bridge.

Abutment Blinding and Installation

Abutment blinding will be placed after the piles have been trimmed to level and the location for abutment installation set out. The abutment reinforcement cage will be prefabricated and lifted into position. The abutment will then be closed out using modular formwork system and the concrete poured.

Deck Beam Installation and cast in-situ concrete deck

The prestressed precast reinforced concrete beams will be manufactured off site and delivered to site for installation. The beams are 11.95m long, 500mm wide x 350mm deep. Each beam will weigh approx. 6.4t.

Temporary handrails will be fixed to the external beams to facilitate deck construction and for fall protection during works.

Bondek or fiber-cement sheeting will be placed between the spaced beams as sacrificial formwork for the deck pour. All joints will be tested with water to ensure there are no leaks and to avoid the risk of any concrete slurry entering the water during the pour.

The reinforcement will then be fixed into position along with edge the edge boards for the cast in-situ concrete deck. All ferrules to accommodate the side mounted bridge rail will be set in position on the outer edge/face of the deck.

The concrete deck will then be poured. Once the deck is poured and cured, edge boards will be stripped, and the side mounted rail will be installed. After the side-mounted rail is installed, the temporary handrail can be removed.

Road Approaches

We have allowed for localized backfilling behind the abutments. The approaches will be re-graded using site won material.

c) Post-construction

- Carry out a final inspection and testing of the permanent crossing to ensure compliance with design specifications, Australian Bridge Standards, and T44 load requirements.
- Dismantle the temporary crossing upon completion and approval of the permanent structure and restore the area to its original or an agreed-upon state.
- Provide a comprehensive completion report.



Site compounds will be demobilised, and any areas disturbed by construction works be regraded and seeded. All environmental controls will be removed from the river. Minor sediment controls can be left in place to prevent silt run off into the creek, until the grass has established on the new formation batters.

Deliverables

- Initial and detailed design reports
- Bill of Quantities
- Construction management plan
- Completed bridge structure meeting AS 5100 and T44 load requirements.
- Completion report

1.1.2. Machinery and Equipment

- Excavator
- Skid Steer
- Roller
- Water Cart
- Rigid Truck or Truck and Dog
- Other as required.

1.1.3. Duration and Working Hours

The works are short term, as outlined in Table 2.

Table 2: Project timeframes

Commencement Date	January 2024
Work Duration	The estimate’s total timeframe for the proposed works is: 8 weeks (Design Phase) 8 weeks (Construction Phase)
Work Hours	Standard construction hours: * Monday to Friday 7:00am to 6:00pm * Saturdays 8:00am to 1:00pm * No work on Sundays or Public Holidays



1.2. Project Location and Context

1.2.1. Location of the Proposed Activity

The site of the existing and proposed bridge is located on Old Mill Road which crosses over an intermittent sub-tributary of Coila Creek. The unnamed gully flows to the north at the site and eventually joins Coila Creek, approximately 0.75km north of the project area (GPS: -36.0176922, 150.0656464). Coila Creek is a sanctuary zone and feeds Coila Lake at Tuross Head.



Image 1. Project Location

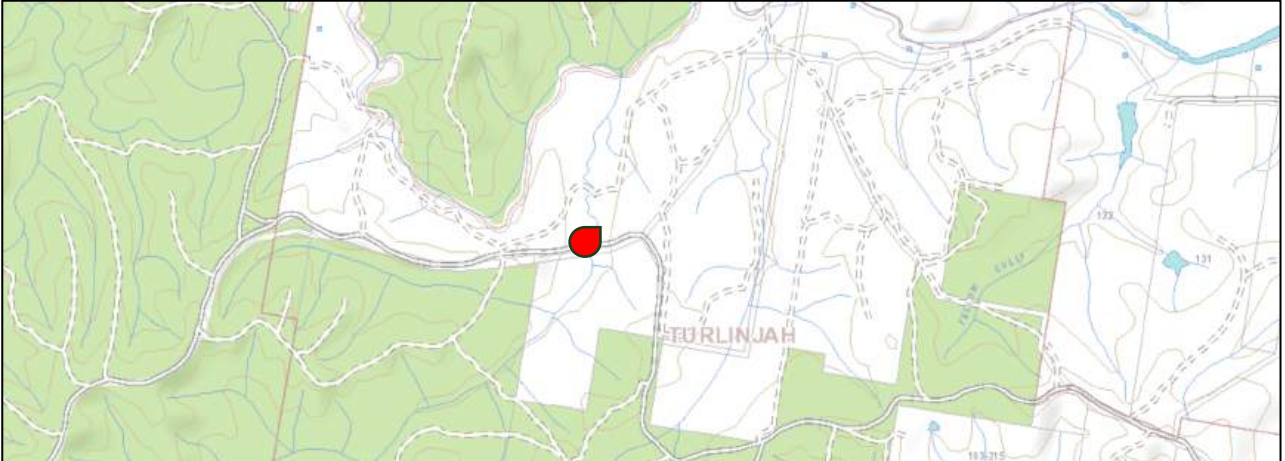


Image 2. Topographic Map of Area

1.2.2. Site Context

Eurobodalla Shire Council (ESC) is located on the far south coast of NSW and covers 110 kilometres of coastline. The coastline stretches from South Durras on the northern end to Akolele on the southern end and includes the main townships of Batemans Bay, Moruya and Narooma.

The site of the existing and proposed bridge is located at chainage 4.0 km along the Old Mill Road from the intersection of Old Mill Road and Prince Highway (A1). It is located in a dense state forest, with an open paddock to the north. The existing bridge is a single-lane timber bridge with unsealed road pavement either side of the bridge. The length and width of the bridge are approximately 6m and 3m, respectively.



The land zoning at the site is RU1 Primary Production.

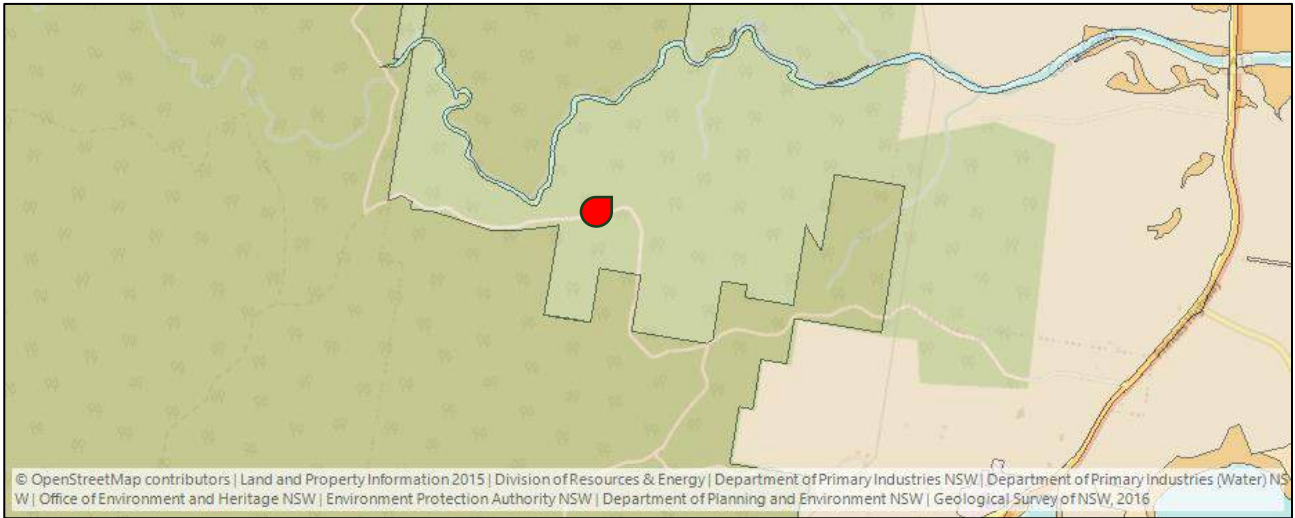
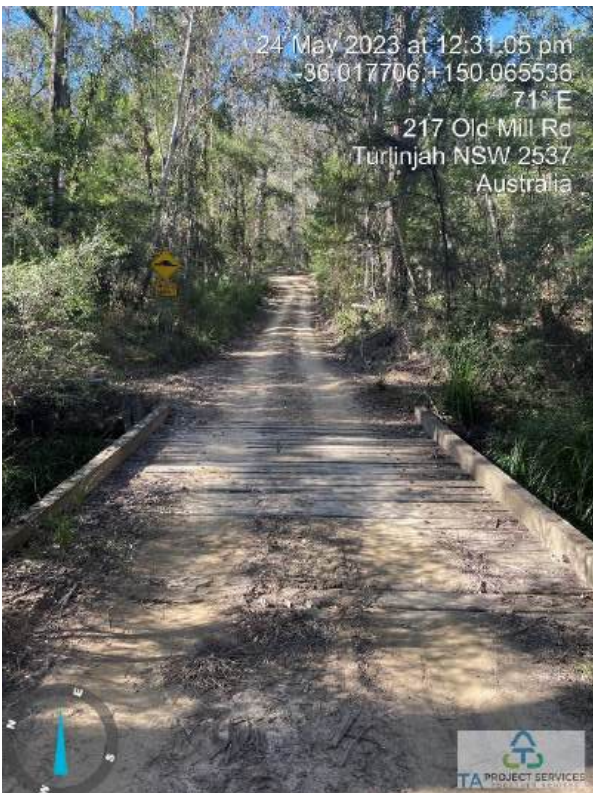
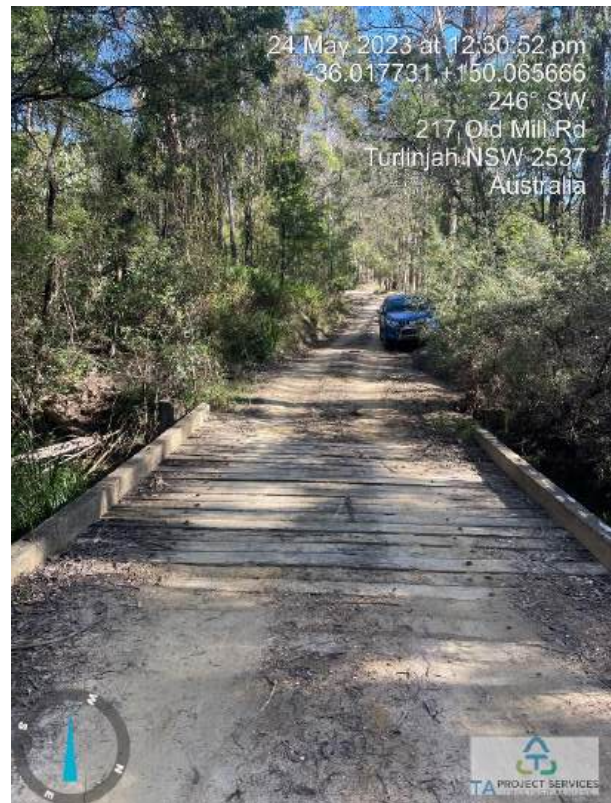
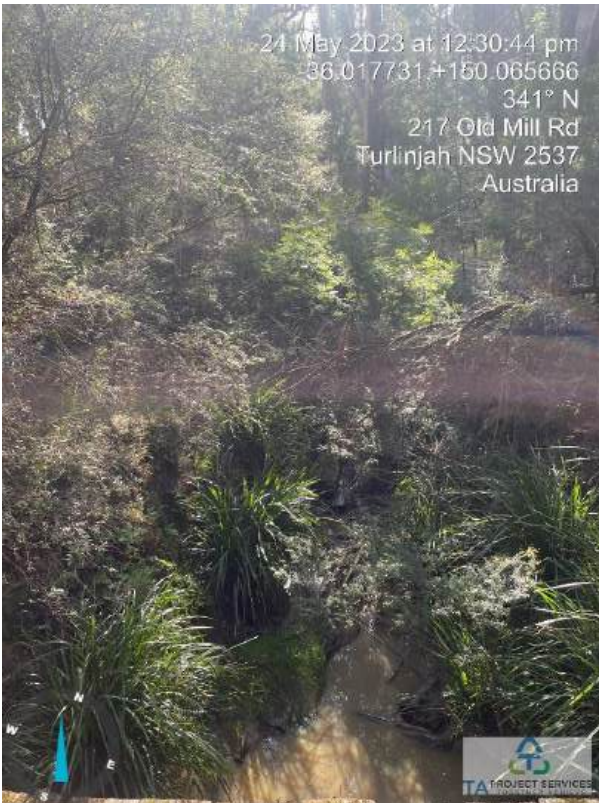
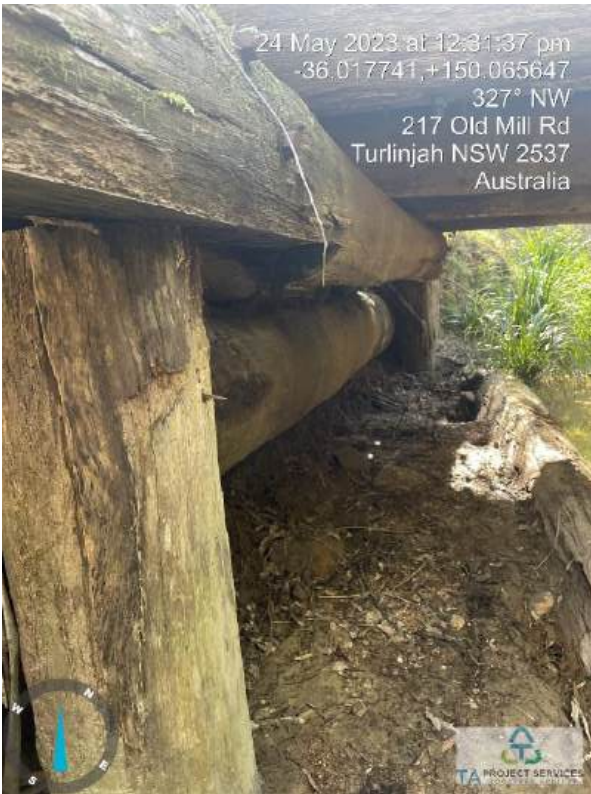


Image 3. Land Zoning

1.2.3. Site Photographs







1.2.4. Project Justification and Consideration of Alternatives

This project is a restoration project funded under the Local Government Recovery Grants Program. The existing bridge is approaching the end of its lifecycle and has been identified as being due for renewal. The construction of a modern equivalent of a timber bridge will reduce to risk for future disruption for surrounding residents.

The replacement of the structure in concrete will also reduce the risk of loss during extreme fire events, providing an alternative egress in an emergency.



2. Statutory and Planning Context

2.1. Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) and the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation) provide the framework for development and environmental assessment in NSW.

As council is the proponent, the works have been assessed as 'development permissible without consent' under Part 5 of the EP&A Act. Accordingly, council must satisfy Sections 5.5, 5.6 and 5.7 of that Act by examining, and taking into account to the fullest extent possible, all matters which are likely to affect the environment. This REF is intended to address council's compliance with the EP&A Act including Sections 5.5, 5.6 and 5.7 and the requirements of clause 228 of the EP&A Regulation 2000. Environmental Planning Instruments made under the EP&A Act 1979 may also be relevant and are addressed below.

2.2. State Environmental Planning Policy (Transport and Infrastructure) 2021

The *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Infrastructure SEPP) aims to facilitate the delivery of infrastructure across NSW by identifying whether certain types of infrastructure require consent, can be carried out without consent or are exempt development.

Pursuant to clause 2.109 of the SEPP, development for the purpose of a road or road infrastructure facilities may be carried out by or on behalf of a public authority without consent on any land. The proposed works are therefore assessed under Part 5 of the EP&A Act.

Not all roadside vegetation management requires assessment under Part 5 of the EP&A Act. Section 97(1) of the infrastructure SEPP states:

- (1) *Development for any of the following purposes is exempt development if it is carried out by or on behalf of a public authority or the Minister responsible for Crown roads (within the meaning of the Roads Act 1993) in connection with a road or road infrastructure facilities and complies with section 2.20:*
 - (d) *upgrading or maintenance of landscaping, or vegetation management (such as weed spraying, slashing and pruning), that—*
 - (i) *does not involve construction works, and*
 - (ii) *involves the replacement (if any) of existing materials with similar materials only,*

2.3. Other Environmental Legislation

Table 3 outlines how the project has been considered under other relevant Commonwealth and State environmental legislation.



Table 3: Other environmental legislation

Legislation	Relevance to the Proposed Activity
COMMONWEALTH LEGISLATION	
<i>Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)</i>	<p>The EPBC Act protects matters of National Environmental Significance (NES), such as threatened species and ecological communities, migratory species (protected under international agreements), and National Heritage places (among others).</p> <p>Matters of NES have been identified on and near the site. An assessment of the activity has been undertaken in accordance with Significant Impact Criteria in the Significant Impact Guidelines 1.1 (Commonwealth of Australia 2013). A significant impact is not likely to result and therefore a referral to the Commonwealth Department of Environment is not required.</p> <p>See Section 3.4.</p>
STATE LEGISLATION	
<i>Biodiversity Conservation Act 2016 (BC Act)</i>	<p>Part 7 of the BC Act provides the environmental assessment requirements for activities being assessed under Part 5 of the EP&A Act 1979. If a significant impact is likely, a Species Impact Statement is required. A biodiversity development assessment report may also be required if the proponent elects for this. Section 7.2(1)(a) and 7.3 describe the assessment requirements and thresholds for what is considered a significant impact.</p> <p>Threatened species and communities listed under this Act were identified as potentially being impacted by the works. Assessments of Significance were undertaken for these matters and concluded that a significant impact is not likely to result and therefore a Species Impact Statement or Biodiversity Development Assessment Report is not required.</p> <p>See Section 3.4.</p>
<i>Local Land Services Act 2013 (LLS Act)</i>	<p>The objects of the LLS Act include 'to ensure the proper management of natural resources in the social, economic and environmental interests of the State, consistently with the principles of ecologically sustainable development. The Act regulates the clearing of native vegetation; however section 60(O)(b)(ii) excludes the need for consent under the LLS Act where the clearing is an activity carried out by a determining authority within the meaning of Part 5 of the EP&A Act 1979.</p>
<i>Fisheries Management Act 1995 (FM Act)</i>	<p>FM Act provides for the protection, conservation, and recovery of threatened species, populations and ecological communities of fish and marine vegetation and fish habitats, as well as promoting the development and sharing of fishery resources in NSW.</p> <p>The development involves dredging and reclamation works and therefore a Part 7 permit under the FM Act is required.</p>
<i>National Parks and Wildlife Act 1974 (NPW Act)</i>	<p>The NPW Act regulates the control and management of all national parks, historic sites, nature reserves, and Aboriginal areas.</p> <p>[If the proposed activity is in or near any NPWS Estate land, state this here]</p> <p>The main aim of the Act is to conserve the natural and cultural heritage of NSW. Where works will disturb Aboriginal objects, an Aboriginal Heritage Impact Permit (AHIP) is required.</p> <p>The proposed activity is within an existing footprint of the bridge and roadway and the area has been largely already disturbed. An AHIMS Web Service Search was conducted 20 June 2023 for an area of 1km surrounding the proposed</p>



Legislation	Relevance to the Proposed Activity
	<p>development site and returned a result showing nil Aboriginal sites or places have been declared within the search area (Appendix B).</p> <p>The proposed activity is of low impact according to the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW 2010). No further assessment is required.</p>
Heritage Act 1977	<p>The proposed activity does not involve an item or place listed on the NSW State Heritage Register or the subject of an interim heritage order or listing and is therefore not a controlled activity. Approval of works on the site is therefore not required under Part 4 of the Heritage Act.</p>
Protection of the Environment Operations Act 1997 (POEO Act)	<p>The POEO Act is the key environmental protection and pollution statute. The POEO Act is administered by the EPA and establishes a licensing regime for waste, air, water and pollution. Relevant sections of the Act are listed below:</p> <ul style="list-style-type: none"> • Part 5.3 Water Pollution • Part 5.4 Air Pollution • Part 5.5 Noise Pollution • Part 5.6 Land Pollution and Waste <p>Any work potentially resulting in pollution must comply with the POEO Act. Relevant licences must be obtained if required. No licences have been identified as being required including an Environmental Protection Licence (EPL).</p>
Water Management Act 2000 (WM Act)	<p>The WM Act's main objective is to manage NSW water in a sustainable and integrated manner that will benefit today's generations without compromising future generations' ability to meet their needs. Section 91E of the Act establishes an approval regime for controlled activities within waterfront land. However clause 41 of the Water Management (General) Regulation 2018 provides an exemption for public authorities in relation to all controlled activities on waterfront land.</p> <p>Note: Although formal approval under the WM Act is not required, if the proposed activity is within 40m of a waterway, an attempt should be made to comply with the requirements of controlled activities in order to reduce risks to waterways. Old Mill Road Bridge is not within 40m of a river, lake or estuary. Whilst some direct impact will occur on Coila Creek for the construction of the new bridge, no significant or lasting impact is expected. Mitigation measures to assist in protection of the creek is at section 3.3.</p>
Roads Act 1993	<p>Section 88 of the <i>Roads Act</i> states that a roads authority may, despite any other Act or law to the contrary, remove or lop any tree or other vegetation that is on or overhanging a public road if, in its opinion it is necessary to do so for the purposes of carrying out road work or removing a traffic hazard. However, the environmental safeguards outlined in this REF still apply.</p>
Biosecurity Act 2015	<p>The <i>Biosecurity Act 2015</i> and regulations provide requirements for state level priority weeds. The Act regulates all plants, with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Section 4 considers the likelihood of encountering weeds and appropriate mitigation measures to reduce the risk of spreading.</p> <p>Mitigation measures are proposed as follows:</p> <ul style="list-style-type: none"> • Dispose of biomaterials at an approved green waste/recycling facility where onsite re-use opportunities cannot be found. If green waste contains High Threat Weeds consider solar radiation to kill seeds/roots before disposal.



Legislation	Relevance to the Proposed Activity
	<ul style="list-style-type: none"> The stockpile site would revegetate naturally however, a weed inspection is recommended (section 3.9) to ensure no High Threat Weeds occur at either the bridge or stockpile sites post the works.
State Environmental Planning Policy – Coastal Management	<p>The <i>State Environmental Planning Policy (Coastal Management) 2018</i> provides controls for undertaking development and activities in coastal management areas. The four coastal management areas are:</p> <ul style="list-style-type: none"> Coastal wetlands and littoral rainforests area – areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26 Coastal vulnerability area – areas subject to coastal hazards such as coastal erosion and tidal inundation Coastal environment area – areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included Coastal use area – land adjacent to coastal waters, estuaries and coastal lakes and lagoons. <p>Under clause 10 of the SEPP, clearing native vegetation in the mapped ‘<i>Coastal wetland and littoral rainforest area</i>’ is permissible without consent when undertaken by or on behalf of a public authority and in accordance with a certified coastal management program, a plan of management under Division 2 of Part 2 of Chapter 6 of the <i>Local Government Act</i>, or a plan of management under Division 6 of the <i>Crown Land Management Act 2016</i>. In other cases, the clearing requires consent.</p> <p>The proposed activity is not located on land subject to the Coastal Management SEPP.</p>
State Environmental Planning Policy Vegetation in Non-Rural Areas 2017	<p>Clause 8 of the SEPP states that an authority to clear vegetation under this policy is not required if it is a clearing authorised under s60(O) of the <i>Local Land Services Act 2013</i>. Section 60(O) provides an exemption for clearing under Part 5 of the EP&A Act and therefore consent is not required under the SEPP (Vegetation in Non-Rural Areas).</p>
State Environmental Planning Policy (Koala Habitat Protection) 2019	<p>Koala Habitat Protection SEPP aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for <i>Phascolarctos cinereus</i> (Koala) to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline.</p> <p>Koala Habitat Protection SEPP applies to development under part 4 of the EP&A Act 1979. As the proposed activity is not ‘development’, Koala Habitat Protection SEPP doesn’t apply. Regardless, consideration of impacts to koala and koala habitat may still be relevant under the BC Act 2016.</p>



3. Existing Environment and Impact Assessment

3.1. Landform, Geology and Soils

3.1.1. Existing Environment

The site of the existing and proposed bridge is located at chainage 4.0 km along the Old Mill Road from the intersection of Old Mill Road and Prince Highway (A1). The site features a single-span single-lane timber bridge crossing over a small creek.

The site is located in a dense state forest, with an open paddock to the north. The existing bridge is a single lane timber bridge with unsealed road pavement either side of the bridge. The length and width of the bridge are approximately 6m and 3m, respectively.

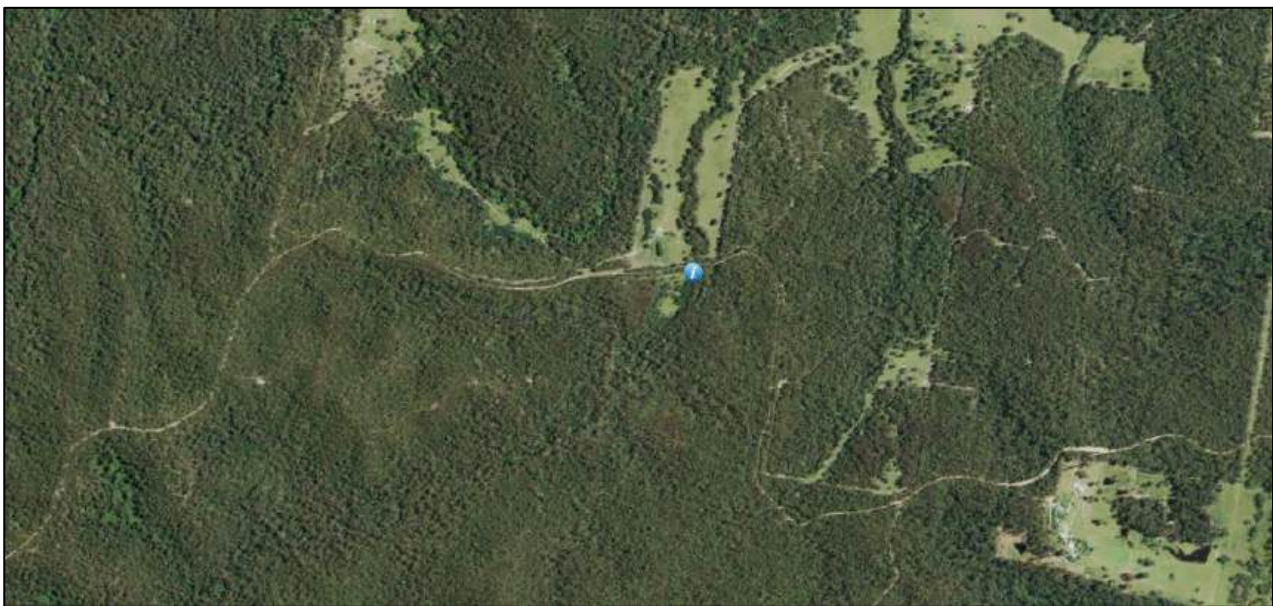


Image 4. Subject Site

A geotechnical investigation was undertaken by Stantec Pty Ltd which indicates that the site is generally fill material associated with the bridge abutments overlying cohesive alluvial deposits and residual soils upon the underlying bedrock.

Table 3-2 below provides a summary of subsurface units identified during the investigation.



Table 3-2 Summary of Subsurface Units

Type	Unit	Description of Layer
FILL	1	Sandy CLAY: low plasticity, orange, brown fine to medium grained sand
ALLUVIUM	2	CLAY: medium plasticity, black, trace fine grained sand
RESIDUAL	3A	Silty SAND/Clayey SAND: fine to coarse grained, orange, grey, medium plasticity, with fine to coarse gravel
	3B	Sandy CLAY/CLAY: medium plasticity, mottled orange, grey, mottled brown, fine to coarse grained sand
BEDROCK	4	SANDSTONE: medium grained, orange-brown and grey, highly weathered, very low to medium strength

Notes:

- EW: Extremely Weathered Rock
- HW: Highly Weathered Rock

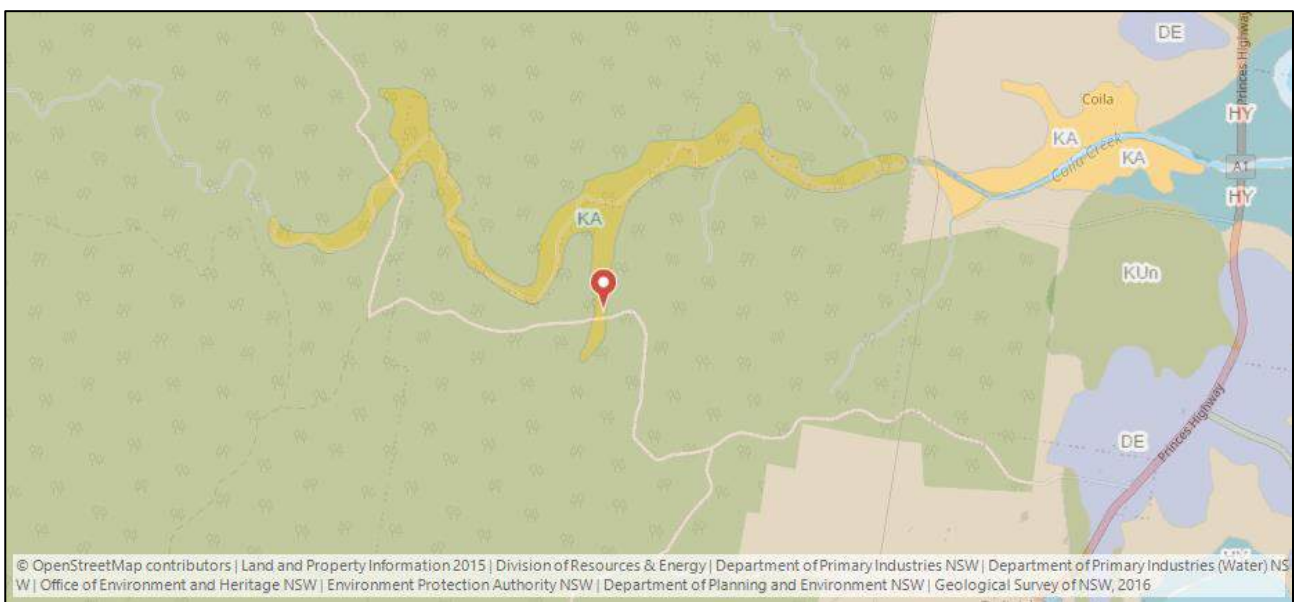


Image 5. Soil Classification Map (Kandosols)

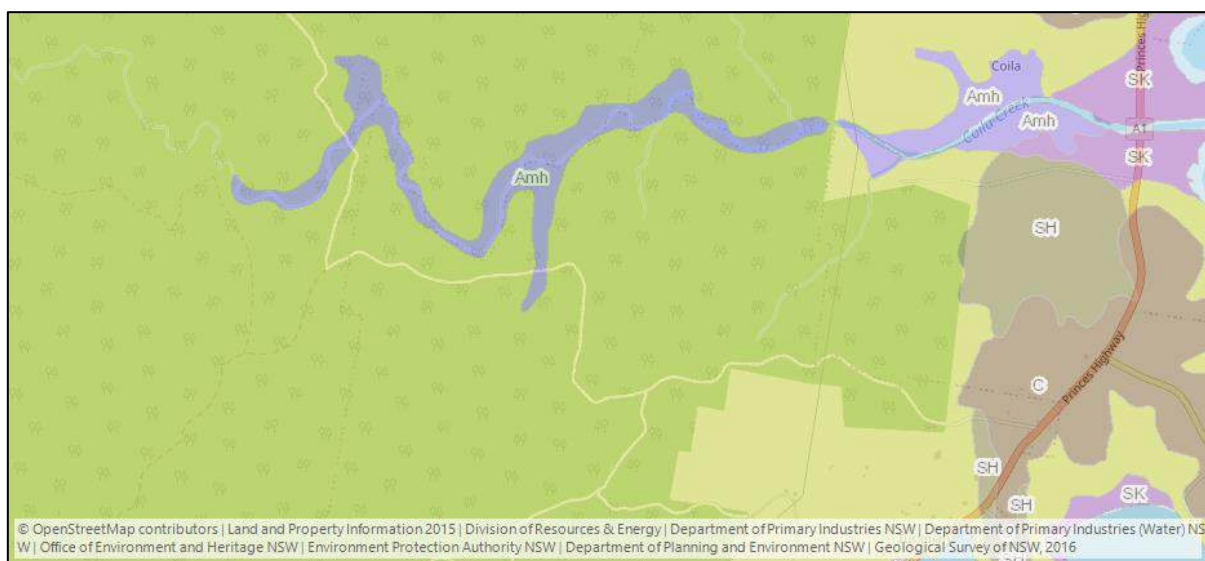


Image 6. Soil Type Map (Great Soil Group: Alluvial Soils - medium to heavy textured (Amh))



3.2.

3.2. Contaminated Land and Acid Sulfate Soils

3.2.1. Existing Environment

No records returned on a search of the NSW EPA Public Register in relation to Contaminated Land.

Samples were tested and screened for acid sulfate soils (ASS) and results show soils in-situ are slightly acidic to neutral with decreasing acidity with depth and following oxidation change in pH is between 0 and 2.5 and appears to decrease with depth. Full analysis is found in the geotechnical investigation (Appendix C). Conclusions indicate that the analysed samples are potential ASS.

3.2.2. Impact Assessment

Based on the ASS results presented above the following recommendations are made:

- Undertake further sampling to determine the distribution of actual and potential ASS that interact with the proposed road design. Sampling should include methods to verify the ANC (acid neutralising capacity) of site soils using appropriate methods as outlined in Appendix C *National Acid Sulfate Soils Guidance: Identification and Laboratory Methods Manual* (DAWR, 2018). Sampling should consider the proposed design and soils that may be disturbed or impacted by the proposed works.
- Sampling design should refer to guidance provided in the *Acid Sulfate Soils Manual* (ASSMAC, 1998) and the *National Acid Sulfate Soils Guidance* (DAWR, 2018).
- Following completion of further sampling preparation of an Acid Sulfate Soil Management Plan (ASSMP) that outlines the appropriate and necessary management measures to be put in place including for stockpiling and treatment (e.g. liming) methodologies for the soils.

3.3. Water Quality and Hydrology

3.3.1. Existing Environment

The intermittent gully flows north at the site and eventually joins Coila Lake approximately 4.4km to the east of the project area.

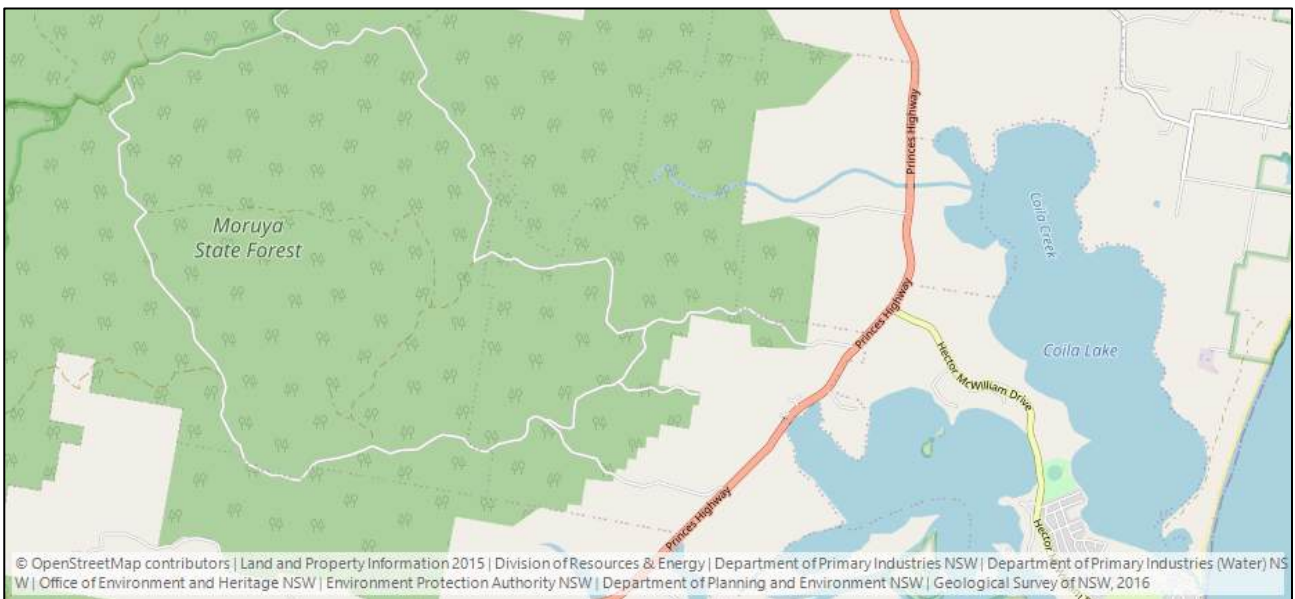


Image 7. NSW Hydrography - Watercourses



3.3.2. Impact Assessment

Proposed works have a potential for erosion and sedimentation, and the movement of sediment into Coila Creek. In order to manage for erosion and sedimentation during construction, an erosion and sediment control plan (ESCP) shall be prepared. *Managing Urban Stormwater; soils and construction Vol 1* (Landcom, 2004) and other associated guidelines should be used. An ESCP plan shall form part of the CEMP, and the CEMP is to be provided to regulatory authorities (Fisheries) two weeks prior to any works commencing at the site.

3.3.3. Management and mitigation

Works adjacent to the unnamed gully (stockpiling of materials/equipment) should be carefully undertaken with suitable sediment and erosion controls, which should include primary and secondary systems, such as:

Land-based Primary & Secondary Containment

- Earth containment bund / windrow
- Geofabric-wrapped rock edge bund (temporary working platforms)
- Sediment fence
- Spill kits
- Sandbags or bulka bags (filled with washed river sand)
- Coir logs

Over Water Primary Containment

- Concrete formwork containment
- Earth containment bund / windrow
- Sandbags
- Self-bunded plant and equipment
- Plant nappies / trays
- Rubber or steel concrete delivery lines
- Concrete kibbles
- Concrete washout trays and management of alkaline curing water (if any is generated by works)

Over Water Secondary Containment

- Floating hydrocarbon absorbent boom
- Floating hydrocarbon containment boom
- Floating silt curtains
- Concrete delivery line containment (sheet pile, pipes or casings)
- Nappies around discharge end of boom pump line or kibble during extension / retraction over water
- Dirty water extraction containment (sheet pile, pipes or casings)
- Spill kit

Works staff should be aware of weather forecast conditions and minimize the exposure of disturbed areas and risk of sediment laden runoff in this area. Sediment and erosion controls should remain in place until all disturbed ground is stabilised with native grasses etc.

As the works will involve pumping of concrete into the formwork bridge structures, there is a risk of concrete accidentally entering the creek. This can be managed through standard control measures for concrete pours, including using low flow concrete, and higher-level formwork so concrete does not need to reach the top edge.



3.4. Biodiversity

3.4.1. Existing Environment

(i) *Threatened Ecological Communities*

There were no TEC's mapped in the vicinity of the proposed site.

(ii) *Threatened Flora Species*

A table of threatened flora records were recorded within 10km search of the site from:

- NSW Bionet Atlas results
- EPBC Protected Matters Search Report.

The search returned a total of 479 species, with the *River Peppermint* recorded within the immediate vicinity of the proposed site.

Eucalyptus elata	River Peppermint				Low risk – 16 species recorded within the immediate vicinity of the proposed site along Old Mill Road; however, all construction is proposed within the existing footprint and no vegetation is proposed to be removed. Any disturbance to any vegetated areas will be remediated upon completion.
Prostanthera lasianthos	Victorian Christmas Bush				Low risk - Species recorded within 1km of the proposed site. No species records mapped within the immediate vicinity of the proposed site. All construction is proposed within the existing footprint and no vegetation is proposed to be removed. Any disturbance to any vegetated areas will be remediated upon completion.
Lobelia purpurascens	whiteroot				None – Species recorded within 1km of the proposed site, however none with in the immediate vicinity. All construction is proposed within the existing footprint and no vegetation is proposed to be removed. Any disturbance to any vegetated areas will be remediated upon completion.
Xanthosia atkinsoniana					None – Species recorded within 1km of the proposed site, however none with in the immediate vicinity. All construction is proposed within the existing footprint and no vegetation is proposed to be removed. Any disturbance to any vegetated areas will be remediated upon completion.

It is considered very low risk that any this species will be impacted as all construction is proposed inside existing footprint of the bridge and roadway, with minimal disturbance to surrounding vegetation. There are no trees or large established vegetation to be removed as part of this project.



(iii) *Threatened Fauna Species*

A table of threatened fauna records were recorded within 10km search of the site from:

- NSW Bionet Atlas results
- EPBC Protected Matters Search Report.

The search returned a total of 163 species; however none were mapped within the vicinity of the proposed site.

<i>Prototroctes maraena</i>	Australian Grayling	V		Low risk – No species were mapped in the vicinity of the proposed works site.
<i>Tyto novaehollandiae</i>	Masked Owl	V,P,3		Low risk - Species recorded within a 1km buffer of the proposed area, but not in the immediate vicinity. Species are more likely to be located within the more highly vegetated areas.

It is considered very low risk that any this species will be impacted as all construction is proposed inside existing footprint of the bridge and roadway, with minimal disturbance to surrounding vegetation. There are no trees or large established vegetation to be removed as part of this project.

It is considered that any impact would be temporary (estimated 8 weeks construction period).

(iv) *Other MNES*

Migratory Species

A table of Migratory Species records were recorded within 10km search of the site from:

- NSW Bionet Atlas results
- EPBC Protected Matters Search Report.

The search returned a total of 14 species; however none were mapped within the immediate vicinity of the proposed site.

It is considered very low risk that any migratory species will be impacted as all construction is proposed inside existing footprint of the bridge and roadway, with minimal disturbance to surrounding vegetation. The proposed construction works will not produce significant noise impacts outside of normal daily operating hours, as work will be carried out during designated construction times (7am-6pm, Monday to Friday; 8am-1pm Saturday). No ongoing noise emissions would occur.

3.4.2. Impact Assessment

Consideration was given to the potential impact of the proposed activity on each species assessed as potentially occurring in the REF Study Area.

See **Appendix A** for the full likelihood of occurrence assessment and consideration of potential impacts for each flora and fauna species identified in the 10km search of the NSW Bionet Atlas and EPBC Protected Matters Search Tool. An Assessment of Significance as per s7.3 of the *Biodiversity Conservation Act 2016* was undertaken for each of these species. Note that if an Assessment of Significance determines that an impact is likely, a Species Impact Statement is required.

An Assessment of Significance conducted for these species concluded that there is unlikely to be a significant impact based on the following:



- Breeding resources such as logs and burrows will be retained and similar habitats are widespread in the locality;
- A significant area of foraging resources will be retained and similar resources are widespread in the locality;
- Similar or higher-quality habitat is widespread in the region;
- Construction is scheduled to avoid periods of migration and breeding;
- Breeding resources will be retained and similar habitats are widespread in the locality.

3.5. Aboriginal Heritage

3.5.1. Existing Environment

The proposed activity is within an existing footprint of the bridge and roadway and the area has been largely already disturbed. An AHIMS Web Service Search was conducted 20 June 2023 for an area of 1km surrounding the proposed development site and returned a result showing nil Aboriginal sites or places have been declared within the search area (Appendix B).

3.5.2. Impact Assessment

The proposed activity is of low impact according to the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW 2010). No further assessment is required.

3.5.3. Management and mitigation

Follow the generic due diligence process outlined in the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW, 2010)

Step 1. Will the activity disturb the ground surface? Yes

Step 2a. Search the AHIMS database and use any other sources of information of which you are already aware. Search undertaken and Aboriginal sites or artefacts not recorded within 200m of the proposed disturbance area.

Step 2b. Activities in areas where landscape features indicate the presence of Aboriginal objects. No. Site is highly modified and previously disturbed by road construction, existing bridge development.

Step 3 and 4. Can potential disturbance be avoided and/or does visual inspection confirm the presence or likely presence of aboriginal objects. Disturbance cannot be avoided. Surface has been disturbed due to previous roadworks and bridge constructions. Therefore, presence of objects is unlikely.

Recommended procedure for carrying out works:

- Proceed with caution when excavating any soil over the site.
- If while undertaking your activity you find an Aboriginal object you must stop work, notify Council's environmental Officer, OEH and you may need to apply for an AHIP.
- Some works may not be able to resume until you have been granted an AHIP and you follow the conditions of the AHIP.
- Further investigation may be required depending on the type of Aboriginal object that is found. If human skeletal remains are found during the activity, you must stop work immediately, secure the area to prevent unauthorised access and contact NSW Police and OEH.



The NPW Act requires that, if a person finds an Aboriginal object on land and the object is not already recorded on AHIMS, they are legally bound under s.89A of the NPW Act to notify OEH as soon as possible of the object's location. This requirement applies to all people and to all situations, including when you are following this code. If a person finds an Aboriginal object which is not recorded on AHIMS, they should contact DECCW as soon as practicable. Refer link below:

<https://www.heritage.nsw.gov.au/applications/aboriginal-objects-and-places/>

3.6. Non-Aboriginal Heritage

3.6.1. Existing Environment

There are no items of non-Aboriginal heritage in the vicinity of the site.

3.7. Noise and Vibration

3.7.1. Existing Environment

The existing noise level at the site is consistent with what would be expected for the surrounding area which is predominately forested land to the east and grazing paddocks and some rural residential dwellings to the north.

3.7.2. Impact Assessment

Construction works should ensure that DECC noise guidelines are not exceeded. All ESC/contractor vehicles travelling to the site should consider nearby residences when travelling along Church Street. The proposed construction works will not produce significant noise impacts outside of normal daily operating hours, as work will be carried out during designated construction times (7am-6pm, Monday to Friday; 8am-1pm Saturday). No ongoing noise emissions would occur. No noise monitoring is deemed necessary to evaluate potential noise impacts.

3.7.3. Management and mitigation

As per the *Draft Noise Control Guideline – Construction Site Noise* (DECC, 2008a), construction related noise should be managed to the following standards:

- **Construction period of four weeks or under** - The L10 level* measured over a period of not less than 15 minutes (measured at nearest residence) when the construction site is in operation must not exceed the background level by more than 20dB(A).
- **Time restrictions** - Monday to Friday 7am to 6pm, Saturday 8am to 1pm if audible on residential premises, otherwise 7am to 1pm. No construction work to take place on Sundays or Public Holidays.
- **Silencing** - All possible steps should be taken to silence construction equipment.

*L10: Noise level exceeded for 10% of a specified time-period

In addition to the DECC guidelines, the construction activities should be guided by AS2436- 1981 "Guide to Noise Control on Construction, Maintenance and Demolition Sites".

Mitigation measures may be employed to minimise any impacts should these occur:



Vehicle noise and pollution emissions shall be limited by ensuring that all plant and equipment meet WorkCover regulations and are fitted with correct noise reduction devices in accordance with manufacturer's recommendations:

- Regular servicing of construction equipment shall be undertaken by the Construction contractor.
- Working hours to be restricted to comply with EPA and Council regulations and these should be confirmed prior to undertaking any of the proposed works.
- Consultation with affected nearby residents and informing them in advance as to the extent and timing of works and responsibly advising when noise levels during such works may be relatively high.
- Where readily available, deploying plant having lower noise emission levels.
- Properly maintaining plant to ensure rated noise emission levels are not exceeded.
- Work only within designated hours.
- Providing a contact telephone number for the public to seek information or make a complaint. A log of complaints will be maintained and actioned by the site superintendent in a responsive manner.
- Undertaking construction activities guided by AS2436-1981 "*Guide to Noise Control on Construction, Maintenance and Demolition Sites*".

Furthermore, construction work is to give due consideration to the amenity of site neighbours and any complaints are to be noted and addressed where possible.

3.8. Air Quality

3.8.1. Existing Environment

The existing air quality at the site is consistent with what would be expected for the surrounding area which is predominately forested land to the east and grazing paddocks and some rural residential dwellings to the north.

3.8.2. Impact Assessment

Construction

Limited dust generation will occur from the proposed works. Any exposed soil from these works should be covered as soon as practicable. It is unlikely soils will require to be imported/exported from the site. Following the completion of construction works, the proposed works would not have any dust impacts on air quality.

Operation

No dust impacts would occur once the bridge is installed.

3.8.3. Management and mitigation

The CEMP for the works should include soil and water management, including consideration of wind-blown dust. This can be managed through the use of covers over truck loads and any stockpiled soils/sand.

The following mitigation measures should be employed to reduce any potentially adverse air quality impact from dust during construction:

- Stockpiles should be kept to a minimum.

Excess spoil should be promptly removed from site if required.



3.9. Waste and Chemical Management (non-asbestos)

The following major waste streams are identified and methods for their management provided below.

During construction the following waste streams will be produced:

- **Bulk earthworks material** – excavated material for new abutments will be reused as backfill on site where possible. Excess fill will be transferred to a Council stockpile for reuse in other areas.
- **General construction waste** – construction at the site will generate general construction waste such as paper, plastics and metal.

3.9.1. Management and mitigation

The following mitigation measures are to be implemented:

- Transport of materials from construction site to sites of reuse or disposal to be done using covered trucks where possible.
- Dispose of biomaterials at an approved green waste/recycling facility where onsite re-use opportunities cannot be found. If green waste contains High Threat Weeds, consideration of solar radiation to kill seeds/roots before disposal.
- Securely store other waste on-site until it is removed so that it does not become litter. Skip bins or other containers will be used on-site for the collection of general waste which will be taken off-site at end of works to an approved waste disposal/recycling facility.
- In the event of any oil waste occurring on-site, this would be collected and transported to the nearest oil recycling facility.

Chemical and potentially hazardous substances that are likely to be used for the proposed works will be hydrocarbons, including oils, greases, and fuels. No temporary fuel or chemical storage will be required. A hydrocarbon spill kit should be available on site whilst machinery is operating to manage any hydrocarbon spills.

Where refuelling of machinery is undertaken on-site, ensure a hydrocarbon spill kit is located in close proximity to the refuelling location and bund all fuel contained on the site. All fuel should be stored, banded, at least 50m away from waterways.

Undertake any refuelling away from creeks and road drains.

Spill Management

The spill management procedure shall include at a minimum:

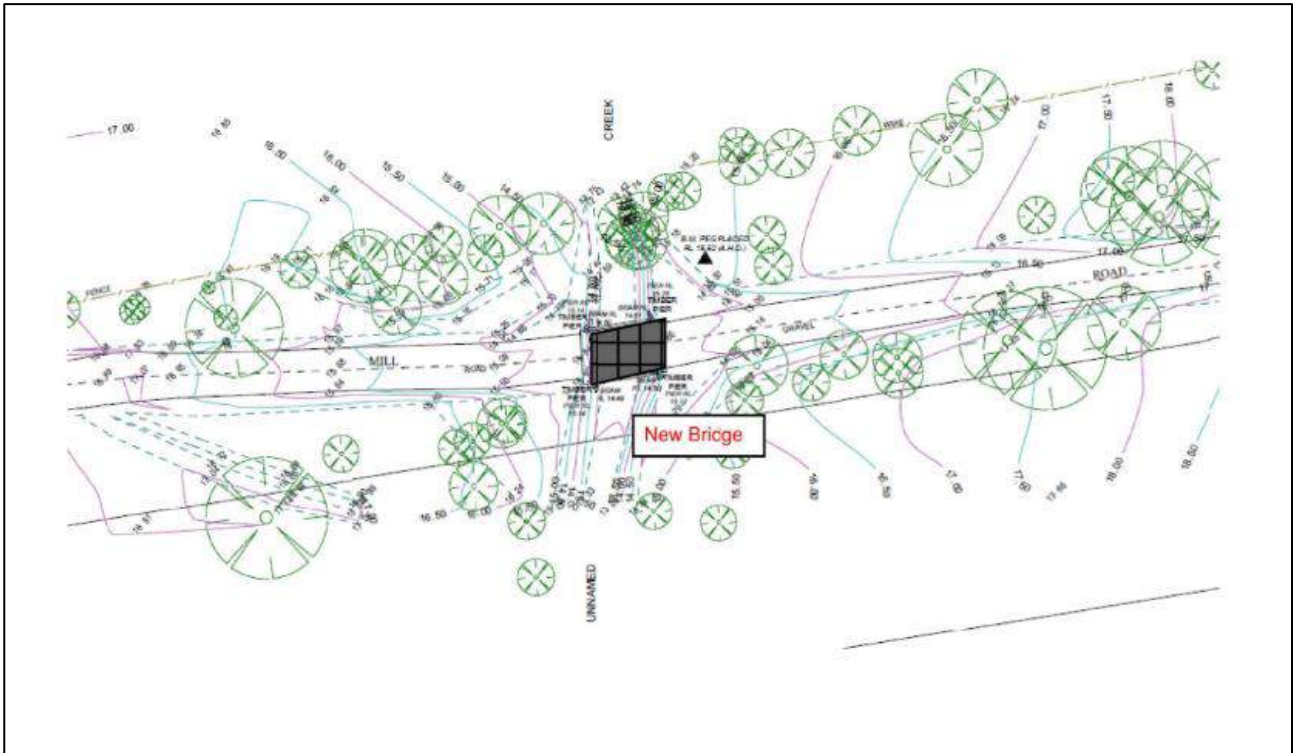
- Contact appropriate authorities, if necessary, generally Fire, Council and EPA.
- Isolate spill from transfer to the environment, either through collection, bunding, diversion or other means.
- Undertake necessary clean-up.

3.10. Traffic

Access to the site will be along Old Mill Road. Impacts on traffic and access will be the result of:

- Road closure of Old Mill Road.
- Additional vehicle movements associated with machinery and deliveries to site.
- Parking and storage of materials.





3.10.1. Management and mitigation

Council has approved the road closure of Old Mill Road. The construction tender required contractors to provide a suitable traffic management plan that was assessed during the tender evaluation process.

3.11. Visual Amenity/ Landscape

Visual amenity will be temporarily disturbed by construction at the site. Likely impacts will be the result of barrier fencing, temporary signage, machinery, materials stockpiles and earth stockpiles. As works are minor in nature and in length, visual amenity would not be impacted severely. All waste materials will be removed. The stockpile site would revegetate naturally however, a weed inspection is recommended (section 3.9) to ensure no High Threat Weeds occur at either the bridge or stockpile sites post the works.

3.12. Socio-Economic Considerations

3.12.1. Site Hazards

The majority of safety hazards at the site will be the result of construction activities. Contractors or ESC works division will be required to identify and implement management measures for the works sites. These should be included in Safe Work Method Statements (SWMS).

3.12.2. Management and mitigation

ESC and contractors will be required to implement work, health and safety procedures for the works site. These should include, but are not limited to:

- Preventing unauthorised access to work sites
- Details on management of parking for the construction machinery and workers vehicles to minimise impacts on road users of Old Mill Road.
- Working near a waterway- low risk as long as out of heavy rainfall period.



- Working at heights
- Traffic hazards

3.13. Cumulative Impacts

There are no known additional works happening in the area at the proposed time of construction, therefore it is considered any cumulative impacts to the area to be negligible.



4. Clause 228 of the EP&A Regulation

Clause 228 of the EP&A Regulation sets out 16 factors that need to be considered when assessing environmental impact under Part 5 of the EP&A Act.

Table 4: Clause 228 assessment

Relevant Clause	Impact Assessment (Positive/Negative/Neutral)	Reason
(a) Any environmental impact on a community?	Neutral	The proposed works will not detrimentally impact any community long term.
(b) Any transformation of a locality?	Neutral	The proposed works will not transform the locality.
(c) Any environmental impact on the ecosystem of the locality?	Neutral	New bridge will replace existing bridge within the same development footprint.
(d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	Neutral	Visual amenity will be temporarily disturbed by construction at the site, however there will be no negative long-term impacts.
(e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?	Neutral	The proposed works will not cause any negative social or cultural impacts.
(f) Any impact on the habitat of protected animals (within the meaning of the <i>Biodiversity Conservation Act 2016</i>)?	Neutral	New bridge will replace existing bridge within the same development footprint.
(g) Any endangering of any species of animal, plant or other form of life whether living on land in water or in the air?	Neutral	The proposed works will cause minor temporary disruption during construction; however no long-term impacts are anticipated.
(h) Any long-term effects on the environment?	Neutral	New bridge will replace existing bridge within the same development footprint.
(i) Any degradation of the quality of the environment?	Neutral	The proposed works will not cause any degradation of the quality of the environment.
(j) Any risk to the safety of the environment?	Neutral	The proposed works does not propose any risk to the safety of the environment.
(k) Any reduction in the range of beneficial uses of the environment?	Neutral	The proposed works will not reduce any beneficial uses of the environment.



Relevant Clause	Impact Assessment (Positive/Negative/Neutral)	Reason
(l) Any pollution of the environment?	Neutral	The proposed works will not cause any degradation of the quality of the environment. Mitigation measures have been detailed in Section 3.9.
(m) Any environmental problems associated with the disposal of waste?	Neutral	The proposed works will not cause any degradation of the quality of the environment. Mitigation measures have been detailed in Section 3.9.
(n) Any increased demand on resources (natural or otherwise) which are, or are likely to become, in short supply?	Neutral	The proposed works will not increase demand on existing resources.
(o) Any cumulative environmental effect with other existing or likely future activities?	Neutral	The proposed works will not cause any negative cumulative impacts on the environment.
(p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?	Neutral	The proposed works will not cause any impact on the coastal environment.



5. Consultation

Division 1 of the Infrastructure SEPP Provides recommendations for consultation with affected stakeholders (Table 7).

Table 5: Infrastructure SEPP consultation requirements

ISEPP Clause	Clause Reference	Consultation Required
Clause 13	<p><u>Impacts on council-related infrastructure or services</u></p> <p>Consultation is required if the public authority is of the opinion that the development:</p> <p>(a) will have a substantial impact on stormwater management services provided by a council, or</p> <p>(b) is likely to generate traffic to an extent that will strain the capacity of the road system in a local government area, or</p> <p>(c) involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council, or</p> <p>(d) involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council, or</p> <p>(e) involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council's management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential, or</p> <p>(f) involves excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which a council is the roads authority under the Roads Act 1993 (if the public authority that is carrying out the development, or on whose behalf it is being carried out, is not responsible for the maintenance of the road or footpath).</p>	No
Clause 14	<p><u>Impacts on local heritage</u></p> <p>Consultation is required if the development:</p> <p>(a) is likely to have an impact that is not minor or inconsequential on a local heritage item (other than a local heritage item that is also a State heritage item) or a heritage conservation area, and</p> <p>(b) is development that this Policy provides may be carried out without consent.</p>	No
Clause 15	<p><u>Impacts on flood liable land</u></p> <p>In this clause, flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the manual entitled <i>Floodplain Development Manual: the management of flood liable land</i> published by the New South Wales Government and as in force from time to time.</p>	No
Clause 16	<p><u>Consultation with public authorities other than councils</u></p> <p>Consultation is required if the development is:</p>	No



ISEPP Clause	Clause Reference	Consultation Required
	<p>(a) development adjacent to land reserved under the National Parks and Wildlife Act 1974 or to land acquired under Part 11 of that Act—the Office of Environment and Heritage,</p> <p>(b) development on land in Zone E1 National Parks and Nature Reserves or in a land use zone that is equivalent to that zone—the Office of Environment and Heritage,</p> <p>(c) development adjacent to an aquatic reserve or a marine park declared under the Marine Estate Management Act 2014—the Department of Industry,</p> <p>(d) development in the foreshore area within the meaning of the Sydney Harbour Foreshore Authority Act 1998—the Sydney Harbour Foreshore Authority,</p> <p>(e) development comprising a fixed or floating structure in or over navigable waters—Roads and Maritime Services,</p> <p>(f) development for the purposes of a health services facility, correctional centre or group home, or for residential purposes, in an area that is bush fire prone land (as defined by the Act)—the NSW Rural Fire Service,</p> <p>(g) development that may increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map—the Director of the Observatory,</p> <p>(h) development on defence communications facility buffer land within the meaning of clause 5.15 of the Standard Instrument—the Secretary of the Commonwealth Department of Defence</p> <p>development on land in a mine subsidence district within the meaning of the Mine Subsidence Compensation Act 1961—the Mine Subsidence Board.</p> <p><i>Note.</i> The Act defines bush fire prone land, in relation to an area, as land recorded for the time being as bush fire prone land on a map certified as referred to in section 146 (2) of the Act.</p> <p><i>Note.</i> When carrying out development of a kind referred to in paragraph (f), consideration should be given to the publication of the NSW Rural Fire Service Planning for Bush Fire Protection 2006.</p> <p>(g) (Repealed)</p> <p><i>Note.</i> Clause 18A (2) of State Environmental Planning Policy (Sydney Region Growth Centres) 2006 requires public authorities (or persons acting on their behalf) to consult with the Department of Planning and Infrastructure before carrying out any development comprising the clearing of native vegetation on certain land within a growth centre (within the meaning of that Policy). The land concerned is land other than the subject land (within the meaning of Part 7 of Schedule 7 to the Threatened Species Conservation Act 1995). The subject land is generally land to which precinct plans apply under that Policy.</p>	



6. Conclusion

An impact assessment of biodiversity was undertaken and 2 protected fauna species and 2 protected flora species, were identified as being of low risk of potential negative impact.

There were no threatened ecological communities or migratory species mapped in the vicinity of the proposed site.

It is considered that the project poses very low risk to biodiversity as all construction is proposed inside the existing footprint of the bridge and roadway, with minimal disturbance to surrounding vegetation. The proposed construction works will not produce significant noise impacts outside of normal daily operating hours, as work will be carried out during designated construction times (7am-6pm, Monday to Friday; 8am-1pm Saturday). No ongoing noise emissions would occur.

Findings and recommendations of the geotechnical investigation undertaken indicate that the analysed samples are potential acid sulfate soils, and the preparation of an Acid Sulfate Soil Management Plan will be required following additional testing.

Additional work required includes:

- Part 7 permit under the FM Act is required.
- Bridge design will form part of the Construction Environmental Management Plan (CEMP) to be provided to Fisheries a minimum of two weeks prior to any works commencing.
- Acid Sulfate Soil Management Plan (ASSMP) that outlines the appropriate and necessary management measures to be put in place.



7. REF Determination

This Review of Environmental Factors has assessed the likely environmental impacts of a proposal by Eurobodalla Shire Council for the Old Mill Road bridge renewal involving removal of the existing timber bridge and construction of a modern equivalent.

Eurobodalla Shire Council has considered the potential environmental effects of the proposal and the effectiveness and feasibility of measures for reducing or preventing detrimental effects. It is determined that:

1. The proposed mitigation measures will be adopted and implemented;
2. Implementation of these mitigation measures will reduce the potential environmental impact of the proposed activity;
3. An Environmental Impact Statement is not required for the proposed works if all mitigation measures in this REF are implemented by Eurobodalla Shire Council.

REF Author


Signature: 

Name: Carley McGregor

Title: Planning and Development Consultant

Date: 9.11.23

Reviewed and endorsed by:

Signature: 

Name: Jason Heffernan

Title: Managing Director

Date: 5.12.2023

Authorising Manager's approval

Signature: 

Name: Royce Toohey

Title: Maintenance Engineer

Eurobodalla Shire Council

Date: 5 December 2023



Appendix A

Assessments of Significance and Threatened Species Tables



Appendix A – Threatened Species Assessments

Likelihood of occurrence table

An assessment of likelihood of occurrence was made for all threatened and migratory species. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the field survey and professional judgement.

Those species where it is considered that impacts may be possible are further considered in the threatened species assessments.

The terms for likelihood of impact occurring are defined below:

- “yes” = the species was or has been observed on the site
- “likely” = a medium to high probability that a species uses the site
- “potential” = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- “unlikely” = a very low to low probability that a species uses the site or that proposed actions will influence habitat for the species.
- “None” = habitat on site and in the vicinity is unsuitable for the species.

(E = Endangered, V = Vulnerable, M = Migratory, EEC = endangered ecological community, CEEC = critically endangered ecological community)

Scientific name	Common name	TSC Act	EPBC Act	Habitat present or likelihood of occurrence (in/adjacent to works corridor)	Impacts predicted
LISTED ECOLOGICAL COMMUNITIES					
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland		Endangered		Community may occur within the buffer area only	None - Not considered to occur in study area
Subtropical and Temperate Coastal Saltmarsh		Vulnerable		Community likely to occur within the buffer area	None - Not considered to occur in study area

Araluen Scarp Grassy Forest		Endangered		Community likely to occur within the buffer area	None - Not considered to occur in study area
Illawarra and south coast lowland forest and woodland ecological community		Critically Endangered		Community likely to occur within area	None - Not considered to occur in study area
Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community		Endangered		Community likely to occur within area	None - Not considered to occur in study area
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia		Critically Endangered		Community likely to occur within the buffer area	None - Not considered to occur in study area
Lowland Grassy Woodland in the South East Corner Bioregion		Critically Endangered		Community likely to occur within area	None - Not considered to occur in study area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria		Critically Endangered		Community likely to occur within area	None - Not considered to occur in study area
Broggo Vine Forest of the South East Corner Bioregion		Endangered		Community likely to occur within area	None - Not considered to occur in study area
Bird Species					
<i>Lathamus discolor</i>	Swift Parrot	Critically Endangered		Known	None - Not considered to occur in study area
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	Critically Endangered		May occur in the 10km buffer area only	None - Not considered to occur in study area
<i>Anthochaera phrygia</i>	Regent Honeyeater	Critically Endangered		Known	None - Not considered to occur in study area
<i>Calidris ferruginea</i>	Curlew Sandpiper	Critically Endangered		Known	None - Not considered to occur in study area
<i>Numenius madagascariensis</i>	Eastern Curlew, Far Eastern Curlew	Critically Endangered		Known	None - Not considered to occur in study area
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	Endangered		Likely	None - Not considered to occur in study area
<i>Collocephalon fimbriatum</i>	Gang-gang Cockatoo	Endangered		Known	None - Not considered to occur in study area
<i>Melanodryas cucullata cucullata</i>	South-eastern Hooded Robin, Hooded Robin (south-eastern)	Endangered		May	None - Not considered to occur in study area
<i>Macronectes giganteus</i>	Southern Giant-Petrel, Southern Giant Petrel	Endangered		May occur in the 10km buffer area only	None - Not considered to occur in study area

<i>Thalassarche cauta</i>	Shy Albatross	Endangered		Likely to occur in the 10km buffer area only	None - Not considered to occur in study area
<i>Pterodroma leucoptera leucoptera</i>	Gould's Petrel, Australian Gould's Petrel	Endangered		May occur in the 10km buffer area only	None - Not considered to occur in study area
<i>Calidris canutus</i>	Red Knot, Knot	Endangered		Known	None - Not considered to occur in study area
<i>Thalassarche eremita</i>	Chatham Albatross	Endangered		May occur in the 10km buffer area only	None - Not considered to occur in study area
<i>Diomedea sanfordi</i>	Northern Royal Albatross	Endangered		May occur in the 10km buffer area only	None - Not considered to occur in study area
<i>Botaurus poiciloptilus</i>	Australasian Bittern	Endangered		Likely	None - Not considered to occur in study area
<i>Rostratula australis</i>	Australian Painted Snipe	Endangered		Likely	None - Not considered to occur in study area
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (south-eastern)	Vulnerable		May	None - Not considered to occur in study area
<i>Pycnoptilus floccosus</i>	Pilotbird	Vulnerable		Known	None - Not considered to occur in study area
<i>Thalassarche steadi</i>	White-capped Albatross	Vulnerable		Known to occur in the 10km buffer area	None - Not considered to occur in study area
<i>Aphelocephala leucopsis</i>	Southern Whiteface	Vulnerable		May	None - Not considered to occur in study area
<i>Pachyptila turtur subantarctica</i>	Fairy Prion (southern)	Vulnerable		Known to occur in the 10km buffer area only	None - Not considered to occur in study area
<i>Falco hypoleucos</i>	Grey Falcon	Vulnerable		Likely	None - Not considered to occur in study area
<i>Thalassarche melanophris</i>	Black-browed Albatross	Vulnerable		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Stagonopleura guttata</i>	Diamond Firetail	Vulnerable		Known	None - Not considered to occur in study area
<i>Neophema chrysostoma</i>	Blue-winged Parrot	Vulnerable		Likely	None - Not considered to occur in study area
<i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-Cockatoo	Vulnerable		Known	None - Not considered to occur in study area

<i>Diomedea epomophora</i>	Southern Royal Albatross	Vulnerable		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Diomedea exulans</i>	Wandering Albatross	Vulnerable		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Grantiella picta</i>	Painted Honeyeater	Vulnerable		Likely	None - Not considered to occur in study area
<i>Charadrius leschenaultii</i>	Greater Sand Plover, Large Sand Plover	Vulnerable		Known	None - Not considered to occur in study area
<i>Thalassarche bulleri</i>	Buller's Albatross, Pacific Albatross	Vulnerable		May occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Thalassarche salvini</i>	Salvin's Albatross	Vulnerable		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Sternula nereis nereis</i>	Australian Fairy Tern	Vulnerable		Known	None - Not considered to occur in study area
<i>Thalassarche carteri</i>	Indian Yellow-nosed Albatross	Vulnerable		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Fregetta grallaria grallaria</i>	White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian)	Vulnerable		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Limosa lapponica baueri</i>	Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit	Vulnerable		Known to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Thalassarche bulleri platei</i>	Northern Buller's Albatross, Pacific Albatross	Vulnerable		May occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Diomedea antipodensis</i>	Antipodean Albatross	Vulnerable		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Pterodroma neglecta neglecta</i>	Kermadec Petrel (western)	Vulnerable		May occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Phoebastria fusca</i>	Sooty Albatross	Vulnerable		May occur within the 10km buffer area only	None - Not considered to occur in study area

<i>Diomedea antipodensis gibsoni</i>	Gibson's Albatross	Vulnerable		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Thalassarche impavida</i>	Campbell Albatross, Campbell Black-browed Albatross	Vulnerable		May occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Hirundapus caudacutus</i>	White-throated Needletail	Vulnerable		Known	None - Not considered to occur in study area
<i>Thinornis cucullatus cucullatus</i>	Eastern Hooded Plover, Eastern Hooded Plover	Vulnerable		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Macronectes halli</i>	Northern Giant Petrel	Vulnerable		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
Frog and Reptile Species					
<i>Caretta caretta</i>	Loggerhead Turtle	Endangered		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Dermochelys coriacea</i>	Leatherback Turtle, Leathery Turtle, Luth	Endangered		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Natator depressus</i>	Flatback Turtle	Vulnerable		Known to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Mixophyes balbus</i>	Stuttering Frog, Southern Barred Frog (in Victoria)	Vulnerable		May occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Litoria aurea</i>	Green and Golden Bell Frog	Vulnerable		May	None - Not considered to occur in study area
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	Vulnerable		Likely	None - Not considered to occur in study area
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	Vulnerable		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Chelonia mydas</i>	Green Turtle	Vulnerable		Known to occur within the 10km buffer area only	None - Not considered to occur in study area
Fish and Shark species					

<i>Thunnus maccoyii</i>	Southern Bluefin Tuna	Conservation Dependent		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Serirolella brama</i>	Blue Warehou	Conservation Dependent		Known to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Galeorhinus galeus</i>	School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark	Conservation Dependent		May occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Carcharias taurus (east coast population)</i>	Grey Nurse Shark (east coast population)	Critically Endangered		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Carcharodon carcharias</i>	White Shark, Great White Shark	Vulnerable		Known to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Prototroctes maraena</i>	Australian Grayling	Vulnerable		Known	Low risk - No species were mapped in the vicinity of the proposed works site.
<i>Epinephelus daemeli</i>	Black Rockcod, Black Cod, Saddled Rockcod	Vulnerable		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Rhincodon typus</i>	Whale Shark	Vulnerable		May occur within the 10km buffer area only	None - Not considered to occur in study area
Mammal species					
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern)	Endangered		Likely	None - Not considered to occur in study area
<i>Eubalaena australis</i>	Southern Right Whale	Endangered		Known to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Dasyurus maculatus maculatus (SE mainland population)</i>	Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	Endangered		Known	None - Not considered to occur in study area

<i>Phascolarctos cinereus</i> (combined populations of Qld, NSW and the ACT)	Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)	Endangered		Likely	None - Not considered to occur in study area
<i>Petauroides volans</i>	Greater Glider (southern and central)	Endangered		Known	None - Not considered to occur in study area
<i>Balaenoptera musculus</i>	Blue Whale	Endangered		May occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Potorous tridactylus trisulcatus</i>	Long-nosed Potoroo (southern mainland)	Vulnerable		Likely	None - Not considered to occur in study area
<i>Petaurus australis australis</i>	Yellow-bellied Glider (south-eastern)	Vulnerable		Known	None - Not considered to occur in study area
<i>Pseudomys novaehollandiae</i>	New Holland Mouse, Pookila	Vulnerable		Likely	None - Not considered to occur in study area
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat, Large Pied Bat	Vulnerable		May	None - Not considered to occur in study area
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vulnerable		Known	None - Not considered to occur in study area
Plant species					
<i>Rhodamnia rubescens</i>	Scrub Turpentine, Brown Malletwood	Critically Endangered		Likely	None - Not considered to occur in study area
<i>Pomaderris gilmourii</i> var. <i>cana</i>	Grey Deua Pomaderris	Critically Endangered		May occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Mordacia praecox</i>	Non-parasitic Lamprey, Precocious Lamprey	Endangered		Likely to occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Pomaderris gilmourii</i> var. <i>gilmourii</i>	null	Endangered		May occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Calochilus pulchellus</i>	Pretty Beard Orchid, Pretty Beard-orchid	Endangered		May occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Correa baeuerlenii</i>	Chef's Cap	Vulnerable		May occur within the 10km buffer area only	None - Not considered to occur in study area
<i>Pomaderris parrisiae</i>	Parris' Pomaderris	Vulnerable		May	None - Not considered to occur in study area
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid	Vulnerable		May	None - Not considered to occur in study area

<i>Persicaria elatior</i>	Knotweed, Tall Knotweed	Vulnerable		Known	None - Not considered to occur in study area
<i>Thesium australe</i>	Austral Toadflax, Toadflax	Vulnerable		Known	None - Not considered to occur in study area
<i>Haloragis exalata subsp. exalata</i>	Wingless Raspwort, Square Raspwort	Vulnerable		Known	None - Not considered to occur in study area
<i>Caladenia tessellata</i>	Thick-lipped Spider-orchid, Daddy Long-legs	Vulnerable		May	None - Not considered to occur in study area
<i>Corunastylis vernalis</i>	East Lynne Midge-orchid	Vulnerable (listed as Genoplesium vernale)		Likely	None - Not considered to occur in study area

Threatened Flora List

Scientific Name	Common Name	NSW Status	Commonwealth Status	Likelihood of Occurrence (Known, High, Moderate, Low, None/Unlikely)	Potential Impacts (Consider KTPS, direct impacts and indirect impacts)
<i>Avicennia marina</i> <i>subsp. australasica</i>	Grey Mangrove				No species records mapped within the immediate vicinity of the proposed site.
<i>Brunoniella australis</i>	Blue Trumpet				No species records mapped within the immediate vicinity of the proposed site.
<i>Pseuderanthemum variabile</i>	Pastel Flower				No species records mapped within the immediate vicinity of the proposed site.
<i>Sambucus australasica</i>	Native Elderberry				No species records mapped within the immediate vicinity of the proposed site.
<i>Tetragonia tetragonioides</i>	New Zealand Spinach				No species records mapped within the immediate vicinity of the proposed site.
<i>Alisma plantago-aquatica</i>	Water Plantain				No species records mapped within the immediate vicinity of the proposed site.
<i>Alternanthera denticulata</i>	Lesser Joyweed				No species records mapped within the immediate vicinity of the proposed site.
<i>Amaranthus powellii</i>	Powell's Amaranth				No species records mapped within the immediate vicinity of the proposed site.
<i>Laxmannia gracilis</i>	Slender Wire Lily				No species records mapped within the immediate vicinity of the proposed site.
<i>Thysanotus tuberosus</i>	Common Fringe-lily				No species records mapped within the immediate vicinity of the proposed site.
<i>Tricoryne elatior</i>	Yellow Autumn-lily				No species records mapped within the immediate vicinity of the proposed site.
<i>Aphanopetalum resinosum</i>	Gum Vine				No species records mapped within the immediate vicinity of the proposed site.
<i>Apium prostratum</i> <i>var. filiforme</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Apium prostratum</i> <i>var. prostratum</i>					No species records mapped within the immediate vicinity of the proposed site.

<i>Centella asiatica</i>	Indian Pennywort				No species records mapped within the immediate vicinity of the proposed site.
<i>Daucus carota</i>	Wild Carrot				No species records mapped within the immediate vicinity of the proposed site.
<i>Hydrocotyle acutiloba</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Hydrocotyle geraniifolia</i>	Forest Pennywort				No species records mapped within the immediate vicinity of the proposed site.
<i>Hydrocotyle hirta</i>	Hairy Pennywort				No species records mapped within the immediate vicinity of the proposed site.
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort				No species records mapped within the immediate vicinity of the proposed site.
<i>Hydrocotyle sibthorpioides</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Platysace lanceolata</i>	Shrubby Platysace				No species records mapped within the immediate vicinity of the proposed site.
<i>Xanthosia atkinsoniana</i>					None – Species recorded within 1km of the proposed site, however none with in the immediate vicinity. All construction is proposed within the existing footprint and no vegetation is proposed to be removed. Any disturbance to any vegetated areas will be remediated upon completion.
<i>Xanthosia pilosa</i>	Woolly Xanthosia				No species records mapped within the immediate vicinity of the proposed site.
<i>Araujia sericifera</i>	Moth Vine				No species records mapped within the immediate vicinity of the proposed site.
<i>Marsdenia rostrata</i>	Milk Vine				No species records mapped within the immediate vicinity of the proposed site.
<i>Marsdenia suaveolens</i>	Scented Marsdenia				No species records mapped within the immediate vicinity of the proposed site.
<i>Parsonsia straminea</i>	Common Silkpod				No species records mapped within the immediate vicinity of the proposed site.

<i>Tylophora barbata</i>	Bearded Tylophora				No species records mapped within the immediate vicinity of the proposed site.
<i>Astrotricha latifolia</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Polyscias murrayi</i>	Pencil Cedar				No species records mapped within the immediate vicinity of the proposed site.
<i>Polyscias sambucifolia</i> subsp. <i>sambucifolia</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Arthropodium milleflorum</i>	Pale Vanilla-lily				No species records mapped within the immediate vicinity of the proposed site.
<i>Arthropodium</i> sp. <i>South-east Highlands</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Asparagus asparagoides</i>	Bridal Creeper				No species records mapped within the immediate vicinity of the proposed site.
<i>Asparagus plumosus</i>	Climbing Asparagus Fern				No species records mapped within the immediate vicinity of the proposed site.
<i>Asparagus scandens</i>	Asparagus Fern				No species records mapped within the immediate vicinity of the proposed site.
<i>Dianella caerulea</i>	Blue Flax-lily				No species records mapped within the immediate vicinity of the proposed site.
<i>Dianella caerulea</i> var. <i>caerulea</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Dianella longifolia</i>	Blueberry Lily				No species records mapped within the immediate vicinity of the proposed site.
<i>Dianella longifolia</i> var. <i>longifolia</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Dianella revoluta</i> var. <i>revoluta</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Asplenium flabellifolium</i>	Necklace Fern				No species records mapped within the immediate vicinity of the proposed site.

<i>Aster subulatus</i>	Wild Aster				No species records mapped within the immediate vicinity of the proposed site.
<i>Bidens pilosa</i>	Cobbler's Pegs				No species records mapped within the immediate vicinity of the proposed site.
<i>Brachyscome graminea</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Cassinia aculeata</i>	Dolly Bush				No species records mapped within the immediate vicinity of the proposed site.
<i>Cassinia trinerva</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Centipeda minima subsp. minima</i>	spreading sneezeweed				No species records mapped within the immediate vicinity of the proposed site.
<i>Cichorium intybus</i>	Chicory				No species records mapped within the immediate vicinity of the proposed site.
<i>Cirsium vulgare</i>	Spear Thistle				No species records mapped within the immediate vicinity of the proposed site.
<i>Conyza bonariensis</i>	Flaxleaf Fleabane				No species records mapped within the immediate vicinity of the proposed site.
<i>Conyza sumatrensis</i>	Tall fleabane				No species records mapped within the immediate vicinity of the proposed site.
<i>Coronidium elatum</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Cotula australis</i>	Common Cotula				No species records mapped within the immediate vicinity of the proposed site.
<i>Cotula coronopifolia</i>	Water Buttons				No species records mapped within the immediate vicinity of the proposed site.
<i>Cymbonotus lawsonianus</i>	Bear's Ear				No species records mapped within the immediate vicinity of the proposed site.
<i>Delairea odorata</i>	Cape Ivy				No species records mapped within the immediate vicinity of the proposed site.
<i>Gamochaeta purpurea</i>	Purple Cudweed				No species records mapped within the immediate vicinity of the proposed site.

<i>Gamochaeta spp.</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Glossocardia bidens</i>	Cobbler's Tack				No species records mapped within the immediate vicinity of the proposed site.
<i>Hypochaeris radicata</i>	Catsear				No species records mapped within the immediate vicinity of the proposed site.
<i>Lagenophora gracilis</i>	Slender Lagenophora				No species records mapped within the immediate vicinity of the proposed site.
<i>Lagenophora stipitata</i>	Common Lagenophora				No species records mapped within the immediate vicinity of the proposed site.
<i>Leptinella longipes</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Olearia erubescens</i>	Pink-tip Daisy-bush				No species records mapped within the immediate vicinity of the proposed site.
<i>Olearia lirata</i>	Snowy Daisy-bush				No species records mapped within the immediate vicinity of the proposed site.
<i>Olearia ramulosa</i>	Twiggy Daisy-bush				No species records mapped within the immediate vicinity of the proposed site.
<i>Ozothamnus argophyllus</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Ozothamnus diosmifolius</i>	White Dogwood				No species records mapped within the immediate vicinity of the proposed site.
<i>Ozothamnus ferrugineus</i>	Tree Everlasting				No species records mapped within the immediate vicinity of the proposed site.
<i>Ozothamnus obcordatus</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Senecio glomeratus</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Senecio linearifolius</i>	Fireweed Groundsel				No species records mapped within the immediate vicinity of the proposed site.
<i>Senecio madagascariensis</i>	Fireweed				No species records mapped within the immediate vicinity of the proposed site.

<i>Sigesbeckia orientalis subsp. orientalis</i>	Indian Weed				No species records mapped within the immediate vicinity of the proposed site.
<i>Sonchus asper</i>	Prickly Sowthistle				No species records mapped within the immediate vicinity of the proposed site.
<i>Sonchus oleraceus</i>	Common Sowthistle				No species records mapped within the immediate vicinity of the proposed site.
<i>Tagetes minuta</i>	Stinking Roger				No species records mapped within the immediate vicinity of the proposed site.
<i>Xerochrysum bracteatum</i>	Golden Everlasting				No species records mapped within the immediate vicinity of the proposed site.
<i>Pandorea pandorana</i>	Wonga Wonga Vine				No species records mapped within the immediate vicinity of the proposed site.
<i>Blechnum cartilagineum</i>	Gristle Fern				No species records mapped within the immediate vicinity of the proposed site.
<i>Blechnum minus</i>	Soft Water Fern				No species records mapped within the immediate vicinity of the proposed site.
<i>Blechnum neohollandicum</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Hackelia latifolia</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Barbarea verna</i>	Wintercress				No species records mapped within the immediate vicinity of the proposed site.
<i>Capsella bursa-pastoris</i>	Shepherd's Purse				No species records mapped within the immediate vicinity of the proposed site.
<i>Lepidium pseudohyssopifolium</i>	Peppergrass				No species records mapped within the immediate vicinity of the proposed site.
<i>Raphanus raphanistrum</i>	Wild Radish				No species records mapped within the immediate vicinity of the proposed site.
<i>Rorippa palustris</i>	Yellow Cress				No species records mapped within the immediate vicinity of the proposed site.
<i>Lobelia anceps</i>					No species records mapped within the immediate vicinity of the proposed site.

<i>Lobelia purpurascens</i>	whiteroot				None – Species recorded within 1km of the proposed site, however none with in the immediate vicinity. All construction is proposed within the existing footprint and no vegetation is proposed to be removed. Any disturbance to any vegetated areas will be remediated upon completion.
<i>Wahlenbergia gracilis</i>	Sprawling Bluebell				No species records mapped within the immediate vicinity of the proposed site.
<i>Wahlenbergia multicaulis</i>	Tadgell's Bluebell				No species records mapped within the immediate vicinity of the proposed site.
<i>Wahlenbergia spp.</i>	Bluebell				No species records mapped within the immediate vicinity of the proposed site.
<i>Lonicera japonica</i>	Japanese Honeysuckle				No species records mapped within the immediate vicinity of the proposed site.
<i>Paronychia brasiliiana</i>	Chilean Whitlow Wort, Brazilian Whitlow				No species records mapped within the immediate vicinity of the proposed site.
<i>Spergularia marina</i>	Lesser Sea-spurrey				No species records mapped within the immediate vicinity of the proposed site.
<i>Spergularia tasmanica</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Stellaria flaccida</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Stellaria media</i>	Common Chickweed				No species records mapped within the immediate vicinity of the proposed site.
<i>Allocasuarina littoralis</i>	Black She-Oak				No species records mapped within the immediate vicinity of the proposed site.
<i>Casuarina cunninghamiana</i> <i>subsp. cunninghamiana</i>	River Oak				No species records mapped within the immediate vicinity of the proposed site.
<i>Casuarina glauca</i>	Swamp Oak				No species records mapped within the immediate vicinity of the proposed site.

<i>Celastrus australis</i>	Staff Climber				No species records mapped within the immediate vicinity of the proposed site.
<i>Atriplex australasica</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Atriplex prostrata</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Atriplex semibaccata</i>	Creeping Saltbush				No species records mapped within the immediate vicinity of the proposed site.
<i>Chenopodium glaucum</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Einadia hastata</i>	Berry Saltbush				No species records mapped within the immediate vicinity of the proposed site.
<i>Einadia trigonos</i>	Fishweed				No species records mapped within the immediate vicinity of the proposed site.
<i>Enchylaena tomentosa</i>	Ruby Saltbush				No species records mapped within the immediate vicinity of the proposed site.
<i>Rhagodia candolleana</i> subsp. <i>candolleana</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Sarcocornia quinqueflora</i> subsp. <i>quinqueflora</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Suaeda australis</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Commelina cyanea</i>	Native Wandering Jew				No species records mapped within the immediate vicinity of the proposed site.
<i>Tradescantia fluminensis</i>	Wandering Jew				No species records mapped within the immediate vicinity of the proposed site.
<i>Calystegia marginata</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Calystegia sepium</i> subsp. <i>roseata</i>					No species records mapped within the immediate vicinity of the proposed site.

<i>Cuscuta tasmanica</i>	Tasmanian Dodder				No species records mapped within the immediate vicinity of the proposed site.
<i>Dichondra repens</i>	Kidney Weed				No species records mapped within the immediate vicinity of the proposed site.
<i>Wilsonia rotundifolia</i>	Round-leafed Wilsonia	E1			No species records mapped within the immediate vicinity of the proposed site.
<i>Crassula helmsii</i>	Swamp Stonecrop				No species records mapped within the immediate vicinity of the proposed site.
<i>Schizomeria ovata</i>	Crabapple				No species records mapped within the immediate vicinity of the proposed site.
<i>Cyathea australis</i>	Rough Treefern	P			No species records mapped within the immediate vicinity of the proposed site.
<i>Bolboschoenus caldwellii</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Bolboschoenus spp.</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Carex appressa</i>	Tall Sedge				No species records mapped within the immediate vicinity of the proposed site.
<i>Carex breviculmis</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Carex gaudichaudiana</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Carex longibrachiata</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Carex spp.</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Cladium procerum</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Cyperus eragrostis</i>	Umbrella Sedge				No species records mapped within the immediate vicinity of the proposed site.
<i>Cyperus gracilis</i>	Slender Flat-sedge				No species records mapped within the immediate vicinity of the proposed site.

<i>Cyperus laevigatus</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Cyperus lucidus</i>	Leafy Flat Sedge				No species records mapped within the immediate vicinity of the proposed site.
<i>Cyperus spp.</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Eleocharis sphacelata</i>	Tall Spike Rush				No species records mapped within the immediate vicinity of the proposed site.
<i>Ficinia nodosa</i>	Knobby Club-rush				No species records mapped within the immediate vicinity of the proposed site.
<i>Gahnia aspera</i>	Rough Saw-sedge				No species records mapped within the immediate vicinity of the proposed site.
<i>Gahnia clarkei</i>	Tall Saw-sedge				No species records mapped within the immediate vicinity of the proposed site.
<i>Gahnia melanocarpa</i>	Black Fruit Saw-sedge				No species records mapped within the immediate vicinity of the proposed site.
<i>Isolepis cernua</i>	Nodding Club-rush				No species records mapped within the immediate vicinity of the proposed site.
<i>Lepidosperma gunnii</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Lepidosperma laterale</i>	Variable Sword-sedge				No species records mapped within the immediate vicinity of the proposed site.
<i>Lepidosperma urophorum</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Machaerina juncea</i>	Bare Twig-rush				No species records mapped within the immediate vicinity of the proposed site.
<i>Schoenus melanostachys</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Schoenus spp.</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Dennstaedtia davallioides</i>	Lacy Ground Fern				No species records mapped within the immediate vicinity of the proposed site.

<i>Hypolepis glandulifera</i>	Downy Ground Fern				No species records mapped within the immediate vicinity of the proposed site.
<i>Hypolepis muelleri</i>	Harsh Ground Fern				No species records mapped within the immediate vicinity of the proposed site.
<i>Pteridium esculentum</i>	Bracken				No species records mapped within the immediate vicinity of the proposed site.
<i>Calochlaena dubia</i>	Rainbow Fern				No species records mapped within the immediate vicinity of the proposed site.
<i>Hibbertia aspera</i>	Rough Guinea Flower				No species records mapped within the immediate vicinity of the proposed site.
<i>Hibbertia dentata</i>	Twining Guinea Flower				No species records mapped within the immediate vicinity of the proposed site.
<i>Hibbertia linearis</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Hibbertia obtusifolia</i>	Hoary Guinea Flower				No species records mapped within the immediate vicinity of the proposed site.
<i>Hibbertia scandens</i>	Climbing Guinea Flower				No species records mapped within the immediate vicinity of the proposed site.
<i>Lastreopsis microsora subsp. microsora</i>	Creeping Shield Fern				No species records mapped within the immediate vicinity of the proposed site.
<i>Elaeocarpus reticulatus</i>	Blueberry Ash				No species records mapped within the immediate vicinity of the proposed site.
<i>Tetradlea ericifolia</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Tetradlea thymifolia</i>	Black-eyed Susan				No species records mapped within the immediate vicinity of the proposed site.
<i>Acrotriche serrulata</i>	Honeypots				No species records mapped within the immediate vicinity of the proposed site.
<i>Epacris impressa</i>	Common Heath				No species records mapped within the immediate vicinity of the proposed site.
<i>Leucopogon juniperinus</i>	Prickly Beard-heath				No species records mapped within the immediate vicinity of the proposed site.

<i>Leucopogon lanceolatus</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Leucopogon lanceolatus</i> var. <i>lanceolatus</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Adriana tomentosa</i> var. <i>tomentosa</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Beyeria lasiocarpa</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Claoxylon australe</i>	Brittlewood				No species records mapped within the immediate vicinity of the proposed site.
<i>Eupomatia laurina</i>	Bolwarra				No species records mapped within the immediate vicinity of the proposed site.
<i>Daviesia squarrosa</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Daviesia ulicifolia</i>	Gorse Bitter Pea				No species records mapped within the immediate vicinity of the proposed site.
<i>Daviesia ulicifolia</i> subsp. <i>ulicifolia</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Glycine clandestina</i>	Twining glycine				No species records mapped within the immediate vicinity of the proposed site.
<i>Glycine microphylla</i>	Small-leaf Glycine				No species records mapped within the immediate vicinity of the proposed site.
<i>Grona varians</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Hardenbergia violacea</i>	False Sarsaparilla				No species records mapped within the immediate vicinity of the proposed site.
<i>Hovea longifolia</i>	Rusty Pods				No species records mapped within the immediate vicinity of the proposed site.
<i>Indigofera australis</i>	Australian Indigo				No species records mapped within the immediate vicinity of the proposed site.
<i>Kennedia rubicunda</i>	Dusky Coral Pea				No species records mapped within the immediate vicinity of the proposed site.

<i>Lotus subbiflorus</i>	Hairy Birds-foot Trefoil				No species records mapped within the immediate vicinity of the proposed site.
<i>Mirbelia platylobioides</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Oxytes brachypoda</i>	Large Tick-trefoil				No species records mapped within the immediate vicinity of the proposed site.
<i>Platylobium formosum</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Podolobium ilicifolium</i>	Prickly Shaggy Pea				No species records mapped within the immediate vicinity of the proposed site.
<i>Podolobium scandens</i>	Netted Shaggy Pea				No species records mapped within the immediate vicinity of the proposed site.
<i>Pullenia gunnii</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Pultenaea linophylla</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Pultenaea villosa</i>	Hairy Bush-pea				No species records mapped within the immediate vicinity of the proposed site.
<i>Vicia sativa subsp. nigra</i>	Narrow-leaved Vetch				No species records mapped within the immediate vicinity of the proposed site.
<i>Acacia brownii</i>	Heath Wattle				No species records mapped within the immediate vicinity of the proposed site.
<i>Acacia cognata</i>	Narrow-leaf Bower Wattle				No species records mapped within the immediate vicinity of the proposed site.
<i>Acacia floribunda</i>	White Sally				No species records mapped within the immediate vicinity of the proposed site.
<i>Acacia implexa</i>	Hickory Wattle				No species records mapped within the immediate vicinity of the proposed site.
<i>Acacia irrorata</i>	Green Wattle				No species records mapped within the immediate vicinity of the proposed site.
<i>Acacia irrorata subsp. irrorata</i>	Green Wattle				No species records mapped within the immediate vicinity of the proposed site.

<i>Acacia longifolia</i> <i>subsp. longifolia</i>	Sydney Golden Wattle				No species records mapped within the immediate vicinity of the proposed site.
<i>Acacia maidenii</i>	Maiden's Wattle				No species records mapped within the immediate vicinity of the proposed site.
<i>Acacia mearnsii</i>	Black Wattle				No species records mapped within the immediate vicinity of the proposed site.
<i>Acacia melanoxylon</i>	Blackwood				No species records mapped within the immediate vicinity of the proposed site.
<i>Acacia obtusifolia</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Acacia silvestris</i>	Bodalla Silver Wattle				No species records mapped within the immediate vicinity of the proposed site.
<i>Acacia terminalis</i>	Sunshine Wattle				No species records mapped within the immediate vicinity of the proposed site.
<i>Fumaria muralis</i> <i>subsp. muralis</i>	Wall Fumitory				No species records mapped within the immediate vicinity of the proposed site.
<i>Geranium</i> <i>homeanum</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Geranium solanderi</i>	Native Geranium				No species records mapped within the immediate vicinity of the proposed site.
<i>Geranium solanderi</i> <i>var. solanderi</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Geranium spp.</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Coopernookia</i> <i>barbata</i>	Purple Goodenia				No species records mapped within the immediate vicinity of the proposed site.
<i>Goodenia</i> <i>heterophylla subsp.</i> <i>eglandulosa</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Goodenia ovata</i>	Hop Goodenia				No species records mapped within the immediate vicinity of the proposed site.
<i>Goodenia spp.</i>					No species records mapped within the immediate vicinity of the proposed site.

<i>Scaevola aemula</i>	Fairy Fan-flower				No species records mapped within the immediate vicinity of the proposed site.
<i>Scaevola ramosissima</i>	Purple Fan-flower				No species records mapped within the immediate vicinity of the proposed site.
<i>Selliera radicans</i>	Swamp Weed				No species records mapped within the immediate vicinity of the proposed site.
<i>Gonocarpus tetragynus</i>	Poverty Raspwort				No species records mapped within the immediate vicinity of the proposed site.
<i>Gonocarpus teucroides</i>	Germander Raspwort				No species records mapped within the immediate vicinity of the proposed site.
<i>Haloragis exalata</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Haloragis exalata</i> subsp. <i>exalata</i> var. <i>exalata</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Hymenophyllum cupressiforme</i>	Common Filmy Fern				No species records mapped within the immediate vicinity of the proposed site.
<i>Libertia paniculata</i>	Branching Grass-flag				No species records mapped within the immediate vicinity of the proposed site.
<i>Juncus continuus</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Juncus gregiflorus</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Juncus kraussii</i> subsp. <i>australiensis</i>	Sea Rush				No species records mapped within the immediate vicinity of the proposed site.
<i>Juncus mollis</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Juncus pallidus</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Juncus pauciflorus</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Juncus usitatus</i>					No species records mapped within the immediate vicinity of the proposed site.

<i>Juncus vaginatus</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Triglochin spp.</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Triglochin striata</i>	Streaked Arrowgrass				No species records mapped within the immediate vicinity of the proposed site.
<i>Mentha satureioides</i>	Native Pennyroyal				No species records mapped within the immediate vicinity of the proposed site.
<i>Plectranthus parviflorus</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Prostanthera incana</i>	Velvet Mint-bush				No species records mapped within the immediate vicinity of the proposed site.
<i>Prostanthera incisa</i>	Cut-leaved Mint-bush				No species records mapped within the immediate vicinity of the proposed site.
<i>Prostanthera lasianthos</i>	Victorian Christmas Bush				Low risk - Species recorded within 1km of the proposed site. No species records mapped within the immediate vicinity of the proposed site. All construction is proposed within the existing footprint and no vegetation is proposed to be removed. Any disturbance to any vegetated areas will be remediated upon completion.
<i>Scutellaria mollis</i>	Soft Skullcap				No species records mapped within the immediate vicinity of the proposed site.
<i>Cassytha pubescens</i>	Downy Dodder-laurel				No species records mapped within the immediate vicinity of the proposed site.
<i>Lindsaea microphylla</i>	Lacy Wedge Fern				No species records mapped within the immediate vicinity of the proposed site.
<i>Logania albiflora</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Lomandra confertifolia subsp. rubiginosa</i>					No species records mapped within the immediate vicinity of the proposed site.

<i>Lomandra confertifolia</i> subsp. <i>similis</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush				No species records mapped within the immediate vicinity of the proposed site.
<i>Lomandra multiflora</i> subsp. <i>multiflora</i>	Many-flowered Mat-rush				No species records mapped within the immediate vicinity of the proposed site.
<i>Amyema pendula</i> subsp. <i>pendula</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Eustrephus latifolius</i>	Wombat Berry				No species records mapped within the immediate vicinity of the proposed site.
<i>Geitonoplesium cymosum</i>	Scrambling Lily				No species records mapped within the immediate vicinity of the proposed site.
<i>Lythrum salicaria</i>	Purple Loosestrife				No species records mapped within the immediate vicinity of the proposed site.
<i>Commersonia fraseri</i>	Brush Kurrajong				No species records mapped within the immediate vicinity of the proposed site.
<i>Hibiscus trionum</i>	Flower-of-an-hour				No species records mapped within the immediate vicinity of the proposed site.
<i>Sida rhombifolia</i>	Paddy's Lucerne				No species records mapped within the immediate vicinity of the proposed site.
<i>Synoum glandulosum</i> subsp. <i>glandulosum</i>	Scentless Rosewood				No species records mapped within the immediate vicinity of the proposed site.
<i>Stephania japonica</i> var. <i>discolor</i>	Snake Vine				No species records mapped within the immediate vicinity of the proposed site.
<i>Ficus coronata</i>	Creek Sandpaper Fig				No species records mapped within the immediate vicinity of the proposed site.
<i>Ficus rubiginosa</i>	Port Jackson Fig				No species records mapped within the immediate vicinity of the proposed site.
<i>Acmena smithii</i>	Lilly Pilly				No species records mapped within the immediate vicinity of the proposed site.

<i>Angophora costata</i>	Sydney Red Gum				No species records mapped within the immediate vicinity of the proposed site.
<i>Angophora floribunda</i>	Rough-barked Apple				No species records mapped within the immediate vicinity of the proposed site.
<i>Backhousia myrtifolia</i>	Grey Myrtle				No species records mapped within the immediate vicinity of the proposed site.
<i>Corymbia gummifera</i>	Red Bloodwood				No species records mapped within the immediate vicinity of the proposed site.
<i>Corymbia maculata</i>	Spotted Gum				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus agglomerata</i>	Blue-leaved Stringybark				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus angophoroides</i>	Apple-topped Gum				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus baueriana</i>	Blue Box				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus bosistoana</i>	Coast Grey Box				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus botryoides</i>	Bangalay				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus consideniana</i>	Yertchuk				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus conspicua</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus cypellocarpa</i>	Monkey Gum				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus elata</i>	River Peppermint				Low risk - All construction is proposed within the existing footprint and no vegetation is proposed to be removed. Any disturbance to any vegetated areas will be remediated upon completion.
<i>Eucalyptus eugenioides</i>	Thin-leaved Stringybark				No species records mapped within the immediate vicinity of the proposed site.

<i>Eucalyptus fibrosa</i>	Red Ironbark				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus globoidea</i>	White Stringybark				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus longifolia</i>	Woollybutt				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus muelleriana</i>	Yellow Stringybark				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus paniculata</i>	Grey Ironbark				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus paniculata subsp. paniculata</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus pilularis</i>	Blackbutt				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus radiata subsp. radiata</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus sieberi</i>	Silvertop Ash				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus smithii</i>	Ironbark Peppermint				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus tereticornis</i>	Forest Red Gum				No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus tricarpa</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Eucalyptus viminalis</i>	Ribbon Gum				No species records mapped within the immediate vicinity of the proposed site.
<i>Melaleuca ericifolia</i>	Swamp Paperbark				No species records mapped within the immediate vicinity of the proposed site.
<i>Sannantha pluriflora</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Tristaniopsis collina</i>	Mountain Water Gum				No species records mapped within the immediate vicinity of the proposed site.

<i>Notelaea longifolia</i>	Large Mock-olive				No species records mapped within the immediate vicinity of the proposed site.
<i>Notelaea longifolia f. longifolia</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Notelaea venosa</i>	Veined Mock-olive				No species records mapped within the immediate vicinity of the proposed site.
<i>Epilobium spp.</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Ludwigia peploides subsp. montevidensis</i>	Water Primrose				No species records mapped within the immediate vicinity of the proposed site.
<i>Oenothera mollissima</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Cymbidium suave</i>	Snake Orchid	P			No species records mapped within the immediate vicinity of the proposed site.
<i>Dendrobium aemulum</i>	Ironbark Orchid	P			No species records mapped within the immediate vicinity of the proposed site.
<i>Dendrobium teretifolium</i>	Rat's Tail Orchid	P			No species records mapped within the immediate vicinity of the proposed site.
<i>Dipodium variegatum</i>		P			No species records mapped within the immediate vicinity of the proposed site.
<i>Diuris sulphurea</i>	Tiger Orchid	P			No species records mapped within the immediate vicinity of the proposed site.
<i>Orchidaceae indeterminate</i>	Orchids				No species records mapped within the immediate vicinity of the proposed site.
<i>Prasophyllum pyriforme</i>	Graceful leek orchid	P			No species records mapped within the immediate vicinity of the proposed site.
<i>Pterostylis spp.</i>	Greenhood	P			No species records mapped within the immediate vicinity of the proposed site.
<i>Oxalis exilis</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Oxalis perennans</i>					No species records mapped within the immediate vicinity of the proposed site.

<i>Oxalis spp.</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Papaver somniferum subsp. setigerum</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Passiflora edulis</i>	Common Passionfruit				No species records mapped within the immediate vicinity of the proposed site.
<i>Stypandra glauca</i>	Nodding Blue Lily				No species records mapped within the immediate vicinity of the proposed site.
<i>Breynia oblongifolia</i>	Coffee Bush				No species records mapped within the immediate vicinity of the proposed site.
<i>Phyllanthus hirtellus</i>	Thyme Spurge				No species records mapped within the immediate vicinity of the proposed site.
<i>Poranthera microphylla</i>	Small Poranthera				No species records mapped within the immediate vicinity of the proposed site.
<i>Phytolacca octandra</i>	Inkweed				No species records mapped within the immediate vicinity of the proposed site.
<i>Billardiera scandens</i>	Hairy Apple Berry				No species records mapped within the immediate vicinity of the proposed site.
<i>Bursaria spinosa</i>	Native Blackthorn				No species records mapped within the immediate vicinity of the proposed site.
<i>Bursaria spinosa subsp. lasiophylla</i>	Native Blackthorn				No species records mapped within the immediate vicinity of the proposed site.
<i>Pittosporum revolutum</i>	Rough Fruit Pittosporum				No species records mapped within the immediate vicinity of the proposed site.
<i>Pittosporum undulatum</i>	Sweet Pittosporum				No species records mapped within the immediate vicinity of the proposed site.
<i>Plantago lanceolata</i>	Lamb's Tongues				No species records mapped within the immediate vicinity of the proposed site.
<i>Veronica plebeia</i>	Trailing Speedwell				No species records mapped within the immediate vicinity of the proposed site.
<i>Limonium australe</i>	Native Sea Lavender				No species records mapped within the immediate vicinity of the proposed site.

<i>Austrostipa ramosissima</i>	Stout Bamboo Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Austrostipa rudis</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Austrostipa rudis subsp. australis</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Austrostipa rudis subsp. nervosa</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Austrostipa spp.</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Avena barbata</i>	Bearded Oats				No species records mapped within the immediate vicinity of the proposed site.
<i>Axonopus fissifolius</i>	Narrow-leafed Carpet Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Briza subaristata</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Bromus catharticus</i>	Praire Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Cenchrus clandestinus</i>	Kikuyu Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Cymbopogon refractus</i>	Barbed Wire Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Cynodon dactylon</i>	Common Couch				No species records mapped within the immediate vicinity of the proposed site.
<i>Dactylis glomerata</i>	Cocksfoot				No species records mapped within the immediate vicinity of the proposed site.
<i>Deyeuxia nudiflora</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Deyeuxia spp.</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Dichelachne micrantha</i>	Shorthair Plumegrass				No species records mapped within the immediate vicinity of the proposed site.

<i>Digitaria sanguinalis</i>	Crab Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Distichlis distichophylla</i>	Australian Saltgrass	E1			No species records mapped within the immediate vicinity of the proposed site.
<i>Echinopogon caespitosus</i>	Bushy Hedgehog-grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Echinopogon caespitosus var. caespitosus</i>	Tufted Hedgehog Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Echinopogon ovatus</i>	Forest Hedgehog Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Ehrharta erecta</i>	Panic Veldtgrass				No species records mapped within the immediate vicinity of the proposed site.
<i>Eleusine tristachya</i>	Goose Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Entolasia marginata</i>	Bordered Panic				No species records mapped within the immediate vicinity of the proposed site.
<i>Entolasia stricta</i>	Wiry Panic				No species records mapped within the immediate vicinity of the proposed site.
<i>Eragrostis curvula</i>	African Lovegrass				No species records mapped within the immediate vicinity of the proposed site.
<i>Eragrostis leptostachya</i>	Paddock Lovegrass				No species records mapped within the immediate vicinity of the proposed site.
<i>Hierochloe rariflora</i>	Scented Holygrass				No species records mapped within the immediate vicinity of the proposed site.
<i>Hordeum leporinum</i>	Barley Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Imperata cylindrica</i>	Blady Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Lachnagrostis filiformis</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Lolium spp.</i>					No species records mapped within the immediate vicinity of the proposed site.

<i>Microlaena stipoides</i>	Weeping Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Microlaena stipoides</i> <i>var. stipoides</i>	Weeping Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Oplismenus aemulus</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Oplismenus imbecillis</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Panicum miliaceum</i>	French Millet				No species records mapped within the immediate vicinity of the proposed site.
<i>Panicum simile</i>	Two-colour Panic				No species records mapped within the immediate vicinity of the proposed site.
<i>Parapholis incurva</i>	Coast Barb Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Paspalidium criniforme</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Paspalum dilatatum</i>	Paspalum				No species records mapped within the immediate vicinity of the proposed site.
<i>Phragmites australis</i>	Common Reed				No species records mapped within the immediate vicinity of the proposed site.
<i>Poa cheelii</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Poa ensiformis</i>	Purple-sheathed Tussock-grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Poa labillardierei</i> <i>var. labillardierei</i>	Tussock				No species records mapped within the immediate vicinity of the proposed site.
<i>Poa meionectes</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Poa queenslandica</i>	Queensland Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Poa sieberiana</i> <i>var. cyanophylla</i>					No species records mapped within the immediate vicinity of the proposed site.

<i>Poa sieberiana</i> var. <i>sieberiana</i>	Snowgrass				No species records mapped within the immediate vicinity of the proposed site.
<i>Rostraria cristata</i>	Annual Cat's Tail				No species records mapped within the immediate vicinity of the proposed site.
<i>Rytidosperma longifolium</i>	Long-leaved Wallaby Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Rytidosperma pallidum</i>	Redanther Wallaby Grass; Silvertop Wallaby Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Rytidosperma pilosum</i>	Smooth-flowered Wallaby Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Rytidosperma racemosum</i> var. <i>racemosum</i>	Wallaby Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Rytidosperma</i> spp.					No species records mapped within the immediate vicinity of the proposed site.
<i>Setaria parviflora</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Setaria pumila</i>	Pale Pigeon Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Sporobolus creber</i>	Slender Rat's Tail Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Sporobolus virginicus</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Stenotaphrum secundatum</i>	Buffalo Grass				No species records mapped within the immediate vicinity of the proposed site.
<i>Themeda triandra</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Podocarpus elatus</i>	Plum Pine				No species records mapped within the immediate vicinity of the proposed site.
<i>Polygala virgata</i>					No species records mapped within the immediate vicinity of the proposed site.

<i>Acetosa sagittata</i>	Rambling Dock				No species records mapped within the immediate vicinity of the proposed site.
<i>Persicaria decipiens</i>	Slender Knotweed				No species records mapped within the immediate vicinity of the proposed site.
<i>Persicaria elatior</i>	Tall Knotweed	V	V		No species records mapped within the immediate vicinity of the proposed site.
<i>Persicaria praetermissa</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Polygonum arenastrum</i>	Wireweed				No species records mapped within the immediate vicinity of the proposed site.
<i>Rumex spp.</i>	Dock				No species records mapped within the immediate vicinity of the proposed site.
<i>Platycerium bifurcatum</i>	Elkhorn Fern	P			No species records mapped within the immediate vicinity of the proposed site.
<i>Pyrrhosia rupestris</i>	Rock Felt Fern				No species records mapped within the immediate vicinity of the proposed site.
<i>Calandrinia pickeringii</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Myrsine howittiana</i>	Brush Muttonwood				No species records mapped within the immediate vicinity of the proposed site.
<i>Samolus repens</i>	Creeping Brookweed				No species records mapped within the immediate vicinity of the proposed site.
<i>Banksia spinulosa</i>	Hairpin Banksia	P			No species records mapped within the immediate vicinity of the proposed site.
<i>Banksia spinulosa</i> <i>var. spinulosa</i>		P			No species records mapped within the immediate vicinity of the proposed site.
<i>Hakea eriantha</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Lomatia myricoides</i>	River Lomatia				No species records mapped within the immediate vicinity of the proposed site.
<i>Persoonia linearis</i>	Narrow-leaved Geebung	P			No species records mapped within the immediate vicinity of the proposed site.

<i>Adiantum aethiopicum</i>	Common Maidenhair	P			No species records mapped within the immediate vicinity of the proposed site.
<i>Cheilanthes sieberi subsp. sieberi</i>	Rock Fern				No species records mapped within the immediate vicinity of the proposed site.
<i>Pellaea falcata</i>	Sickle Fern				No species records mapped within the immediate vicinity of the proposed site.
<i>Clematis aristata</i>	Old Man's Beard				No species records mapped within the immediate vicinity of the proposed site.
<i>Clematis glycinoides</i>	Headache Vine				No species records mapped within the immediate vicinity of the proposed site.
<i>Clematis glycinoides var. glycinoides</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Ranunculus plebeius</i>	Forest Buttercup				No species records mapped within the immediate vicinity of the proposed site.
<i>Pomaderris aspera</i>	Hazel Pomaderris				No species records mapped within the immediate vicinity of the proposed site.
<i>Pomaderris bodalla</i>	Bodalla Pomaderris	V			No species records mapped within the immediate vicinity of the proposed site.
<i>Pomaderris cinerea</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Pomaderris elliptica subsp. elliptica</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Pomaderris ferruginea</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Pomaderris lanigera</i>	Woolly Pomaderris				No species records mapped within the immediate vicinity of the proposed site.
<i>Pomaderris ligustrina</i>	Privet Pomaderris				No species records mapped within the immediate vicinity of the proposed site.
<i>Ripogonum album</i>	White Supplejack				No species records mapped within the immediate vicinity of the proposed site.
<i>Rubus anglocandicans</i>	Blackberry				No species records mapped within the immediate vicinity of the proposed site.

<i>Rubus moluccanus</i> <i>var. trilobus</i>	Molucca Bramble				No species records mapped within the immediate vicinity of the proposed site.
<i>Rubus parvifolius</i>	Native Raspberry				No species records mapped within the immediate vicinity of the proposed site.
<i>Rubus rosifolius</i>	Rose-leaf Bramble				No species records mapped within the immediate vicinity of the proposed site.
<i>Rubus ulmifolius</i>	Blackberry				No species records mapped within the immediate vicinity of the proposed site.
<i>Galium aparine</i>	Goosegrass				No species records mapped within the immediate vicinity of the proposed site.
<i>Galium australe</i>	Tangled Bedstraw	E1			No species records mapped within the immediate vicinity of the proposed site.
<i>Galium binifolium</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Galium migrans</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Gynochthodes</i> <i>jasminoides</i>	Sweet Morinda				No species records mapped within the immediate vicinity of the proposed site.
<i>Opercularia aspera</i>	Coarse Stinkweed				No species records mapped within the immediate vicinity of the proposed site.
<i>Opercularia diphylla</i>	Stinkweed				No species records mapped within the immediate vicinity of the proposed site.
<i>Opercularia varia</i>	Variable Stinkweed				No species records mapped within the immediate vicinity of the proposed site.
<i>Pomax umbellata</i>	Pomax				No species records mapped within the immediate vicinity of the proposed site.
<i>Psychotria</i> <i>loniceroides</i>	Hairy Psychotria				No species records mapped within the immediate vicinity of the proposed site.
<i>Boronia ledifolia</i>	Sydney Boronia	P			No species records mapped within the immediate vicinity of the proposed site.
<i>Correa lawrenceana</i>	Mountain Correa				No species records mapped within the immediate vicinity of the proposed site.

<i>Phebalium squamulosum subsp. squamulosum</i>		P			No species records mapped within the immediate vicinity of the proposed site.
<i>Zieria smithii</i>	Sandfly Zieria				No species records mapped within the immediate vicinity of the proposed site.
<i>Exocarpos cupressiformis</i>	Cherry Ballart				No species records mapped within the immediate vicinity of the proposed site.
<i>Santalum obtusifolium</i>	Sandalwood				No species records mapped within the immediate vicinity of the proposed site.
<i>Dodonaea triangularis</i>	Hopbush				No species records mapped within the immediate vicinity of the proposed site.
<i>Dodonaea triquetra</i>	Large-leaf Hop-bush				No species records mapped within the immediate vicinity of the proposed site.
<i>Dodonaea viscosa subsp. angustifolia</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Gratiola pedunculata</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Myoporum acuminatum</i>	Boobiella				No species records mapped within the immediate vicinity of the proposed site.
<i>Myoporum insulare</i>	Common Boobiella				No species records mapped within the immediate vicinity of the proposed site.
<i>Verbascum virgatum</i>	Twiggy Mullein				No species records mapped within the immediate vicinity of the proposed site.
<i>Smilax australis</i>	Lawyer Vine				No species records mapped within the immediate vicinity of the proposed site.
<i>Smilax glycyphylla</i>	Sweet Sarsparilla				No species records mapped within the immediate vicinity of the proposed site.
<i>Cyphomandra betacea</i>	Tamarillo				No species records mapped within the immediate vicinity of the proposed site.
<i>Lycium ferocissimum</i>	African Boxthorn				No species records mapped within the immediate vicinity of the proposed site.
<i>Physalis peruviana</i>	Cape Gooseberry				No species records mapped within the immediate vicinity of the proposed site.

<i>Solanum chenopodioides</i>	Whitetip Nightshade				No species records mapped within the immediate vicinity of the proposed site.
<i>Solanum linnaeanum</i>	Apple of Sodom				No species records mapped within the immediate vicinity of the proposed site.
<i>Solanum mauritanum</i>	Wild Tobacco Bush				No species records mapped within the immediate vicinity of the proposed site.
<i>Solanum nigrum</i>	Black-berry Nightshade				No species records mapped within the immediate vicinity of the proposed site.
<i>Solanum prinophyllum</i>	Forest Nightshade				No species records mapped within the immediate vicinity of the proposed site.
<i>Solanum pseudocapsicum</i>	Madeira Winter Cherry				No species records mapped within the immediate vicinity of the proposed site.
<i>Solanum pungetium</i>	Eastern Nightshade				No species records mapped within the immediate vicinity of the proposed site.
<i>Solanum silvestre</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Solanum spp.</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Solanum stelligerum</i>	Devil's Needles				No species records mapped within the immediate vicinity of the proposed site.
<i>Pimelea curviflora</i> <i>var. sericea</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Pimelea ligustrina</i> <i>subsp. ligustrina</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Pimelea linifolia</i>	Slender Rice Flower				No species records mapped within the immediate vicinity of the proposed site.
<i>Pimelea linifolia</i> <i>subsp. linifolia</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Trema tomentosa</i> <i>var. aspera</i>	Native Peach				No species records mapped within the immediate vicinity of the proposed site.
<i>Unknown A</i>					No species records mapped within the immediate vicinity of the proposed site.

<i>Schelhammera undulata</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Lantana camara</i>	Lantana				No species records mapped within the immediate vicinity of the proposed site.
<i>Verbena bonariensis</i>	Purpletop				No species records mapped within the immediate vicinity of the proposed site.
<i>Verbena rigida var. rigida</i>	Veined Verbena				No species records mapped within the immediate vicinity of the proposed site.
<i>Melicytus dentatus</i>	Tree Violet				No species records mapped within the immediate vicinity of the proposed site.
<i>Viola banksii</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Viola caleyana</i>	Swamp Violet				No species records mapped within the immediate vicinity of the proposed site.
<i>Viola hederacea</i>	Ivy-leaved Violet				No species records mapped within the immediate vicinity of the proposed site.
<i>Viola spp.</i>					No species records mapped within the immediate vicinity of the proposed site.
<i>Cissus antarctica</i>	Water Vine				No species records mapped within the immediate vicinity of the proposed site.
<i>Cissus hypoglauca</i>	Giant Water Vine				No species records mapped within the immediate vicinity of the proposed site.
<i>Xanthorrhoea concava</i>		P			No species records mapped within the immediate vicinity of the proposed site.
<i>Macrozamia communis</i>	Burrawang	P			No species records mapped within the immediate vicinity of the proposed site.
<i>Zostera muelleri subsp. capricorni</i>					No species records mapped within the immediate vicinity of the proposed site.

Threatened Fauna List

Scientific name	Common name	NSW Status	Commonwealth Status	Impact Assessment
<i>Crinia signifera</i>	Common Eastern Froglet	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Uperoleia tyleri</i>	Tyler's Toadlet	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Limnodynastes dumerilii</i>	Eastern Banjo Frog	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Limnodynastes peronii</i>	Brown-striped Frog	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Limnodynastes tasmaniensis</i>	Spotted Grass Frog	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Litoria dentata</i>	Bleating Tree Frog	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Litoria ewingii</i>	Brown Tree Frog	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Litoria fallax</i>	Eastern Dwarf Tree Frog	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Litoria jervisiensis</i>	Jervis Bay Tree Frog	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Litoria lesueuri</i>	Lesueur's Frog	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Litoria peronii</i>	Peron's Tree Frog	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Litoria phyllochroa</i>	Leaf-green Tree Frog	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Litoria tyleri</i>	Tyler's Tree Frog	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Litoria verreauxii</i>	Verreaux's Frog	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Lampropholis delicata</i>	Dark-flecked Garden Sunskink	P		No species records mapped within the immediate vicinity of the proposed site.

<i>Lampropholis guichenoti</i>	Pale-flecked Garden Sunskink	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Cryptophis nigrescens</i>	Eastern Small-eyed Snake	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Dromaius novaehollandiae</i>	Emu	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Anas castanea</i>	Chestnut Teal	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Anas superciliosa</i>	Pacific Black Duck	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Chenonetta jubata</i>	Australian Wood Duck	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Cygnus atratus</i>	Black Swan	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Tadorna tadornoides</i>	Australian Shelduck	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Columba leucomela</i>	White-headed Pigeon	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Leucosarcia melanoleuca</i>	Wonga Pigeon	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Phaps chalcoptera</i>	Common Bronzewing	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Podargus strigoides</i>	Tawny Frogmouth	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Hirundapus caudacutus</i>	White-throated Needletail	P	V,C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Anhinga novaehollandiae</i>	Australasian Darter	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Microcarbo melanoleucos</i>	Little Pied Cormorant	P		No species records mapped within the immediate vicinity of the proposed site.

<i>Phalacrocorax carbo</i>	Great Cormorant	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Phalacrocorax varius</i>	Pied Cormorant	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Pelecanus conspicillatus</i>	Australian Pelican	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Ardea pacifica</i>	White-necked Heron	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Butorides striata</i>	Striated Heron	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Casmerodius modesta</i>	Eastern Great Egret	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Egretta garzetta</i>	Little Egret	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Egretta novaehollandiae</i>	White-faced Heron	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Platalea regia</i>	Royal Spoonbill	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Threskiornis moluccus</i>	Australian White Ibis	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Accipiter novaehollandiae</i>	Grey Goshawk	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Aquila audax</i>	Wedge-tailed Eagle	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Circus approximans</i>	Swamp Harrier	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P		No species records mapped within the immediate vicinity of the proposed site.
<i>Haliastur sphenurus</i>	Whistling Kite	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Falco cenchroides cenchroides</i>	Nankeen Kestrel	P		No species records mapped within the immediate vicinity of the proposed site.

<i>Falco longipennis</i>	Australian Hobby	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Hypotaenidia philippensis</i>	Buff-banded Rail	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Porphyrio porphyrio</i>	Purple Swamphen	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Haematopus longirostris</i>	Pied Oystercatcher	E1,P		No species records mapped within the immediate vicinity of the proposed site.
<i>Charadrius leschenaultii</i>	Greater Sand-plover	V,P	V,C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Charadrius ruficapillus</i>	Red-capped Plover	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Pluvialis fulva</i>	Pacific Golden Plover	P	C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Pluvialis squatarola</i>	Grey Plover	P	C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Thinornis cucullatus cucullatus</i>	Eastern Hooded Dotterel	E4A	V	No species records mapped within the immediate vicinity of the proposed site.
<i>Vanellus miles</i>	Masked Lapwing	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Actitis hypoleucos</i>	Common Sandpiper	P	C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Arenaria interpres</i>	Ruddy Turnstone	P	C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	P	C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Calidris canutus</i>	Red Knot	P	E,C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Calidris ferruginea</i>	Curlew Sandpiper	E1,P	CE,C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Calidris ruficollis</i>	Red-necked Stint	P	C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Gallinago hardwickii</i>	Latham's Snipe	P	J,K	No species records mapped within the immediate vicinity of the proposed site.

<i>Limosa lapponica</i>	Bar-tailed Godwit	P	C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Limosa limosa</i>	Black-tailed Godwit	V,P	C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Numenius madagascariensis</i>	Eastern Curlew	P	CE,C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Numenius phaeopus</i>	Whimbrel	P	C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Tringa nebularia</i>	Common Greenshank	P	C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Tringa stagnatilis</i>	Marsh Sandpiper	P	C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Chlidonias leucopterus</i>	White-winged Black Tern	P	C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Chroicocephalus novaehollandiae</i>	Silver Gull	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Hydroprogne caspia</i>	Caspian Tern	P	J	No species records mapped within the immediate vicinity of the proposed site.
<i>Sterna striata</i>	White-fronted Tern	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Sternula albifrons</i>	Little Tern	E1,P	C,J,K	No species records mapped within the immediate vicinity of the proposed site.
<i>Thalasseus bergii</i>	Crested Tern	P	J	No species records mapped within the immediate vicinity of the proposed site.
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Cacatua sanguinea</i>	Little Corella	P		No species records mapped within the immediate vicinity of the proposed site.
^^ <i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V,P,3	E	No species records mapped within the immediate vicinity of the proposed site.
^ <i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V,P,2	V	No species records mapped within the immediate vicinity of the proposed site.
<i>Eolophus roseicapilla</i>	Galah	P		No species records mapped within the immediate vicinity of the proposed site.

<i>Alisterus scapularis</i>	Australian King-Parrot	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Lathamus discolor</i>	Swift Parrot	E1,P	CE	No species records mapped within the immediate vicinity of the proposed site.
<i>Platycercus elegans</i>	Crimson Rosella	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Platycercus eximius</i>	Eastern Rosella	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Eudynamys orientalis</i>	Eastern Koel	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Scythrops novaehollandiae</i>	Channel-billed Cuckoo	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Ninox novaeseelandiae</i>	Southern Boobook	P		No species records mapped within the immediate vicinity of the proposed site.
^{^^} <i>Ninox strenua</i>	Powerful Owl	V,P,3		No species records mapped within the immediate vicinity of the proposed site.
^{^^} <i>Tyto novaehollandiae</i>	Masked Owl	V,P,3		Low risk - Species recorded within a 1km buffer of the proposed area, but not in the immediate vicinity. Species are more likely to be located within the more highly vegetated areas.
^{^^} <i>Tyto tenebricosa</i>	Sooty Owl	V,P,3		No species records mapped within the immediate vicinity of the proposed site.
<i>Ceyx azureus</i>	Azure Kingfisher	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Todiramphus sanctus</i>	Sacred Kingfisher	P		No species records mapped within the immediate vicinity of the proposed site.

<i>Eurystomus orientalis</i>	Dollarbird	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Climacteris erythrops</i>	Red-browed Treecreeper	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Cormobates leucophaea</i>	White-throated Treecreeper	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Ptilonorhynchus violaceus</i>	Satin Bowerbird	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Malurus cyaneus</i>	Superb Fairy-wren	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Malurus lamberti</i>	Variiegated Fairy-wren	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Acanthiza nana</i>	Yellow Thornbill	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Acanthiza pusilla</i>	Brown Thornbill	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Gerygone mouki</i>	Brown Gerygone	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Pardalotus punctatus</i>	Spotted Pardalote	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Anthochaera carunculata</i>	Red Wattlebird	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Anthochaera chrysoptera</i>	Little Wattlebird	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Anthochaera sp.</i>	Unidentified Wattlebird	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Caligavis chrysops</i>	Yellow-faced Honeyeater	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Epthianura albifrons</i>	White-fronted Chat	V,P		No species records mapped within the immediate vicinity of the proposed site.
<i>Manorina melanophrys</i>	Bell Miner	P		No species records mapped within the immediate vicinity of the proposed site.

<i>Meliphaga lewinii</i>	Lewin's Honeyeater	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Myzomela sanguinolenta</i>	Scarlet Honeyeater	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Philemon corniculatus</i>	Noisy Friarbird	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Psophodes olivaceus</i>	Eastern Whipbird	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Pachycephala pectoralis</i>	Golden Whistler	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Pachycephala rufiventris</i>	Rufous Whistler	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Oriolus sagittatus</i>	Olive-backed Oriole	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Cracticus torquatus</i>	Grey Butcherbird	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Gymnorhina tibicen</i>	Australian Magpie	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Strepera graculina</i>	Pied Currawong	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Rhipidura albiscapa</i>	Grey Fantail	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Rhipidura leucophrys</i>	Willie Wagtail	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Corvus coronoides</i>	Australian Raven	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Corvus mellori</i>	Little Raven	P		No species records mapped within the immediate vicinity of the proposed site.

<i>Grallina cyanoleuca</i>	Magpie-lark	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Myiagra inquieta</i>	Restless Flycatcher	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Eopsaltria australis</i>	Eastern Yellow Robin	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Microeca fascinans</i>	Jacky Winter	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Petroica phoenicea</i>	Flame Robin	V,P		No species records mapped within the immediate vicinity of the proposed site.
<i>Hirundo neoxena</i>	Welcome Swallow	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Sturnus vulgaris</i>	Common Starling			No species records mapped within the immediate vicinity of the proposed site.
<i>Zosterops lateralis</i>	Silvereye	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Dicaeum hirundinaceum</i>	Mistletoebird	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Neochmia temporalis</i>	Red-browed Finch	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Anthus novaeseelandiae</i>	Australian Pipit	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Carduelis carduelis</i>	European Goldfinch			No species records mapped within the immediate vicinity of the proposed site.
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Antechinus agilis</i>	Agile Antechinus	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	E	No species records mapped within the immediate vicinity of the proposed site.
<i>Perameles nasuta</i>	Long-nosed Bandicoot	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Vombatus ursinus</i>	Bare-nosed Wombat	P		No species records mapped within the immediate vicinity of the proposed site.

<i>Petaurus australis</i>	Yellow-bellied Glider	V,P	V	No species records mapped within the immediate vicinity of the proposed site.
<i>Petaurus breviceps</i>	Sugar Glider	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Petauroides volans</i>	Southern Greater Glider	E1,P	E	No species records mapped within the immediate vicinity of the proposed site.
<i>Trichosurus sp.</i>	brushtail possum	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Trichosurus vulpecula</i>	Common Brushtail Possum	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Macropus giganteus</i>	Eastern Grey Kangaroo	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Macropus sp.</i>	kangaroo / wallaby	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Notamacropus rufogriseus</i>	Red-necked Wallaby	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Wallabia bicolor</i>	Swamp Wallaby	P		No species records mapped within the immediate vicinity of the proposed site.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	No species records mapped within the immediate vicinity of the proposed site.
<i>Canis familiaris</i>	Dog			No species records mapped within the immediate vicinity of the proposed site.
<i>Canis lupus</i>	Dingo, domestic dog			No species records mapped within the immediate vicinity of the proposed site.
<i>Vulpes vulpes</i>	Fox			No species records mapped within the immediate vicinity of the proposed site.
<i>Cervus sp.</i>	Unidentified Deer			No species records mapped within the immediate vicinity of the proposed site.

Migratory Species List

Scientific Name	Common Name	Class	Presence	Threatened Category	Buffer Status	Impact Assessment
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<i>Cuculus optatus</i>	Oriental Cuckoo, Horsfield's Cuckoo	Bird	May		In feature area	No species records mapped within the immediate vicinity of the proposed site.
<i>Tringa nebularia</i>	Common Greenshank, Greenshank	Bird	Likely		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Actitis hypoleucos</i>	Common Sandpiper	Bird	Known		In feature area	No species records mapped within the immediate vicinity of the proposed site.
<i>Thalassarche steadi</i>	White-capped Albatross	Bird	Known	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Phaethon lepturus</i>	White-tailed Tropicbird	Bird	May		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Thalassarche melanophris</i>	Black-browed Albatross	Bird	Likely	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Carcharodon carcharias</i>	White Shark, Great White Shark	Shark	Known	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Rhipidura rufifrons</i>	Rufous Fantail	Bird	Known		In feature area	No species records mapped within the immediate vicinity of the proposed site.
<i>Natator depressus</i>	Flatback Turtle	Reptile	Known	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Symposiachrus trivirgatus</i>	Spectacled Monarch	Bird	Known		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Mobula birostris</i>	Giant Manta Ray	Shark	May		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Apus pacificus</i>	Fork-tailed Swift	Bird	Likely		In feature area	No species records mapped within the immediate vicinity of the proposed site.
<i>Sternula albifrons</i>	Little Tern	Bird	Known		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Macronectes giganteus</i>	Southern Giant-Petrel, Southern Giant Petrel	Bird	May	Endangered	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Monarcha melanopsis</i>	Black-faced Monarch	Bird	Known		In feature area	No species records mapped within the immediate vicinity of the proposed site.
<i>Gallinago megala</i>	Swinhoe's Snipe	Bird	Likely		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.

<i>Gallinago hardwickii</i>	Latham's Snipe, Japanese Snipe	Bird	Likely		In feature area	No species records mapped within the immediate vicinity of the proposed site.
<i>Diomedea epomophora</i>	Southern Royal Albatross	Bird	Likely	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Diomedea exulans</i>	Wandering Albatross	Bird	Likely	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Ardenna grisea</i>	Sooty Shearwater	Bird	Likely		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Thalassarche cauta</i>	Shy Albatross	Bird	Likely	Endangered	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark	Shark	May		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Limosa lapponica</i>	Bar-tailed Godwit	Bird	Known		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Pandion haliaetus</i>	Osprey	Bird	Known		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Lagenorhynchus obscurus</i>	Dusky Dolphin	Mammal	May		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Charadrius leschenaultii</i>	Greater Sand Plover, Large Sand Plover	Bird	Known	Vulnerable	In feature area	No species records mapped within the immediate vicinity of the proposed site.
<i>Calidris melanotos</i>	Pectoral Sandpiper	Bird	Known		In feature area	No species records mapped within the immediate vicinity of the proposed site.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Bird	Known		In feature area	No species records mapped within the immediate vicinity of the proposed site.
<i>Ardenna carneipes</i>	Flesh-footed Shearwater, Fleshy-footed Shearwater	Bird	Likely		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Numenius minutus</i>	Little Curlew, Little Whimbrel	Bird	Likely		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Orcinus orca</i>	Killer Whale, Orca	Mammal	Likely		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Balaenoptera edeni</i>	Bryde's Whale	Mammal	May		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.

<i>Eubalaena australis</i>	Southern Right Whale	Mammal	Known	Endangered	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Rhincodon typus</i>	Whale Shark	Shark	May	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Thalassarche bulleri</i>	Buller's Albatross, Pacific Albatross	Bird	May	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Thalassarche salvini</i>	Salvin's Albatross	Bird	Likely	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Thalassarche carteri</i>	Indian Yellow-nosed Albatross	Bird	Likely	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	Bird	Known		In feature area	No species records mapped within the immediate vicinity of the proposed site.
<i>Lamna nasus</i>	Porbeagle, Mackerel Shark	Shark	Likely		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Calidris canutus</i>	Red Knot, Knot	Bird	Known	Endangered	In feature area	No species records mapped within the immediate vicinity of the proposed site.
<i>Calidris ferruginea</i>	Curlew Sandpiper	Bird	Known	Critically Endangered	In feature area	No species records mapped within the immediate vicinity of the proposed site.
<i>Diomedea antipodensis</i>	Antipodean Albatross	Bird	Likely	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Diomedea antipodensis</i>	Antipodean Albatross	Bird	May	Endangered	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Thalassarche eremita</i>	Chatham Albatross	Bird	May	Endangered	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Diomedea sanfordi</i>	Northern Royal Albatross	Bird	May	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Phoebastria fusca</i>	Sooty Albatross	Bird	May	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Thalassarche impavida</i>	Campbell Albatross, Campbell Black-browed Albatross	Reptile	Likely	Endangered	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Caretta caretta</i>	Loggerhead Turtle	Reptile	Likely	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	Mammal	Known		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.

<i>Megaptera novaeangliae</i>	Humpback Whale	Mammal	Likely		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Caperea marginata</i>	Pygmy Right Whale	Bird	Known	Vulnerable	In feature area	No species records mapped within the immediate vicinity of the proposed site.
<i>Hirundapus caudacutus</i>	White-throated Needletail	Bird	Known	Critically Endangered	In feature area	No species records mapped within the immediate vicinity of the proposed site.
<i>Numenius madagascariensis</i>	Eastern Curlew, Far Eastern Curlew	Mammal	May	Endangered	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Balaenoptera musculus</i>	Blue Whale	Reptile	Likely	Endangered	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Dermochelys coriacea</i>	Leatherback Turtle, Leathery Turtle, Luth	Reptile	Known	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Chelonia mydas</i>	Green Turtle	Bird	Likely	Vulnerable	In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Macronectes halli</i>	Northern Giant Petrel	Bird	Likely		In buffer area only	No species records mapped within the immediate vicinity of the proposed site.
<i>Gallinago stenura</i>	Pin-tailed Snipe	Bird	May		In feature area	No species records mapped within the immediate vicinity of the proposed site.

Appendix B

AHIMS Report - Sensitive Information Redacted



Appendix C

Geotechnical Investigation



ESC Various Bridges – Old Mill Road Bridge

Geotechnical Factual Report
14 April 2023

Prepared for:

Eurobodalla Shire Council

Prepared by:

Stantec Australia Pty Ltd

Report Reference:

304000891-001



30400891-001 ESC VARIOUS BRIDGES – OLD MILL ROAD BRIDGE

Revision	Description	Author		Quality Check		Independent Review	
0	First Issue		TC		RDJ		RDJ

30400891-001 ESC VARIOUS BRIDGES – OLD MILL ROAD BRIDGE

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Prepared by



(signature)

Thomas Cantillon

Reviewed/Approved by



(signature)

Robert De Jong

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1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

Eurobodalla Shire Council (ESC) is located on the far south coast of NSW and covers 110 kilometres of coastline. The coastline stretches from South Durras on the northern end to Akolele on the southern end and includes the main townships of Batemans Bay, Moruya and Narooma and has a population of approximately 37,000 people.

ESC has engaged Stantec Australia Pty Ltd (Stantec) to undertake a geotechnical investigation for the Old Mill Road Bridge Replacement as part of the Request for Quotation titled, “Geotechnical Investigation for ESC Various Sites 2223-096” The purpose of the geotechnical investigation is to provide geotechnical information to inform the Design and Construction (D&C) engagement for construction of the new bridge.

1.2 OBJECTIVES

A geotechnical investigation was conducted to provide geotechnical data relevant to the proposed bridge replacement. The results from the investigation methods undertaken are collated in this Geotechnical Factual Report, which comprises:

- A summary of geotechnical investigations conducted in the vicinity of the bridge.
- A summary of ground conditions encountered at test locations.
- Geotechnical engineering logs and in-situ test results.
- A summary of laboratory testing and associated test certificates.
- Relevant published data including bedrock geology, Quaternary geology, and Acid Sulfate Soils.

2.0 SITE DESCRIPTION

2.1.1 Site Location and Topography

The site of the existing and proposed bridge is located at chainage 4.0 km along the Old Mill Road from the intersection of Old Mill Road and Prince Highway (A1). The site featured a single-span single-lane timber bridge crossing over a small creek. The site location is shown Figure 2-1 with imagery from Google Earth below.



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Site Description



Figure 2-1 Site Location

Onsite observations show that the site is located in a dense state forest, with an open paddock to the North. The existing bridge is a single lane timber bridge with unsealed road pavement either side of the bridge. The length and width of the bridge are approximately 6m and 3m, respectively.

It was noted that site access was difficult due to unsealed access roads left in poor condition after rainfall events. Deep ruts more than 300mm deep were observed on the downhill approach to Old Mill Road Bridge. One section of the road was underwater during the investigation and therefore impassable by vehicles. ESC were notified and rehabilitated the road prior to sitework commencing.

2.1.2 Regional Geology

Reference to the MinView spatial geology website (NSW Department of Planning, Industry and Environment, 2023) indicates the site is underlain by:

- Q_af – Alluvium – Fluvially deposited Silt, very fine- to medium-grained lithic to quartz-rich sand, clay.

Formations identified in close proximity to the site include:

- Qada – Sandstone - Interbedded with laminated silstone and mudstone.

The regional geology is presented in Figure 2-2 below with a full copy provided in Attachment A.



Site Description



Figure 2-2 Regional Geology

2.1.3 Acid Sulfate Soils

Acid Sulfate Soil forms within waterlogged soils deposited under estuarine conditions. A review of the eSpade soil mapping website (NSW Department of Planning, Industry and Environment, 2023) Acid Sulfate Soils Risk mapping, indicates there is 'no data for the site'. To the north of the site 'no known occurrence' is recorded at a similar elevation. This is shown on Figure 2-3 below.



Results of Investigation



Figure 2-3 Acid Sulfate Soil Risk Mapping

3.0 RESULTS OF INVESTIGATION

3.1 SITE INVESTIGATION

3.1.1 Preparation of Investigation, Safety and Environmental Plans

Prior to commencement of the geotechnical investigation, Stantec prepared a number of project specific and quality assurance plans for review and approval by ESC. Before commencing the subsurface investigation, a Health and Safety Management Plan (HSE) and a Safe Work Method Statement (SWMS) were produced by Stantec. These documents were submitted to ESC for review and approval.

ESC arranged consultation with any affected residents throughout the investigation to inform them of investigation details and progress. A Before You Dig Australia (BYDA) request was undertaken prior to commencement of fieldwork by Stantec to identify subsurface utilities present within the proposed test area and confirm if service locator would be required at each location.



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Results of Investigation

3.1.2 Environmental and Heritage

No environmental or heritage access constraints were notified to Stantec prior to commencement of the investigation.

3.1.3 Service Location

Underground utility location was undertaken by an accredited contractor and comprised clearing of borehole locations using Cable Avoidance Tool (CAT) prior to drilling commencing. A service location clearance report was presented on-site to Stantec's site representative.

3.1.4 Field Work

An intrusive investigation was undertaken on the 2nd of March 2023 and comprised the following:

- Drilling of two (2) boreholes (OMR1 and OMR2) 13.10m and 9.25m below ground level respectively in order to collect at least 3m of rock core. Soil drilling carried out by solid flight auger technique, equipped with tungsten carbide (TC) drill bit.
- Boreholes were progressed further HQ wireline where rock coring was required.
- Engineering assessment of the subsurface profiles encountered in general accordance with AS 1726 2017 'Geotechnical Site Investigations' (Standards Australia Limited, 2017) by an experienced geotechnical engineer from Stantec.
- Sampling of material considered representative of soil units encountered for subsequent laboratory assessment, including geotechnical and acid sulfate soil sampling.
- Following completion, boreholes were backfilled with drill cuttings returning the location to existing surface level.

3.1.5 Test Locations

- The test locations were recorded by a hand-held GPS device with a ± 5 m accuracy in plan. Reduced Levels were estimated using contour maps and are therefore approximate.

The borehole investigation plan is provided in Appendix A

A summary of the borehole locations is presented in Table 3-1 below.

Table 3-1 Summary of Borehole Locations

Borehole	Easting (m)	Northing (m)	Termination / Refusal Depth (m)
OMR1	-36.017628	150.065538	13.10 – Target rock core recovery achieved
OMR2	-36.017658	150.065805	9.25 – Target rock core recovery achieved



Results of Investigation

3.1.6 Laboratory Testing

Laboratory testing conducted on strategically selected samples recovered during the fieldwork comprised the following per site.

- One (1) Particle Size Distribution test.
- One (1) Atterberg Limits.
- One (1) Moisture content test.
- One (1) Aggressivity test per borehole.
- One (1) Uniaxial Compressive Strength (UCS) test.
- Three (3) Chromium Reducible Suite Analysis (Acid Sulfate)

Point load testing was undertaken on all recovered HQ cores on site following core box photography, and selected core samples. Point load index tests were conducted in both axial and diametral directions on rock core, at a rate of approximately 1 test per meter where suitable core was available. Point load testing was undertaken as soon as practical following sampling so that the moisture condition of the samples was representative of the in-situ conditions.

Unconfined Compressive strength testing was conducted on selected samples.

Testing was performed by NATA accredited laboratory Australian Soil and Concrete Testing (ASCT) Illawarra laboratory. Laboratory test report sheets and certificates are included in Appendix C.

3.2 SUBSURFACE CONDITIONS

Materials encountered in the boreholes were similar that expected to the geological map with fill material associated with the bridge abutments overlying cohesive alluvial deposits and residual soils upon the underlying bedrock.

In summary, subsurface conditions encountered in the boreholes are provided in Table 3-2 and Table 3-3 below.



Results of Investigation

Table 3-2 Summary of Subsurface Units

Type	Unit	Description of Layer
FILL	1	Sandy CLAY: low plasticity, orange, brown fine to medium grained sand
ALLUVIUM	2	CLAY: medium plasticity, black, trace fine grained sand
RESIDUAL	3A	Silty SAND/Clayey SAND: fine to coarse grained, orange, grey, medium plasticity, with fine to coarse gravel
	3B	Sandy CLAY/CLAY: medium plasticity, mottled orange, grey, mottled brown, fine to coarse grained sand
BEDROCK	4	SANDSTONE: medium grained, orange-brown and grey, highly weathered, very low to medium strength

Notes:

- EW: Extremely Weathered Rock
- HW: Highly Weathered Rock

Table 3-3 Depth to Top of Subsurface Units

Borehole	Depth to top of Unit (mBGL)					Termination Depth (mBGL)	Termination Reason
	1	2	3A	3B	4		
OMR1	0.0	0.4	0.6	1.6	6.10	13.10	Minimum core recovery achieved
OMR2	-	-	2.8	0.0	4.25	9.25	Minimum core recovery achieved

Notes:

- mBGL: Meters below ground level

For a detailed description of the subsurface ground conditions the borehole logs in Appendix B should be referred to.

3.3 GROUNDWATER OBSERVATIONS

Groundwater was not observed during drilling of either borehole at the site. It should be noted that groundwater levels are likely to fluctuate with variations in climatic and site conditions.



3.4 IN SITU TESTING

3.4.1 Standard Penetration Test (SPT)

SPT tests were undertaken at 1.5m intervals with the borehole to assist with assessment of material strength parameters in accordance to AS 1289.6.3.1 2016 (Standards Australia Limited, 2016).

A SPT test is undertaken on the drill rig and involves the raising and dropping of a 63.5kg weight a standard distance of 760mm. Blow counts are counted for every 150mm increments over three increments. The first increment is classed as the seating drive, with the next two increments classed as the test. The total blow counts over the test become the ‘N’ value. If the hammer is bouncing, or 30 blows causes less than 100 mm penetration at any stage, is defined as refusal.

3.5 LABORATORY TESTING

Selected samples from the boreholes were tested at NATA accredited laboratories for testing. A summary of mechanical geotechnical laboratory test is presented in Table 3-4 below and the test certificates are presented in Appendix C.

3.5.1 Classification Testing

Table 3-4 Plasticity Index and Particle Size Distribution Results Summary

Borehole	Depth Range (m)	Unit	% GRAVEL	% SAND	% FINES	LL (%)	PL (%)	PI (%)	MC (%)
OMR1	2.50-2.95	3B	8	42	50	33	17	16	14.7

Notes:

- PI: Plasticity Index
- LL: Liquid Limit
- LS: Linear Shrinkage
- MC: Field Moisture Content

3.5.2 Rock Testing

Unconfined Compressive Strength testing was undertaken on one (1) sample and is summarised in Table 3-5 below. Laboratory test certificates are attached in Appendix C.

Table 3-5 Unconfined Compressive Strength Testing

Borehole	Depth Range (m)	Unit	UCS (MPa)	Moisture Content (%)
OMR2	7.30-7.60	4	1.2	8.7

Notes:

- USC: Unconfined Compressive Strength



Results of Investigation

3.5.3 Chemical Testing

Soil aggressivity testing was undertaken and is summarised in Table 3-6 below. Laboratory test certificates are attached in Appendix C.

Table 3-6 Soil Aggressivity Summary

Borehole	Depth (m)	Unit	Soil Type	Chloride (mg/kg)	EC (µS/cm)	pH	Resistivity (ohm.m)	Sulfate (mg/kg)	MC (%)
OMR1	3.5	3A	Silty SAND	800	560	7.0	18	150	-

Notes:

- EC: Electrical Conductivity

In accordance with AS2159-2009 'Piling-Design and Installation' (Standards Australia Limited, 2009), the exposure classification has been assessed for in-ground concrete structures (Table 6.4.2 (C)) and in-ground steel structures (Table 6.5.2 (C)) as follows:

For in-ground concrete structures:

- Non-aggressive (all soils above ground water or low permeability soils).
- Mild (all soils below ground water with high permeability soils).

For in-ground steel structures:

- Non-aggressive (all soils above ground water or low permeability soils).
- Non-aggressive (all soils below ground water with high permeability soils).

For design purposes, it is recommended the worst-case classification be taken i.e. all soils below ground water with high permeability soils.

3.5.4 Acid Sulfate Soil Testing

Samples from sample locations OMR1 and OMR2 were screened for acid sulfate soils (ASS) by measuring pH of soil samples in distilled water and a hydrogen peroxide mixture to measure actual and oxidised pH (pH_F and pH_{Fox}).

Screening results are presented in Table 3-7 compared against applicable criteria, in addition results from OMR 1 and OMR2 are plotted against depth in Figure 3-1. Results show soils in-situ are slightly acidic to neutral with decreasing acidity with depth and following oxidation change in pH is between 0 and 2.5 and appears to decrease with depth.



30400891-001 ESC VARIOUS BRIDGES – OLD MILL ROAD BRIDGE

Results of Investigation

Table 3-7: ASS Field screen results, Cemetery Bridge

Location	Sample ID	pH _F	pH _{Fox}	Reaction Rating
Actual ASS (DAWR, 2018)		<4		
Potential ASS (DAWR, 2018)		>4	<3	Strong or Extreme
OMR1	OMR1_0.5	5.2	4.3	Moderate reaction
OMR1	OMR1_1	5.4	4.5	Moderate reaction
OMR1	OMR1_1.5	5.5	4.4	Moderate reaction
OMR1	OMR1_2	6.5	5.1	Moderate reaction
OMR1	OMR1_2.5	7.1	5.6	Moderate reaction
OMR1	OMR1_3	7.1	6.2	Moderate reaction
OMR1	OMR1_3.5	7.2	6.7	Moderate reaction
OMR1	OMR1_4	7.1	6.7	Moderate reaction
OMR1	OMR1_4.5	6.9	6.7	Moderate reaction
OMR1	OMR1_5.0	6.8	6.8	Moderate reaction
OMR1	OMR1_5.5	6.7	6.7	Moderate reaction
OMR2	OMR2_0.5	4.7	3.9	Moderate reaction
OMR2	OMR2_1	4.7	3.9	Moderate reaction
OMR2	OMR2_1.5	5.7	4.3	Moderate reaction
OMR2	OMR2_2	7.5	5.0	Moderate reaction
OMR2	OMR2_2.5	7.3	5.3	Moderate reaction
OMR2	OMR2_3	7.2	5.4	Moderate reaction
OMR2	OMR2_3.5	7.1	5.6	Moderate reaction
OMR2	OMR2_4	7.0	5.7	Moderate reaction



30400891-001 ESC VARIOUS BRIDGES – OLD MILL ROAD BRIDGE

Results of Investigation

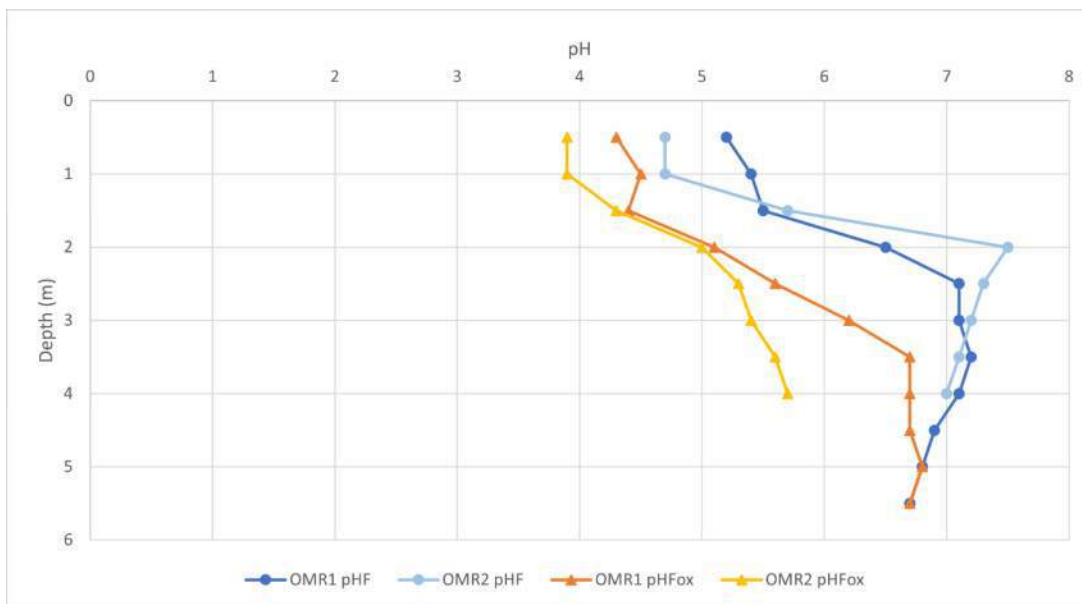


Figure 3-1: pH vs Depth (m) in OMR1 and OMR2

Based on the above results, sample OMR2 1.0 was submitted for chromium reducible sulfur suite analysis to determine whether the results indicate potential acid sulfate soils. The sample was selected as it had the lowest pHFox after the field screen. Results are presented in Table 3-8 and indicate that the analysed samples are potential ASS.

Table 3-8: Chromium reducible sulfur suite results

Analyte	Unit	Criteria	
		Sandy soils – all disturbance volumes	OMR2 1.0
pH KCl	pH	-	4.2
s-TAA	%S	-	0.17
s-HCl	%S	-	0.059
s-KCl	%S	-	0.042
s-NAS ⁴	%S	-	0.076
s-SCr	%S	-	0.028
s-Net Acidity ¹	%S	≥0.03	0.27
a-TAA	moles H+/t	-	110
a-NAS ⁵	moles H+/t	-	36
a-SCr	moles H+/t	-	17
a-Net Acidity ²	moles H+/t	≥18	163
Liming Rate ³	kg CaCO ₃ /t	-	8.2

1 – Sum s-TAA, s-NAS and s-SCr



30400891-001 ESC VARIOUS BRIDGES – OLD MILL ROAD BRIDGE

Results of Investigation

2 – Sum a-TAA, a-NAS and a-SCr
3 – a-Net ÷ 19.98, does not include safety factor
4 – s-NAS = (2 x s-HCl) – s-KCL
5 – a-NAS = s-NAS x 623.7 x 0.75
TAA – Titratable actual acidity
NAS – Net acid soluble sulfur
SCr – Chromium reducible sulfur
ANCbt – Acid neutralising capacity

Net acidity measurements for OMR2_1.0 indicate that ASS is present on the site, based on the s-SCr and s-NAS measurements the ASS is both potential and actual. Screening of soil acid neutralizing capacity (ANC) was not undertaken based on the initial pH-KCl of 4.2 (must be ≥ 6.5 to trigger analysis) however based on generally neutral to slightly acidic field screening results, ANC of the soil may be high.

Based on the ASS results presented above the following recommendations are made:

- Undertake further sampling to determine the distribution of actual and potential ASS that interact with the proposed road design. Sampling should include methods to verify the ANC (acid neutralising capacity) of site soils using appropriate methods as outlined in Appendix C *National Acid Sulfate Soils Guidance: Identification and Laboratory Methods Manual* (DAWR, 2018). Sampling should consider the proposed design and soils that may be disturbed or impacted by the proposed works.
- Sampling design should refer to guidance provided in the *Acid Sulfate Soils Manual* (ASSMAC, 1998) and the *National Acid Sulfate Soils Guidance* (DAWR, 2018).
- Following completion of further sampling preparation of an Acid Sulfate Soil Management Plan (ASSMP) that outlines the appropriate and necessary management measures to be put in place including for stockpiling and treatment (e.g. liming) methodologies for the soils.



Closure

4.0 CLOSURE

We appreciate the opportunity to work collaboratively with you on this project. Our team looks forward to bringing our high level of expertise to deliver successful outcomes in your future projects.

Your attention is drawn to the appended document titled “*Important Information about this Geotechnical Report*” found in Appendix D. This document is intended to clarify to the reader what the realistic expectations of this report should be, and what is the correct use of the document. Misinterpretation of geotechnical information presents significant risk to projects: The document includes a discussion on general limitations of geotechnical services, which by nature, are based extensively on opinion and judgement.

The statements included in this document are not intended to be exculpatory clauses or to reduce the general responsibility accepted by Stantec, but rather to identify where Stantec and our Client’s responsibilities lie. The statements ensure that all parties that may rely on the report are aware of their respective responsibilities.

For further enquiries, please do not hesitate to contact Stantec on the information supplied.



5.0 REFERENCES

- ASSMAC. (1998). *Acid Sulfate Soils Assessment Guidelines*. Acid Sulfate Soils Management Advisory Committee.
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- DAWR. (2018). *National Acid Sulfate Soils guidance: National acid sulfate soils sampling and identification methods manual*. Department of Agriculture and Water Resources.
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- NSW Department of Planning, Industry and Environment. (2023, April). *MinView*. Retrieved February 1, 2023, from <https://minview.geoscience.nsw.gov.au/>
- Standards Australia Limited. (2009). *AS2159-2009 Piling - Design and Installation*.
- Standards Australia Limited. (2016). *AS 1289.6.3.1: Soil strength and consolidation tests - Determination of the penetration resistance of a soil - Standard penetration test (SPT)*.
- Standards Australia Limited. (2017). *AS1726-2017 Geotechnical Site Investigations*.





Appendix A SITE PLAN & GEOLOGY MAP








Old Mill Road Bridge

Geotechnical Investigation
Turlinjah, New South Wales

Client: Eurobodalla Shire Council
Project Code: 304000891-GS-006
Drawn By: AC, Checked By: JE
Rev: 01
Date: 2023-04-17



Legend

-  Borehole
-  Watercourse
-  Cadastre

Notes:

1. Map displayed in GDA2020 MGA Zone 56

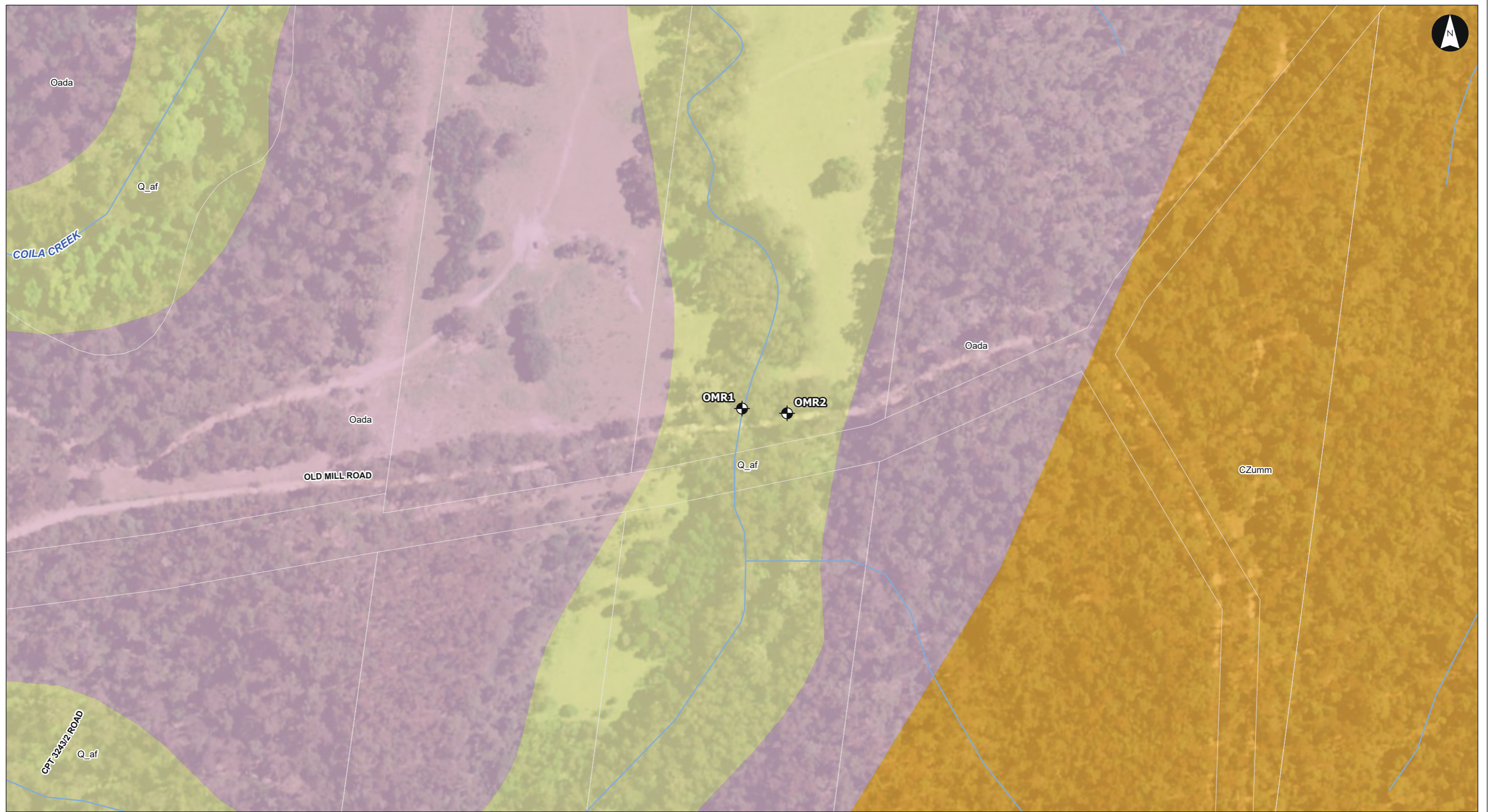
References:

1. Aerial imagery (ESRI and third party suppliers)
2. Watercourse (NSW SS)
3. Cadastre (NSW SS, 2022)



Scale at A3: 1:2,000






Old Mill Road Bridge Geology Plan

Geotechnical Investigation
Turlinjah, New South Wales




Client: Eurobodalla Shire Council
Project Code: 304000891-GS-005
Drawn By: AC, Checked By: JE
Rev: 01
Date: 2023-04-17



Legend

-  Borehole
-  Watercourse
-  Cadastral

NSW Seamless Geology

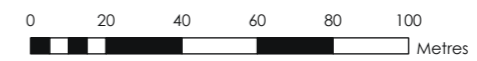
-  CZumm - Meringo Creek Formation
-  Q_af - Alluvial Floodplain Deposits
-  Oada - Abercrombie Formation

Notes:

1. Map displayed in GDA2020 MGA Zone 56

References:

1. Aerial imagery (ESRI and third party suppliers)
2. Watercourse (NSW SS)
3. Cadastre (NSW SS, 2022)
4. NSW Seamless Geology (Geoscience NSW, 2021)



Explanatory Notes

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. Material descriptions are deduced from field observation or engineering examination, and may be appended or confirmed by in situ or laboratory testing. The information is dependent on the scope of investigation, the extent of sampling and testing, and the inherent variability of the conditions encountered.

Subsurface investigation may be conducted by one or a combination of the following methods.

Method	
Test Pitting: excavation/trench	
BH	Backhoe bucket
EX	Excavator bucket
R	Ripper
H	Hydraulic Hammer
X	Existing excavation
N	Natural exposure
Manual drilling: hand operated tools	
HA	Hand Auger
Continuous sample drilling	
PT	Push tube
PS	Percussion sampling
SON	Sonic drilling
Hammer drilling	
AH	Air hammer
AT	Air track
Spiral flight auger drilling	
AS	Auger screwing
AD/V	Continuous flight auger: V-bit
AD/T	Continuous spiral flight auger: TC-Bit
HFA	Continuous hollow flight auger
Rotary non-core drilling	
WB	Washbore drilling
RR	Rock roller
Rotary core drilling	
PQ	85mm core (wire line core barrel)
HQ	63.5mm core (wire line core barrel)
NMLC	51.94mm core (conventional core barrel)
NQ	47.6mm core (wire line core barrel)
DT	Diatube (concrete coring)

Sampling is conducted to facilitate further assessment of selected materials encountered.

Sampling method	
Soil sampling	
B	Bulk disturbed sample
D	Disturbed sample
C	Core sample
ES	Environmental soil sample
SPT	Standard Penetration Test sample
U	Thin wall tube 'undisturbed' sample
Water sampling	
WS	Environmental water sample

Field testing may be conducted as a means of assessment of the in situ conditions of materials.

Field testing	
SPT	Standard Penetration Test
HP/PP	Hand/Pocket Penetrometer
Dynamic Penetrometers (blows per noted increment)	
DCP	Dynamic Cone Penetrometer
PSP	Perth Sand Penetrometer
MC	Moisture Content
VS	Vane Shear
PBT	Plate Bearing Test
IMP	Borehole Impression Test
PID	Photo Ionization Detector

If encountered, refusal (R), virtual refusal (VR) or hammer bouncing (HB) of penetrometers may be noted.

The quality of the rock can be assessed by the degree of natural defects/fractures and the following.

Rock quality description	
TCR	Total Core Recovery (%) (length of core recovered divided by the length of core run)
RQD	Rock Quality Designation (%) (sum of axial lengths of core greater than 100mm long divided by the length of core run)

Notes on groundwater conditions encountered may include.

Groundwater	
Not Encountered	Excavation is dry in the short term
Not Observed	Water level observation not possible
Seepage	Water seeping into hole
Inflow	Water flowing/flooding into hole

Perched groundwater may result in a misleading indication of the depth to the true water table. Groundwater levels are also likely to fluctuate with variations in climatic and site conditions.

Notes on the stability of excavations may include.

Excavation conditions	
Stable	No obvious/gross short term instability noted
Spalling	Material falling into excavation (minor/major)
Unstable	Collapse of the majority, or one or more face of the excavation

Explanatory Notes: General Soil Description

The methods of description and classification of soils used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. In practice, a material is described as a soil if it can be remoulded by hand in its field condition or in water. The dominant component is shown in upper case, with secondary components in lower case. In general descriptions cover: soil type, plasticity or particle size/shape, colour, strength or density, moisture and inclusions.

In general, soil types are classified according to the dominant particle on the basis of the following particle sizes.

Soil Classification		Particle Size (mm)
CLAY		< 0.002
SILT		0.002 to 0.075
SAND	fine	0.075 to 0.21
	medium	0.21 to 0.6
	coarse	0.6 to 2.36
GRAVEL	fine	2.36 to 6.7
	medium	6.7 to 19
	coarse	19 to 63
COBBLES		63 to 200
BOULDERS		> 200

Soil types may be qualified by the presence of minor components on the basis of field examination methods and/or the soil grading.

Terminology	In coarse grained soils		In fine soils
	% fines	% coarse	% coarse
Trace	≤5	≤15	≤15
With	>5, ≤12	>15, ≤30	>15, ≤30

The strength of cohesive soils is classified by engineering assessment or field/lab testing as follows.

Strength	Symbol	Undrained shear strength
Very Soft	VS	≤12kPa
Soft	S	12kPa to ≤25kPa
Firm	F	25kPa to ≤50kPa
Stiff	St	50kPa to ≤100kPa
Very Stiff	VSt	100kPa to ≤200kPa
Hard	H	>200kPa

Cohesionless soils are classified on the basis of relative density as follows.

Relative Density	Symbol	Density Index
Very Loose	VL	<15%
Loose	L	15% to ≤35%
Medium Dense	MD	35% to ≤65%
Dense	D	65% to ≤85%
Very Dense	VD	>85%

The plasticity of cohesive soils is defined by the Liquid Limit (LL) as follows.

Plasticity	Silt LL	Clay LL
Low plasticity	≤ 35%	≤ 35%
Medium plasticity	N/A	> 35% ≤ 50%
High plasticity	> 50%	> 50%

The moisture condition of soil (*w*) is described by appearance and feel and may be described in relation to the Plastic Limit (PL), Liquid Limit (LL) or Optimum Moisture Content (OMC).

Moisture condition and description

Dry	Cohesive soils: hard, friable, dry of plastic limit. Granular soils: cohesionless and free-running
Moist	Cool feel and darkened colour: Cohesive soils can be moulded. Granular soils tend to cohere
Wet	Cool feel and darkened colour: Cohesive soils usually weakened and free water forms when handling. Granular soils tend to cohere

The structure of the soil may be described as follows.

Zoning	Description
Layer	Continuous across exposure or sample
Lens	Discontinuous layer (lenticular shape)
Pocket	Irregular inclusion of different material

The structure of soil layers may include: defects such as softened zones, fissures, cracks, joints and root-holes; and coarse grained soils may be described as strongly or weakly cemented.

The soil origin may also be noted if possible to deduce.

Soil origin and description

Fill	Anthropogenic deposits or disturbed material
Topsoil	Zone of soil affected by roots and root fibres
Peat	Significantly organic soils
Colluvial	Transported down slopes by gravity/water
Aeolian	Transported and deposited by wind
Alluvial	Deposited by rivers
Estuarine	Deposited in coastal estuaries
Lacustrine	Deposited in freshwater lakes
Marine	Deposits in marine environments
Residual soil	Soil formed by in situ weathering of rock, with no structure/fabric of parent rock evident
Extremely weathered material	Formed by in situ weathering of geological formations, with the structure/fabric of parent rock intact but with soil strength properties

The origin of the soil generally cannot be deduced solely on the appearance of the material and the inference may be supplemented by further geological evidence or other field observation. Where there is doubt, the terms 'possibly' or 'probably' may be used

Explanatory Notes: General Rock Description

The methods of description and classification of rocks used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. In practice, if a material cannot be remoulded by hand in its field condition or in water, it is described as a rock. In general, descriptions cover: rock type, grain size, structure, colour, degree of weathering, strength, minor components or inclusions, and where applicable, the defect types, shape, roughness and coating/infill.

Rock types are generally described according to the predominant grain or crystal size, and in groups for each rock type as follows.

Rock type	Groups
Sedimentary	Deposited, carbonate (porous or non), volcanic ejection
Igneous	Felsic (much quartz, pale), Intermediate, or mafic (little quartz, dark)
Metamorphic	Foliated or non-foliated
Duricrust	Cementing mineralogy (iron oxides or hydroxides, silica, calcium carbonate, gypsum)

Reference should be made to AS1726 for details of the rock types and methods of classification.

The classification of rock weathering is described based on definitions in AS1726 and summarised as follows.

Term and symbol	Definition
Residual Soil RS	Soil developed on rock with the mass structure and substance of the parent rock no longer evident
Extremely weathered XW	Weathered to such an extent that the rock has 'soil-like' properties. Mass structure and substance still evident
Distinctly weathered DW	The strength is usually changed and may be highly discoloured. Porosity may be increased by leaching, or decreased due to deposition in pores. May be distinguished into MW (Moderately Weathered) and HW (Highly Weathered).
Slightly weathered SW	Slightly discoloured; little or no change of strength from fresh rock
Fresh Rock FR	The rock shows no sign of decomposition or staining

The rock material strength can be defined based on the point load index as follows.

Term and symbol	Point Load Index I_{s50} (MPa)
Very Low VL	0.03 to 0.1
Low L	0.1 to 0.3
Medium M	0.3 to 1.0
High H	1.0 to 3
Very High VH	3 to 10
Extremely High EH	> 10

It is important to note that the rock material strength as above is distinct from the rock mass strength which can be significantly weaker due to the effect of defects.

A preliminary assessment of rock strength may be made using the field guide detailed in AS1726, and this is conducted in the absence of point load testing.

The defect spacing measured normal to defects of the same set or bedding, is described as follows.

Definition	Defect Spacing (mm)
Thinly laminated	< 6
Laminated	6 to 20
Very thinly bedded	20 to 60
Thinly bedded	60 to 200
Medium bedded	200 to 600
Thickly bedded	600 to 2000
Very thickly bedded	> 2000

Terms for describing rock and defects are as follows.

Defect Terms			
Joint	JT	Sheared zone	SZ
Bedding Parting	BP	Seam	SM
Foliation	FL	Vein	VN
Cleavage	CL	Drill Lift	DL
Crushed Seam	CS	Handling Break	HB
Fracture Zone	FZ	Drilling Break	DB



The shape and roughness of defects in the rock mass are described using the following terms.

Planarity		Roughness	
Planar	PR	Very Rough	VR
Curved	CU	Rough	RF
Undulose	UN	Smooth	S
Irregular	IR	Slickensided	SL
Stepped	ST	Polished	POL
Discontinuous	DIS		

The coating or infill associated with defects in the rock mass are described as follows.

Infill and Coating		
Clean	CN	
Stained	SN	
Carbonaceous	X	
Minerals	MU	Unidentified mineral
	MS	Secondary mineral
	KT	Chlorite
	CA	Calcite
	Fe	Iron Oxide
	Qz	Quartz
	Veneer	VNR
Coating	CT	Infill up to 1mm

Graphic Symbols Index

	CLAY		SILT		SAND		GRAVEL
	Silty CLAY		Clayey SILT		Clayey SAND		Clayey GRAVEL
	Sandy CLAY		Sandy SILT		Silty SAND		Silty GRAVEL
	Gravelly CLAY		Gravelly SILT		Gravelly SAND		Sandy GRAVEL
	Silty Gravelly CLAY		Clayey Sandy SILT		Clayey Silty SAND		Clayey Silty GRAVEL
	Silty Sandy CLAY		Clayey Gravelly SILT		Clayey Gravelly SAND		Clayey Sandy GRAVEL
	Sandy Gravelly CLAY		Sandy Gravelly SILT		Silty Gravelly SAND		Silty Sandy GRAVEL
	COBBLES & BOULDERS		Sedimentary rock: fine, mostly clay (CLAYSTONE)		Igneous rock: Felsic, fine (RHYOLITE)		
	PEAT, highly organic soil		Sedimentary rock: fine, mostly silt (SILTSTONE)		Igneous rock: Felsic, coarse (GRANITE)		
	TOPSOIL		Sedimentary rock: fine, silt and clay (MUDSTONE, SHALE, LAMINITE)		Igneous rock: Mafic, fine to medium (BASALT, DOLERITE)		
	FILL		Sedimentary rock: medium (SANDSTONE, GREYWACKE)		Igneous rock: Mafic, coarse (GABBRO)		
	FILL: Asphalt or Bituminous Seal		Sedimentary rock: fine to coarse, angular (BRECCIA)		Metamorphic rock: Foliated, fine to medium (SLATE, PHYLLITE, SHIST)		
	FILL: Ballast		Sedimentary rock: coarse, rounded (CONGLOMERATE)		Metamorphic rock: Foliated, coarse (GNEISS)		
	FILL: Concrete		Sedimentary rock: Organic (COAL)		Metamorphic rock: Non-foliated (QUARTZITE, HORNFELS, MARBLE)		
	FILL: Roadbase		Sedimentary rock: Carbonate (LIMESTONE, DOLOMITE)				
			Sedimentary rock: Volcanic (TUFF, VOLCANIC BRECCIA, AGGLOMERATE)				

Client: Eurobodalla Shire Council Project: ESC Various Sites Location: Old Mill Road	Job No: 304000891 Sheet: 1 of 5	Hole No: OMR1
Position: E235546.793 N6010112.073 56 MGA20	Angle from Horizontal: 90°	Surface Elevation:
Rig Type: Hanjin D&B 8D	Mounting: Track	Driller: JM
Casing Diameter:	Contractor: Total Drilling	
Data Started: 2/3/23	Date Completed: 2/3/23	Logged By: AC
		Checked By: RDJ

Drilling			Sampling & Testing		Material Description						
Method	Resistance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
				D 0.40 m	0.40		CL	FILL: Sandy CLAY: low plasticity, orange - brown, fine to medium, sub-rounded to sub-angular sand	M (<PL)		FILL
				ES 0.50 m	0.50		CI	CLAY: medium plasticity, mottled orange - pale grey, trace fine sand	M (>PL)	F	ALLUVIUM
				SPT 1.00 - 1.45 m 8, 6, 6 N=12	1.00		SM	Silty SAND: fine to coarse grained, sub-rounded to sub-angular, orange	M	MD	RESIDUAL SOIL
				ES 1.50 m	1.60		SM	Silty SAND: fine to coarse grained, sub-rounded to sub-angular, orange, trace quartz gravel	M	MD	
				D 1.80 m	2.00		CL	Sandy CLAY: low plasticity, mottled orange and pale grey, fine to coarse grained sand, trace fine to medium gravel	M (>PL)	St	
				ES 2.00 m	2.50						
				ES 2.50 m SPT 2.50 - 2.95 m 11, 12, 12 N=24	3.00						
				ES 3.00 m	3.50						
				ES 3.50 m	4.00						

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy (No Resistance) E Easy F Firm H Hard VH Very Hard (Refusal) WATER Water Level on Date shown water inflow water outflow	FIELD TESTS SPT - Standard Penetration Test HP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photoionisation Detector VS - Vane Shear; P=Peak, R=Residual (uncorrected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube 'undisturbed' MOISTURE D - Dry M - Moist W - Wet PL - Plastic limit LL - Liquid limit w - Moisture content	SOIL CONSISTENCY VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard RELATIVE DENSITY VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense
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Refer to explanatory notes for details of abbreviations and basis of descriptions

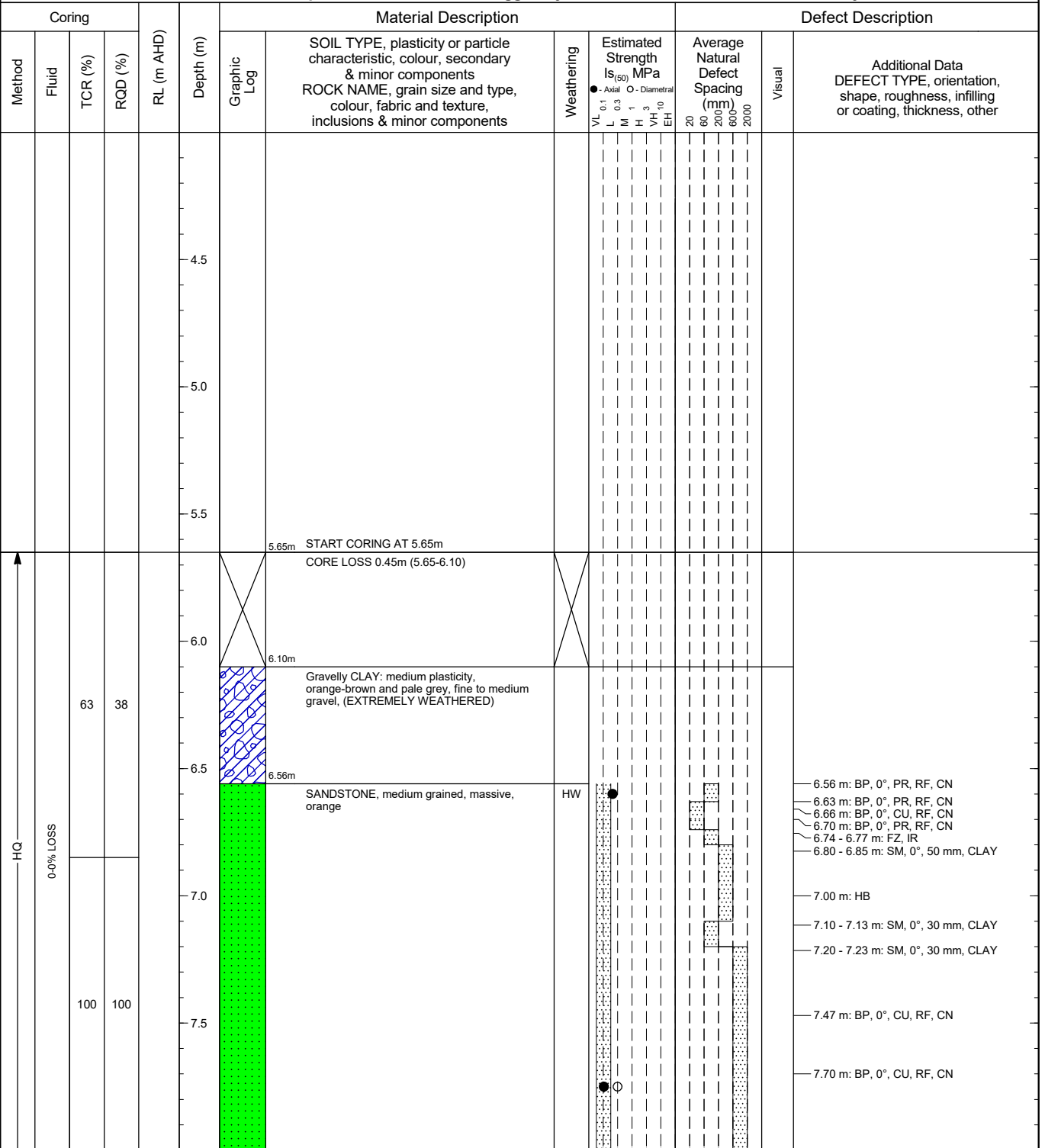
Client: Eurobodalla Shire Council	Job No: 304000891	Sheet: 2 of 5
Project: ESC Various Sites	Position: E235546.793 N6010112.073 56 MGA20	Angle from Horizontal: 90°
Location: Old Mill Road	Rig Type: Hanjin D&B 8D	Surface Elevation:
	Mounting: Track	Driller: JM
	Casing Diameter:	Contractor: Total Drilling
Data Started: 2/3/23	Date Completed: 2/3/23	Logged By: AC
		Checked By: RDJ

Drilling			Sampling & Testing		Material Description						
Method	Resistance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
AD/T ↓	E, F		Not Observed	ES 4.00 m SPT 4.00 - 4.45 m 15, 30, 30 N=60	4.5		CL	Sandy CLAY: low plasticity, mottled orange and pale grey, fine to coarse grained sand, trace fine to medium gravel	M (<PL)	H	EXTREMELY WEATHERED
				ES 4.50 m							
				ES 5.00 m							
				ES 5.50 m							
					5.65m			Continued as Cored Drill Hole			
					6.0						
					6.5						
					7.0						
					7.5						

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy (No Resistance) E Easy F Firm H Hard VH Very Hard (Refusal) WATER Water Level on Date shown water inflow water outflow	FIELD TESTS SPT - Standard Penetration Test HP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photoionisation Detector VS - Vane Shear; P=Peak, R=Residual (uncorrected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube 'undisturbed' MOISTURE D - Dry M - Moist W - Wet PL - Plastic limit LL - Liquid limit w - Moisture content	SOIL CONSISTENCY VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard RELATIVE DENSITY VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense
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Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Eurobodalla Shire Council	Job No: 304000891	Sheet: 3 of 5
Project: ESC Various Sites		
Location: Old Mill Road		
Position: E235546.793 N6010112.073 56 MGA20	Angle from Horizontal: 90°	Surface Elevation:
Rig Type: Hanjin D&B 8D	Mounting: Track	Driller: JM
Casing Diameter:	Bit Type:	Bit Condition:
Data Started: 2/3/23	Date Completed: 2/3/23	Logged By: AC
		Checked By: RDJ



DRILLING AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller PQ Rotary core (85mm) HQ Rotary core (63.5mm) NMLC Rotary core (51.94mm) DT Diatube concrete coring PT Push tube PS Percussion sampling SON Sonic drilling AH Air hammer	WATER Water Level on date shown water inflow water outflow ROCK QUALITY DESCRIPTIONS RQD Rock Quality Designation (%) TCR Total Core Recovery (%)	ROCK STRENGTH EH Extremely High VH Very High H High M Medium L Low VL Very Low ROCK WEATHERING FR Fresh SW Slightly Weathered DW Distinctly Weathered MW Moderately Weathered HW Highly Weathered XW Extremely Weathered	DEFECT TYPE JT Joint SZ Sheared zone BP Bedding Parting SM Seam FL Foliation VN Vein CL Cleavage CS Crushed Seam FZ Fracture Zone DL Drift Lift HB Handing Break DB Drilling Break	PLANARITY CU Curved DIS Discontinuous IR Irregular PR Planar ST Stepped UN Undulose ROUGHNESS VR Very Rough RF Rough S Smooth SL Stockensided POL Polished	COATING CN Clean SN Stained VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceous MU Unidentified mineral MS Secondary mineral KT Chlorite CA Calcite Fe Iron Oxide Oz Quartz
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Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC 2.01.6 LIB:GLOB Log STANTEC CORED BOREHOLE_GINT_OLD_MILL_ROAD.GPJ <-DrawingFile>> 27/04/2023 16:26 10.03.00.09 Datgei/AGS RTA, Photo, Monitoring Tools

Client: Eurobodalla Shire Council	Job No: 304000891	Sheet: 4 of 5
Project: ESC Various Sites		
Location: Old Mill Road		
Position: E235546.793 N6010112.073 56 MGA20	Angle from Horizontal: 90°	Surface Elevation:
Rig Type: Hanjin D&B 8D	Mounting: Track	Driller: JM
Casing Diameter:	Bit Type:	Bit Condition:
Data Started: 2/3/23	Date Completed: 2/3/23	Logged By: AC
		Checked By: RDJ

Coring					Material Description				Defect Description			
Method	Fluid	TCR (%)	RQD (%)	RL (m AHD)	Depth (m)	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary & minor components ROCK NAME, grain size and type, colour, fabric and texture, inclusions & minor components	Weathering	Estimated Strength Is(50) MPa ● - Axial ○ - Diametral VL 0.1 L M H T 3 VH 10 EH	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Visual	Additional Data DEFECT TYPE, orientation, shape, roughness, infilling or coating, thickness, other
HQ	0-0% LOSS	100	100		8.5		SANDSTONE, medium grained, massive, orange (continued)	HW				8.00 m: HB 8.10 m: JT, 50°, PR, RF, CN 8.75 - 8.76 m: SM, 10 mm, Washed Away 8.82 m: HB 9.00 m: BP, 0°, PR, RF, CN 9.88 m: HB 10.00 m: BP, 0°, PR, RF, CN 10.45 m: HB 10.76 m: JT, 30°, PR, RF, CN 10.76 - 11.00 m: FZ, IR, 240 mm
		88	87		10.0							
					10.5							
					11.0		CORE LOSS 0.75m (11.00-11.75)					
		75	75		11.5		SANDSTONE, medium grained, massive, grey	MW				11.85 m: HB 11.96 m: BP, 30°, PR, RF, VNR

DRILLING AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller PQ Rotary core (85mm) HQ Rotary core (63.5mm) NMLC Rotary core (51.94mm) DT Diatube concrete coring PT Push tube PS Percussion sampling SON Sonic drilling AH Air hammer	WATER Water Level on date shown water inflow water outflow ROCK QUALITY DESCRIPTIONS RQD Rock Quality Designation (%) TCR Total Core Recovery (%)	ROCK STRENGTH EH Extremely High VH Very High H High M Medium L Low VL Very Low ROCK WEATHERING FR Fresh SW Slightly Weathered DW Distinctly Weathered MW Moderately Weathered HW Highly Weathered XW Extremely Weathered	DEFECT TYPE JT Joint SZ Sheared zone BP Bedding Parting SM Seam FL Foliation VN Vein CL Cleavage CS Crushed Seam FZ Fracture Zone DL Drift Lift HB Handing Break DB Drilling Break	PLANARITY CU Curved DIS Discontinuous IR Irregular PR Planar ST Stepped UN Undulose ROUGHNESS VR Very Rough RF Rough S Smooth SL Stockensided POL Polished	COATING CN Clean SN Stained VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceous MU Unidentified mineral MS Secondary mineral KT Chlorite CA Calcite Fe Iron Oxide Oz Quartz
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Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Eurobodalla Shire Council	Job No: 304000891	Sheet: 5 of 5
Project: ESC Various Sites	Position: E235546.793 N6010112.073 56 MGA20	Angle from Horizontal: 90°
Location: Old Mill Road	Rig Type: Hanjin D&B 8D	Surface Elevation:
	Mounting: Track	Driller: JM
Casing Diameter:	Bit Type:	Bit Condition:
Data Started: 2/3/23	Date Completed: 2/3/23	Logged By: AC
		Checked By: RDJ

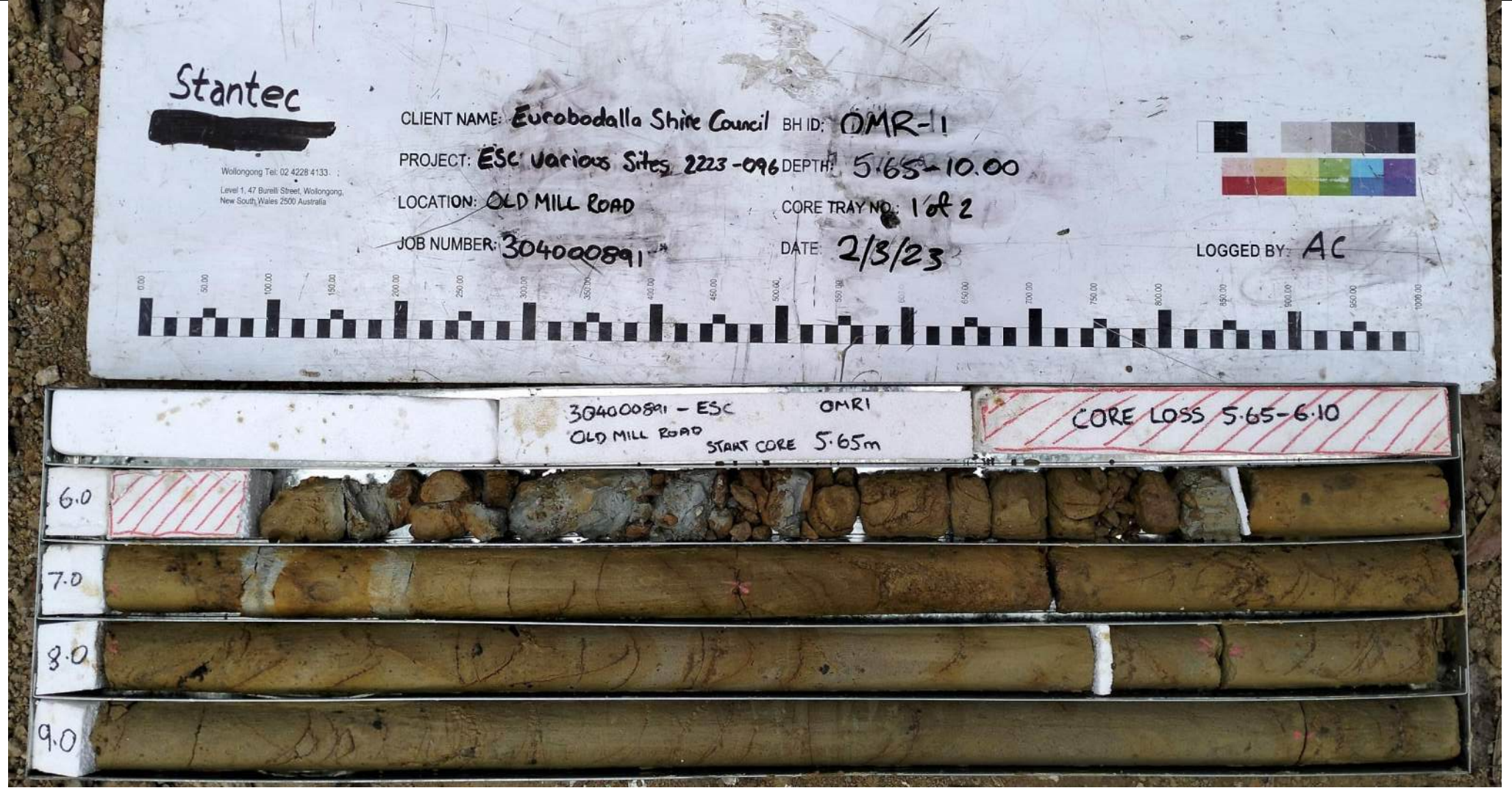
Coring					Material Description				Defect Description			
Method	Fluid	TCR (%)	RQD (%)	RL (m AHD)	Depth (m)	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary & minor components ROCK NAME, grain size and type, colour, fabric and texture, inclusions & minor components	Weathering	Estimated Strength $I_{s(50)}$ MPa ● - Axial ○ - Diametral VL 0.1 L M H VH EH 1 2 3 4 5 10	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Visual	Additional Data DEFECT TYPE, orientation, shape, roughness, infilling or coating, thickness, other
HQ	0-0% LOSS	75	75		12.5		SANDSTONE, medium grained, massive, grey (continued)	MW				12.00 m: HB 12.08 m: HB 12.27 m: HB 12.33 m: BP, 30°, PR, RF, VNR 12.38 m: BP, 20°, PR, RF, VNR 12.41 m: BP, 20°, PR, RF, VNR 12.78 - 13.10 m: SM, 320 mm, CLAY
					13.0		TERMINATED AT 13.10 m Target depth					
					13.5							
					14.0							
					14.5							
					15.0							
					15.5							

DRILLING AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller PQ Rotary core (85mm) HQ Rotary core (63.5mm) NMLC Rotary core (51.94mm) DT Diatube concrete coring PT Push tube PS Percussion sampling SON Sonic drilling AH Air hammer	WATER Water Level on date shown water inflow water outflow ROCK QUALITY DESCRIPTIONS RQD Rock Quality Designation (%) TCR Total Core Recovery (%)	ROCK STRENGTH EH Extremely High VH Very High H High M Medium L Low VL Very Low ROCK WEATHERING FR Fresh SW Slightly Weathered DW Distinctly Weathered MW Moderately Weathered HW Highly Weathered XW Extremely Weathered	DEFECT TYPE JT Joint SZ Sheared zone BP Bedding Parting SM Seam FL Foliation VN Vein CL Cleavage CS Crushed Seam FZ Fracture Zone DL Drift Lift HB Handing Break DB Drilling Break	PLANARITY CU Curved DIS Discontinuous IR Irregular PR Planar ST Stepped UN Undulose ROUGHNESS VR Very Rough RF Rough S Smooth SL Stockensided POL Polished	COATING CN Clean SN Stained VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceous MU Unidentified mineral MS Secondary mineral KT Chlorite CA Calcite Fe Iron Oxide Oz Quartz
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Refer to explanatory notes for details of abbreviations and basis of descriptions



TITLE BOREHOLE CORE PHOTOGRAPH-OMR1 ESC – VARIOUS SITES 2223-096			
PROJECT NUMBER 304000891	TEST DATE 2/3/2023	INCLINATION: -90 DEGREES	CORE LENGTH: BOX 1 OF 2 5.65 m to 9.0 m – 4.35m
DRILL RIG: HANJIN D&B 8D	CONTRACTOR: TOTAL DRILLING	LOGGED BY: AC	CHECKED BY: TC





TITLE		BOREHOLE CORE PHOTOGRAPH-OMR1 ESC – VARIOUS SITES	
PROJECT NUMBER 304000891	TEST DATE 2/3/2023	INCLINATION -90 DEGREES	CORE LENGTH: BOX 2 of 2 10.0 m to 13.1 m – 3.1
DRILL RIG: HANJIN D&B 8D	CONTRACTOR: Total drilling	LOGGED BY: AC	CHECKED BY: TC

Stantec

Wollongong Tel: 02 4228 4133
Level 1, 47 Bunnell Street, Wollongong,
New South Wales 2500 Australia

CLIENT NAME: Eurobodalla Shire Council BH ID: OMR-1

PROJECT: ESC Various Sites, 2223-096 DEPTH: 10.0-13.1

LOCATION: OLD MILL ROAD

CORE TRAY NO.: 2 of 2

JOB NUMBER: 304000891

DATE: 2/3/23

LOGGED BY: AC



Client: Eurobodalla Shire Council Project: ESC Various Sites Location: Old Mill Road	Job No: 304000891 Position: E235570.970 N6010109.522 56 MGA20 Rig Type: Hanjin D&B 8D Casing Diameter:	Sheet: 1 of 4 Angle from Horizontal: 90° Surface Elevation: Mounting: Track Driller: JM Contractor: Total Drilling Checked By: RDJ
Data Started: 2/3/23 Date Completed: 2/3/23 Logged By: AC		

Drilling			Sampling & Testing		Material Description							
Method	Resistance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations	
AD/T			Not Observed	ES 0.50 m	0.5		CI	CLAY: medium plasticity, mottled brown, grey	M (>PL)	F to St	RESIDUAL SOIL	
				ES 1.00 m SPT 1.00 - 1.45 m 2, 4, 3 N=7	1.0			CL	Sandy CLAY: low plasticity, mottled brown, grey, fine to coarse grained sand	M (>PL)		F to St
				ES 1.50 m	1.5							
				ES 2.00 m	2.0		CL	Clayey SAND: fine to coarse grained, sub-rounded to sub-angular, grey, orange, medium plasticity clay, with fine to coarse quartz gravel	M	D		
				ES 2.50 m SPT 2.50 - 2.95 m 4, 6, 6 N=12	2.5		CL					
				ES 3.00 m	3.0		SC	Clayey SAND: fine to coarse grained, sub-rounded to sub-angular, orange, medium plasticity clay, trace fine gravel	M	D		
D 3.40 m ES 3.50 m	3.5		SC									

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy (No Resistance) E Easy F Firm H Hard VH Very Hard (Refusal) WATER Water Level on Date shown water inflow water outflow	FIELD TESTS SPT - Standard Penetration Test HP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photoionisation Detector VS - Vane Shear; P=Peak, R=Residual (uncorrected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube 'undisturbed' MOISTURE D - Dry M - Moist W - Wet PL - Plastic limit LL - Liquid limit w - Moisture content	SOIL CONSISTENCY VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard RELATIVE DENSITY VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense
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Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Eurobodalla Shire Council	Job No: 304000891	Sheet: 2 of 4
Project: ESC Various Sites	Angle from Horizontal: 90°	Surface Elevation:
Location: Old Mill Road	Mounting: Track	Driller: JM
Position: E235570.970 N6010109.522 56 MGA20	Contractor: Total Drilling	
Rig Type: Hanjin D&B 8D	Checked By: RDJ	
Casing Diameter:		
Data Started: 2/3/23	Date Completed: 2/3/23	Logged By: AC

Drilling			Sampling & Testing		Material Description						
Method	Resistance	Casing	Water	Sample or Field Test	Depth (m)	Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
AD/T				ES 4.00 m SPT 4.00 - 4.14 m 25/140mm HB N=R	4.10m		SC		M	D	RESIDUAL SOIL
					4.25m		SC	Clayey SAND: fine to coarse grained, sub-rounded to sub-angular, orange, medium plasticity clay, trace fine gravel	M	VD	EXTREMELY WEATHERED
					4.5			Continued as Cored Drill Hole			
					5.0						
					5.5						
					6.0						
					6.5						
					7.0						
					7.5						

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy (No Resistance) E Easy F Firm H Hard VH Very Hard (Refusal) WATER Water Level on Date shown water inflow water outflow	FIELD TESTS SPT - Standard Penetration Test HP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photoionisation Detector VS - Vane Shear; P=Peak, R=Residual (uncorrected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube 'undisturbed' MOISTURE D - Dry M - Moist W - Wet PL - Plastic limit LL - Liquid limit w - Moisture content	SOIL CONSISTENCY VS - Very Soft S - Soft F - Firm St - Stiff VSt - Very Stiff H - Hard RELATIVE DENSITY VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense
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Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Eurobodalla Shire Council	Job No: 304000891	Sheet: 3 of 4
Project: ESC Various Sites	Angle from Horizontal: 90°	Surface Elevation:
Location: Old Mill Road	Rig Type: Hanjin D&B 8D	Driller: JM
Position: E235570.970 N6010109.522 56 MGA20	Mounting: Track	Contractor: Total Drilling
Casing Diameter:	Bit Type:	Bit Condition:
Data Started: 2/3/23	Date Completed: 2/3/23	Logged By: AC
		Checked By: RDJ

Coring					Material Description				Defect Description			
Method	Fluid	TCR (%)	RQD (%)	RL (m AHD)	Depth (m)	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary & minor components ROCK NAME, grain size and type, colour, fabric and texture, inclusions & minor components	Weathering	Estimated Strength Is(50) MPa ● - Axial ○ - Diametral VL 0.1 L M H T P 3 VH 10 EH 20	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Visual	Additional Data DEFECT TYPE, orientation, shape, roughness, infilling or coating, thickness, other
							4.25m START CORING AT 4.25m					
		100	94		4.5		SANDSTONE, fine to medium grained, massive, orange, grey	HW				4.30 m: BP, 5°, PR, RF, CN 4.44 m: BP, 5°, PR, RF, CN 4.88 m: BP, 45°, PR, RF, CN 5.05 m: BP, 5°, IR, RF, CN 5.09 m: BP, 5°, IR, RF, CN 5.14 m: BP, 5°, IR, RF, SN 5.30 m: JT, 45°, PR, RF, CN 5.45 m: BP, 5°, PR, RF, CN 5.51 - 5.54 m: VN, 20° 5.56 - 5.85 m: SM, 290 mm, CLAY 5.88 m: VN, 30° 5.90 m: VN, 45° 5.93 - 5.95 m: SM, 40°, 20 mm, CLAY 6.00 m: BP, 5°, PR, RF, CN 6.18 m: VN, 30° 6.23 - 6.24 m: SM, 10°, 10 mm, CLAY 6.35 m: VN, 40° 6.48 m: VN, 30° 6.54 m: VN, 30° 6.70 m: BP, 5°, PR, RF, CN 7.00 m: BP, 5°, PR, RF, CN 7.34 - 7.40 m: FZ, IR, SN 7.44 - 7.45 m: SM, 10 mm, WASHED AWAY 7.71 m: JT, 20°, IR, RF, CN
		100	96		6.5							
		100	94		7.5							

DRILLING AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller PQ Rotary core (85mm) HQ Rotary core (63.5mm) NMLC Rotary core (51.94mm) DT Diatube concrete coring PT Push tube PS Percussion sampling SON Sonic drilling AH Air hammer	WATER Water Level on date shown water inflow water outflow ROCK QUALITY DESCRIPTIONS RQD Rock Quality Designation (%) TCR Total Core Recovery (%)	ROCK STRENGTH EH Extremely High VH Very High H High M Medium L Low VL Very Low ROCK WEATHERING FR Fresh SW Slightly Weathered DW Distinctly Weathered MW Moderately Weathered HW Highly Weathered XW Extremely Weathered	DEFECT TYPE JT Joint SZ Sheared zone BP Bedding Parting SM Seam FL Foliation VN Vein CL Cleavage CS Crushed Seam FZ Fracture Zone DL Drift Lift HB Handing Break DB Drilling Break	PLANARITY CU Curved DIS Discontinuous IR Irregular PR Planar ST Stepped UN Undulose ROUGHNESS VR Very Rough RF Rough S Smooth SL Stockensided POL Polished	COATING CN Clean SN Stained VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceous MU Unidentified mineral MS Secondary mineral KT Chlorite CA Calcite Fe Iron Oxide Oz Quartz
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Refer to explanatory notes for details of abbreviations and basis of descriptions

Client: Eurobodalla Shire Council	Job No: 304000891	Sheet: 4 of 4
Project: ESC Various Sites		
Location: Old Mill Road		
Position: E235570.970 N6010109.522 56 MGA20	Angle from Horizontal: 90°	Surface Elevation:
Rig Type: Hanjin D&B 8D	Mounting: Track	Driller: JM
Casing Diameter:	Bit Type:	Bit Condition:
Data Started: 2/3/23	Date Completed: 2/3/23	Logged By: AC
		Checked By: RDJ

Coring					Material Description				Defect Description				
Method	Fluid	TCR (%)	RQD (%)	RL (m AHD)	Depth (m)	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary & minor components ROCK NAME, grain size and type, colour, fabric and texture, inclusions & minor components	Weathering	Estimated Strength Is(50) MPa ● - Axial ○ - Diametral VL 0.1 L M H VH EH 20 60 100 200 600 2000	Average Natural Defect Spacing (mm) 20 60 100 200 600 2000	Visual	Additional Data DEFECT TYPE, orientation, shape, roughness, infilling or coating, thickness, other	
HQ	0-0% LOSS	100	94										8.5
					9.0	[Pattern]	Gravelly CLAY: medium plasticity, orange-brown, fine to coarse gravel, (EXTREMELY WEATHERED)						
					9.25		TERMINATED AT 9.25 m Target depth						
					9.5								
					10.0								
					10.5								
					11.0								
					11.5								

DRILLING AD/V Solid flight auger: V-Bit AD/T Solid flight auger: TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller PQ Rotary core (85mm) HQ Rotary core (63.5mm) NMLC Rotary core (51.94mm) DT Diatube concrete coring PT Push tube PS Percussion sampling SON Sonic drilling AH Air hammer	WATER Water Level on date shown water inflow water outflow ROCK QUALITY DESCRIPTIONS RQD Rock Quality Designation (%) TCR Total Core Recovery (%)	ROCK STRENGTH EH Extremely High VH Very High H High M Medium L Low VL Very Low ROCK WEATHERING FR Fresh SW Slightly Weathered DW Distinctly Weathered MW Moderately Weathered HW Highly Weathered XW Extremely Weathered	DEFECT TYPE JT Joint SZ Sheared zone BP Bedding Parting SM Seam FL Foliation VN Vein CL Cleavage CS Crushed Seam FZ Fracture Zone DL Drift Lift HB Handing Break DB Drilling Break	PLANARITY CU Curved DIS Discontinuous IR Irregular PR Planar ST Stepped UN Undulose ROUGHNESS VR Very Rough RF Rough S Smooth SL Stockensided POL Polished	COATING CN Clean SN Stained VNR Veneer (thin or patchy) CT Coating (up to 1mm) INFILL MATERIALS X Carbonaceous MU Unidentified mineral MS Secondary mineral KT Chlorite CA Calcite Fe Iron Oxide Oz Quartz
--	---	---	---	--	--

Refer to explanatory notes for details of abbreviations and basis of descriptions

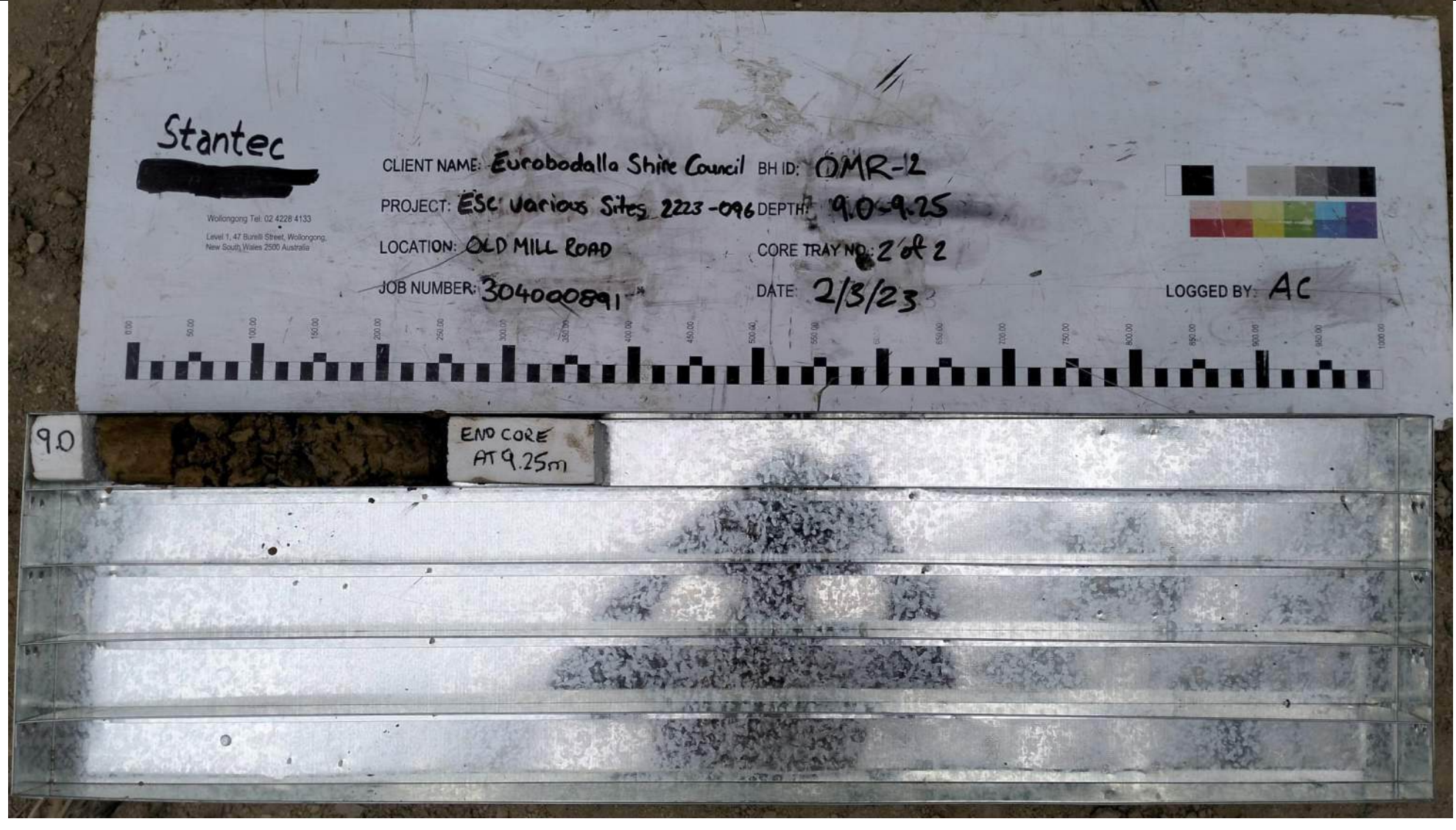


TITLE		BOREHOLE CORE PHOTOGRAPH-OMR2 ESC – VARIOUS SITES	
PROJECT NUMBER	TEST DATE	INCLINATION	CORE LENGTH: BOX 1 of 2
304000891	2/3/2023	-90 DEGREES	4.25 m to 9.0 m – 4.75m
DRILL RIG:	CONTRACTOR:	LOGGED BY:	CHECKED BY:
HANJIN D&B 8D	TOTAL DRILLING	AC	TC





TITLE		BOREHOLE CORE PHOTOGRAPH-OMR2 ESC – VARIOUS SITES	
PROJECT NUMBER 304000891	TEST DATE 2/3/2023	INCLINATION -90 DEGREES	CORE LENGTH: BOX 2 of 2 9.0 m to 9.25 m – 0.25 m
DRILL RIG: HANJIN D&B 8D	CONTRACTOR: TOTAL DRILLING	LOGGED BY: AC	CHECKED BY: TC



Appendix C LABORATORY CERTIFICATES



Stantec Australia Pty Ltd
 Level 22, 570 Bourke Street
 Melbourne
 VIC 3000



NATA Accredited
 Accreditation Number 1261
 Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
 NATA is a signatory to the ILAC Mutual Recognition
 Arrangement for the mutual recognition of the
 equivalence of testing, medical testing, calibration,
 inspection, proficiency testing scheme providers and
 reference materials producers reports and certificates.

Attention: **Robert De Jong**

Report **971539-S**
 Project name **ESC VARIOUS SITES 2223-096**
 Project ID **304000891**
 Received Date **Mar 13, 2023**

Client Sample ID			OMR1 0.5	OMR1 1.0	OMR1 1.5	OMR1 2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			W23- Ma0032013	W23- Ma0032014	W23- Ma0032015	W23- Ma0032016
Date Sampled			Mar 02, 2023	Mar 02, 2023	Mar 02, 2023	Mar 02, 2023
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.4	5.5	6.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	4.5	4.4	5.1
Reaction Ratings* ^{S05}	0	-	2.0	2.0	2.0	2.0

Client Sample ID			OMR1 2.5	OMR1 3.0	OMR1 3.5	OMR1 4.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			W23- Ma0032017	W23- Ma0032018	W23- Ma0032019	W23- Ma0032020
Date Sampled			Mar 02, 2023	Mar 02, 2023	Mar 02, 2023	Mar 02, 2023
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.1	7.1	7.2	7.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.6	6.2	6.7	6.7
Reaction Ratings* ^{S05}	0	-	2.0	2.0	2.0	2.0
Chloride	10	mg/kg	-	-	800	-
Conductivity (1:5 aqueous extract at 25 °C as rec.)	10	uS/cm	-	-	560	-
pH (1:5 Aqueous extract at 25 °C as rec.)	0.1	pH Units	-	-	7.0	-
Resistivity*	0.5	ohm.m	-	-	18	-
Sulphate (as SO4)	10	mg/kg	-	-	150	-

Client Sample ID			OMR1 4.5	OMR1 5.0	OMR1 5.5	OMR2 0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			W23- Ma0032021	W23- Ma0032022	W23- Ma0032023	W23- Ma0032024
Date Sampled			Mar 02, 2023	Mar 02, 2023	Mar 02, 2023	Mar 02, 2023
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.9	6.8	6.7	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.7	6.8	6.7	3.9
Reaction Ratings* ^{S05}	0	-	2.0	2.0	2.0	2.0



ASCT Illawarra

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 A.B.N. 34 635 062 609

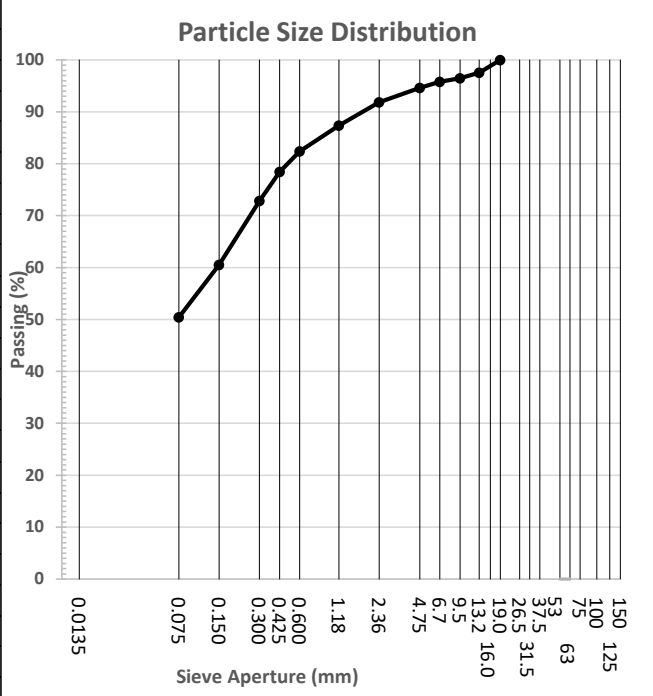
WB080 - Rev 25, 16/01/2023 **Report on Material Quality**

Client:	Stantec Australia Pty Ltd	Report No:	26-1126-MQ
Client Address:	16 Burelli St, Wollongong NSW 2500	Report Date:	22/03/2023
Project:	Geotechnical Testing	Report Page:	Page 1 of 2
Works Component:	ESC Various Sites 2223-096 - Old Mill Road	Project No:	26
Material Used:	-	Request/Order:	304000891
Material Description:	Sandy CLAY	Lot Number:	OMR1
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 14/03/2023 to 15/03/2023	Control Line:	OMR1

Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
7501	2/03/2023	-	-	OMR1	SPT 2.5-2.95

Sampling & Test Methods (Results relate only to the items sampled/tested)	(** NATA accreditation does not cover the performance of this service)
Sampled by Customer: Results apply to the sample/s as received. **	AS 1289.1.1: (2001)Preparation of disturbed soil samples
AS 1289.3.6.1 Coarse: (2009)Determination of the particle size distribution of a soil	AS 1289.3.6.1 Fine: (2009)Determination of the particle size distribution of a soil
AS 1289.3.1.2: (2009)Determination of Liquid Limit (1 point Casagrande)	AS 1289.3.2.1: (2009) Determination of the Plastic Limit
AS 1289.3.3.1: (2009)Calculation of the Plastic Index of a soil	PSD: Ratios, Co-efficients & Weighted Indices

Report Remarks & Endorsement	
	Issued By: <u>P. Baltoski</u> P. Baltoski Approved Signatory
	Accredited for compliance with ISO/IEC 17025 - Testing. NATA Accreditation number: 20656

Specification Name	Units	Result	Specification Limits	Graphical Representation
Particle Size Distribution (WASHED)				
Passing 150mm Sieve	%			
Passing 125mm Sieve	%			
Passing 100mm Sieve	%			
Passing 75.0mm Sieve	%			
Passing 63.0mm Sieve	%			
Passing 53.0mm Sieve	%			
Passing 37.5mm Sieve	%			
Passing 31.5mm Sieve	%			
Passing 26.5mm Sieve	%			
Passing 19.0mm Sieve	%	100		
Passing 16.0mm Sieve	%			
Passing 13.2mm Sieve	%	98		
Passing 9.5mm Sieve	%	96		
Passing 6.7mm Sieve	%	96		
Passing 4.75mm Sieve	%	95		
Passing 2.36mm Sieve	%	92		
Passing 1.18mm Sieve	%	87		
Passing 0.600mm Sieve	%	82		
Passing 0.425mm Sieve	%	78		
Passing 0.300mm Sieve	%	73		
Passing 0.150mm Sieve	%	60		
Passing 0.075mm Sieve	%	50		
Passing 0.0135mm Sieve	%			
Moisture, Ratios, Coefficients & Indices	Units	Result	Specification Limits	Remarks
Moisture Content (AS1289.2.1.1-2005)	%	14.7		Preparation Condition Passing 19.0



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Mobile: 0497 979 929

A.B.N. 34 635 062 609

WB080 - Rev 25, 16/01/2023

Report on Material Quality

Client:	Stantec Australia Pty Ltd	Report No:	26-1126-MQ
Client Address:	16 Burelli St, Wollongong NSW 2500	Report Date:	22/03/2023
Project:	Geotechnical Testing	Report Page:	Page 2 of 2
Works Component:	ESC Various Sites 2223-096 - Old Mill Road	Project No:	26
Material Used:	-	Request/Order:	304000891
Material Description:	Sandy CLAY	Lot Number:	OMR1
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 14/03/2023 to 15/03/2023	Control Line:	OMR1


Sample Number	Sample Date	Chainage/Location	Offset	Level of Test	Test Depth
7501	2/03/2023	-	-	OMR1	SPT 2.5-2.95

Plasticity	Units	Result	Specification Limits	Remarks
Liquid Limit	%	33		Oven Dried & Dry Sieved
Plastic Limit	%	17		Oven Dried & Dry Sieved
Plastic Index	%	16		Oven Dried & Dry Sieved

Report on Uniaxial Compressive Strength (UCS)

Client:	Stantec Australia Pty Ltd	Report No:	1129
Client Address:	16 Burelli St, Wollongong NSW 2500	Report Date:	22/03/2023
Project:	Geotechnical Testing	Report Page:	Page 1 of 1
Works Component:	ESC Various Sites 2223-096	Project No:	26
Material Used:	-	Test Request:	304000891
Material Description:	SANDSTONE	Lot Number:	-
Lot Comments:	-	ITP/PCP Number:	-
Lab Test Date/s:	Laboratory testing 21/03/2023	Control Line:	OMR2
Sample Date:	6/03/2023	Sample Number:	7646

Uniaxial Compressive Strength

Client ID Number		Failure Mode	(DS) Double Shear
Borehole	OMR2	Failure Sketch	
Depth	7.30-7.60m		
Lithological Description	Sedimentary		
Type of Testing Machine	ROCK UCS PH1		
Date of Test	21/03/2023		
Height (mm)	146.0		
Diameter (mm)	50.9		
Test Duration (mins)	3.20	Rate Displacement (mm/min)	0.05
UCS (Mpa)	1.2	Moisture Content (%)	8.7

Specimen - Before Testing



Specimen - After Testing


Sampling & Test Methods (Results relate only to the items sampled/tested)

Sampled by Client: Results apply to the sample/s as received. **
 Client: Test specimens selected by the client.
 As Received: Samples stored & Tested in as received condition.
 AS4133.4.2.2: (2013) Determination of Uniaxial Compressive Strength (<50MPa)
 AS4133.1.1.1: (2005) Determination of moisture content of rock, oven drying.

Report Endorsement


Accredited for compliance with
 ISO/IEC 17025 - Testing.
 NATA Accreditation number: 20656



P. Baltoski
 Approved Signatory

(** NATA accreditation does not cover the performance of this service)

Client Sample ID			OMR2 1.0	OMR2 1.5	OMR2 2.0	OMR2 2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			W23- Ma0032025	W23- Ma0032026	W23- Ma0032027	W23- Ma0032028
Date Sampled			Mar 02, 2023	Mar 02, 2023	Mar 02, 2023	Mar 02, 2023
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	5.7	7.5	7.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	4.3	5.0	5.3
Reaction Ratings* ^{S05}	0	-	2.0	2.0	2.0	2.0

Client Sample ID			OMR2 3.0	OMR2 3.5	OMR2 4.0
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			W23- Ma0032029	W23- Ma0032030	W23- Ma0032031
Date Sampled			Mar 02, 2023	Mar 02, 2023	Mar 02, 2023
Test/Reference	LOR	Unit			
Acid Sulfate Soils Field pH Test					
pH-F (Field pH test)*	0.1	pH Units	7.2	7.1	7.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.4	5.6	5.7
Reaction Ratings* ^{S05}	0	-	2.0	2.0	2.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test - Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests	Sydney	Mar 20, 2023	7 Days
Chloride - Method: LTM-INO-4270 Anions by Ion Chromatography	Sydney	Mar 18, 2023	28 Days
Conductivity (1:5 aqueous extract at 25 °C as rec.) - Method: LTM-INO-4030 Conductivity	Sydney	Mar 18, 2023	7 Days
pH (1:5 Aqueous extract at 25 °C as rec.) - Method: LTM-GEN-7090 pH by ISE	Sydney	Mar 18, 2023	7 Days
Sulphate (as SO ₄) - Method: In-house method LTM-INO-4270 Sulphate by Ion Chromatograph	Sydney	Mar 18, 2023	28 Days

Company Name:	Stantec Australia Pty Ltd (NSW/ACT)	Order No.:		Received:	Mar 13, 2023 10:00 AM
Address:	Level 22, 570 Bourke Street Melbourne VIC 3000	Report #:	971539	Due:	Mar 20, 2023
Project Name:	ESC VARIOUS SITES 2223-096	Phone:		Priority:	5 Day
Project ID:	304000891	Fax:		Contact Name:	Robert De Jong

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Acid Sulfate Soils Field pH Test	Aggressivity Soil Set	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	OMR1 0.5	Mar 02, 2023		Soil	W23-Ma0032013	X		X
2	OMR1 1.0	Mar 02, 2023		Soil	W23-Ma0032014	X		X
3	OMR1 1.5	Mar 02, 2023		Soil	W23-Ma0032015	X		X
4	OMR1 2.0	Mar 02, 2023		Soil	W23-Ma0032016	X		X
5	OMR1 2.5	Mar 02, 2023		Soil	W23-Ma0032017	X		X
6	OMR1 3.0	Mar 02, 2023		Soil	W23-Ma0032018	X		X
7	OMR1 3.5	Mar 02, 2023		Soil	W23-Ma0032019	X	X	X
8	OMR1 4.0	Mar 02, 2023		Soil	W23-Ma0032020	X		X

Company Name: Stantec Australia Pty Ltd (NSW/ACT)
Address: Level 22, 570 Bourke Street
Melbourne
VIC 3000

Project Name: ESC VARIOUS SITES 2223-096
Project ID: 304000891

Order No.:
Report #: 971539
Phone:
Fax:

Received: Mar 13, 2023 10:00 AM
Due: Mar 20, 2023
Priority: 5 Day
Contact Name: Robert De Jong

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Acid Sulfate Soils Field pH Test	Aggressivity Soil Set	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X
9	OMR1 4.5	Mar 02, 2023		Soil	W23-Ma0032021	X		X
10	OMR1 5.0	Mar 02, 2023		Soil	W23-Ma0032022	X		X
11	OMR1 5.5	Mar 02, 2023		Soil	W23-Ma0032023	X		X
12	OMR2 0.5	Mar 02, 2023		Soil	W23-Ma0032024	X		X
13	OMR2 1.0	Mar 02, 2023		Soil	W23-Ma0032025	X		X
14	OMR2 1.5	Mar 02, 2023		Soil	W23-Ma0032026	X		X
15	OMR2 2.0	Mar 02, 2023		Soil	W23-Ma0032027	X		X
16	OMR2 2.5	Mar 02, 2023		Soil	W23-Ma0032028	X		X
17	OMR2 3.0	Mar 02, 2023		Soil	W23-Ma0032029	X		X
18	OMR2 3.5	Mar 02, 2023		Soil	W23-	X		X

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 web: www.eurofins.com.au
 email: EnviroSales@eurofins.com

Company Name: Stantec Australia Pty Ltd (NSW/ACT)
Address: Level 22, 570 Bourke Street
 Melbourne
 VIC 3000

Project Name: ESC VARIOUS SITES 2223-096
Project ID: 304000891

Order No.:
Report #: 971539
Phone:
Fax:
Received: Mar 13, 2023 10:00 AM
Due: Mar 20, 2023
Priority: 5 Day
Contact Name: Robert De Jong

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Acid Sulfate Soils Field pH Test	Aggressivity Soil Set	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X
18	OMR2 3.5	Mar 02, 2023		Soil	W23-Ma0032030			
19	OMR2 4.0	Mar 02, 2023		Soil	W23-Ma0032031	X		X
Test Counts						19	1	19

Internal Quality Control Review and Glossary

General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	µg/L: micrograms per litre
ppm: parts per million	ppb: parts per billion	%: Percentage
org/100 mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (<i>bis</i> -tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
- For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank										
Chloride				mg/kg	< 10			10	Pass	
Conductivity (1:5 aqueous extract at 25 °C as rec.)				uS/cm	< 10			10	Pass	
Sulphate (as SO4)				mg/kg	< 10			10	Pass	
LCS - % Recovery										
Chloride				%	94			70-130	Pass	
Conductivity (1:5 aqueous extract at 25 °C as rec.)				%	92			70-130	Pass	
Resistivity*				%	92			70-130	Pass	
Sulphate (as SO4)				%	92			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1				Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
					Result 1					
Chloride	S23-Ma0037303	NCP	%	119				70-130	Pass	
Sulphate (as SO4)	S23-Ma0037303	NCP	%	86				70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1				Acceptance Limits	Pass Limits	Qualifying Code
Duplicate										
Acid Sulfate Soils Field pH Test					Result 1	Result 2	RPD			
pH-F (Field pH test)*	W23-Ma0032017	CP	pH Units	7.1	7.0	pass		20%	Pass	
pH-FOX (Field pH Peroxide test)*	W23-Ma0032017	CP	pH Units	5.6	5.6	pass		0%	Pass	
Duplicate										
					Result 1	Result 2	RPD			
Chloride	S23-Ma0033227	NCP	mg/kg	19	18	3.5		30%	Pass	
Conductivity (1:5 aqueous extract at 25 °C as rec.)	S23-Ma0032350	NCP	uS/cm	< 10	11	29		30%	Pass	
pH (1:5 Aqueous extract at 25 °C as rec.)	S23-Ma0034822	NCP	pH Units	6.5	6.5	<1		30%	Pass	
Resistivity*	S23-Ma0032350	NCP	ohm.m	1200	910	29		30%	Pass	
Sulphate (as SO4)	S23-Ma0033227	NCP	mg/kg	27	24	11		30%	Pass	
Duplicate										
Acid Sulfate Soils Field pH Test					Result 1	Result 2	RPD			
pH-F (Field pH test)*	W23-Ma0032027	CP	pH Units	7.5	7.5	pass		20%	Pass	
pH-FOX (Field pH Peroxide test)*	W23-Ma0032027	CP	pH Units	5.0	5.0	pass		0%	Pass	

Comments
Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised by:

Hannah Mawbey	Analytical Services Manager
Roopesh Rangarajan	Senior Analyst-Inorganic



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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Appendix D IMPORTANT INFORMATION



Important Information about this Geotechnical Report

Scope of Work

The purpose of this report and any associated documentation is expressly stated in the document. This document does not form a complete assessment of the site, and no implicit determinations about Stantec's scope can be taken if not specifically referenced. Whilst this report is intended to reduce geotechnical risk, no level of detail or scope of work can entirely eliminate risk.

The nature of geotechnical data typically precludes auxiliary environmental assessment without undertaking specific methods in the investigation. Therefore, unless it is explicitly stated in the scope of work, this report does not provide any contamination or environmental assessment of the site or adjacent sites, nor can it be inferred or implied from any component of the document.

The scope of work, geotechnical information, and assessments made by Stantec may be summarised in the report; however, all aspects of the document, including associated data and limitations should be reviewed in its entirety.

Standard of care

Stantec have undertaken investigations, performed consulting services, and prepared this report based on the Client's specific requirements, data that was available or was collected, and previous experience.

Stantec's findings and assessment represent its reasonable judgment, diligence, skill, with sound professional standards, within the time and budget constraints of its commission. No warranty, expressed or implied, is made as to the professional advice included in this report.

Data sources

In preparing this document, or providing any consulting services during the commission, Stantec may have relied on information from third parties including, but not limited to; sub-consultants, published data, and the Client including its employees or representatives. This data may not be verified and Stantec assumes no responsibility for the adequacy, incompleteness, inaccuracies, or reliability of this information.

Stantec does not assume any responsibility for assessments made partly, or entirely based on information provided by third parties.

Variability in conditions and limitations of data

Subsurface conditions are complex and can be highly variable; they cannot be accurately defined by discrete investigations. Geotechnical data is based on investigation locations which are explicitly representative of the specific sample or test points. Interpretation of conditions between such points cannot be assumed to represent actual subsurface information and there are unknowns or variations in ground conditions between test locations that cannot be inferred or predicted.

The precision and reliability of interpretive assessment between discrete points is dependent on the uniformity of the subsurface strata, as well as the frequency, detail, and method of sampling or testing.

Subsurface conditions are formed by various natural and anthropogenic processes and therefore are subject to change over time. This is particularly relevant with changes to the site ownership or usage, site boundary or layout, and design or planning modifications. Aspects of the site may also not be able to be determined due to physical or project related constraints and any information provided by Stantec cannot apply following modification to the site, regulations, standards, or the development itself.

It is important to appreciate that no level of detail in investigation, or diligence in assessment, can eliminate uncertainty related to subsurface conditions and thus, geotechnical risk. Stantec cannot and does not provide unqualified warranties nor does it assume any liability for site conditions not observed or accessible during the investigations.

Verification of opinions and recommendations

Geotechnical information, by nature, represents an opinion and is based extensively on judgement of both data and interpretive assessments or observation. This report and its associated documentation are provided explicitly based on Stantec's opinion of the site at the time of inspection, and cannot be extended beyond this.

Any recommendations or design are provided as preliminary until verified on site during project implementation or construction. Inspection and verification on site shall be conducted by a suitably qualified geotechnical consultant or engineer, and where subsurface conditions or interpretations differ from those provided in this document or otherwise anticipated, Stantec must be notified and be provided with an opportunity to review the recommendations.

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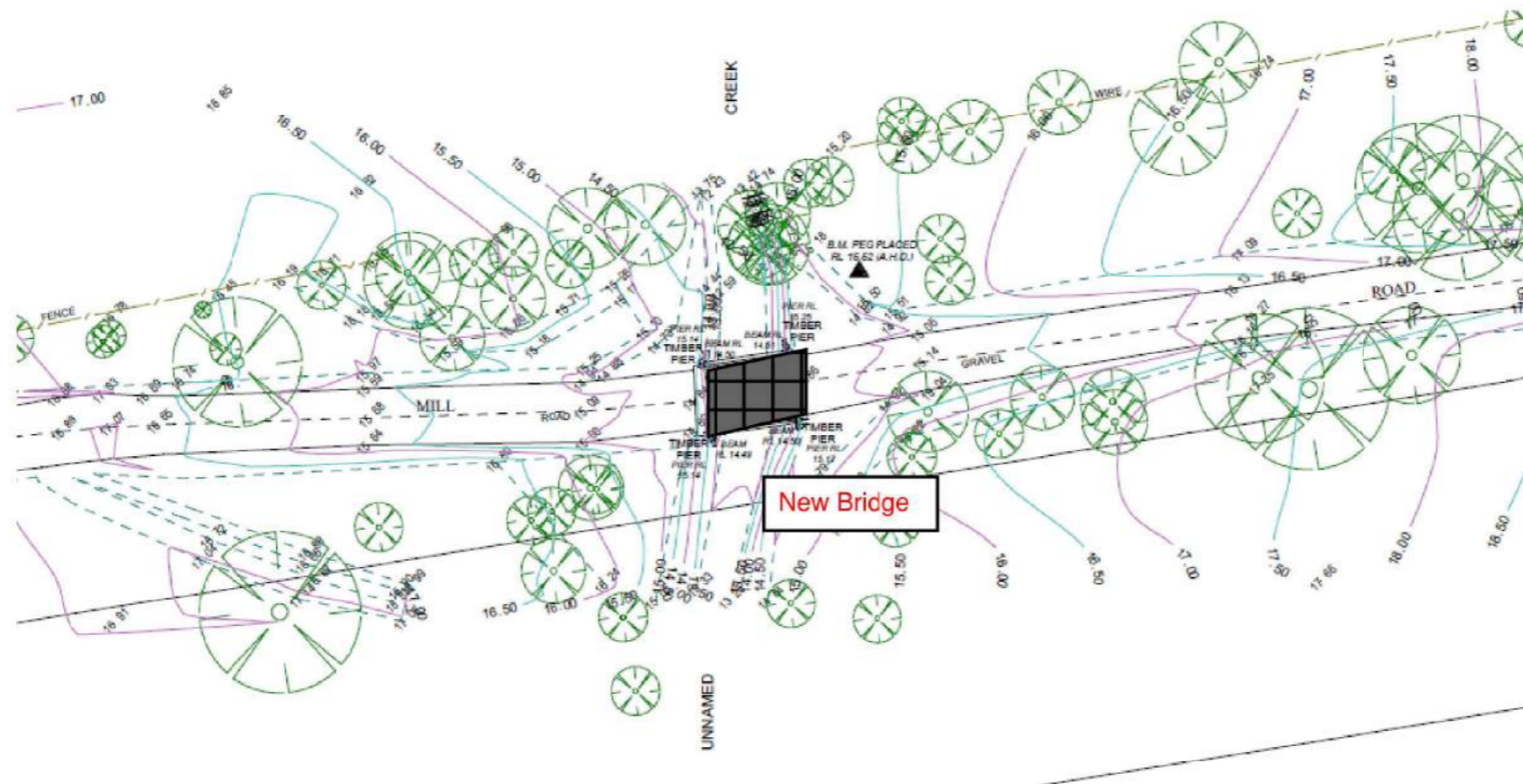
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Appendix D

Bridge Design Plans



Site Layout / New Bridge Layout

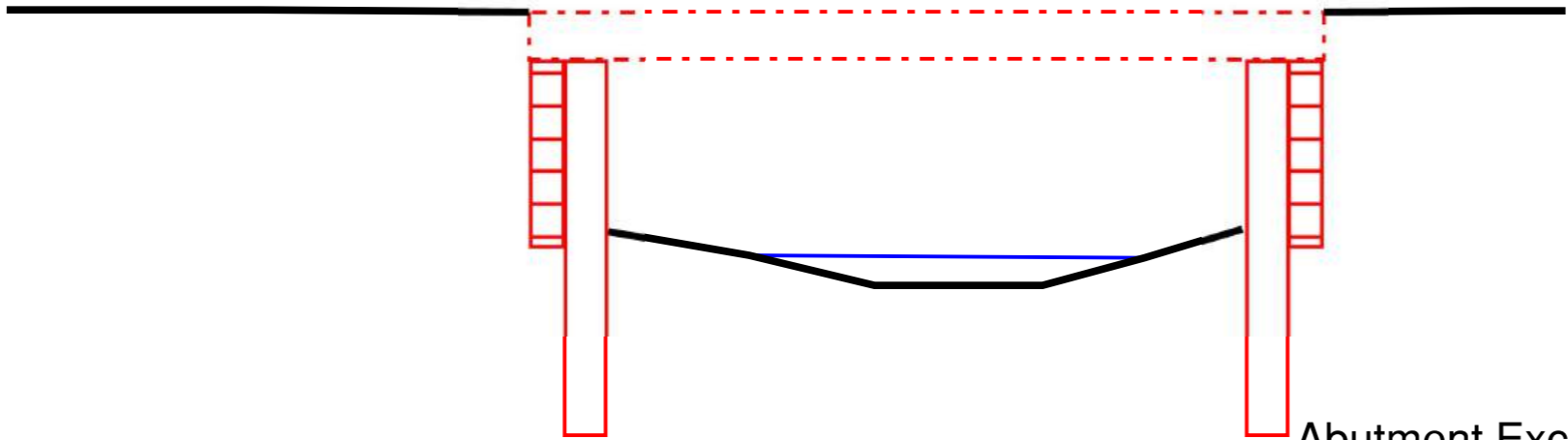


Proposal

- Our proposal is to construct Old Mill bridge on the existing alignment with a road closure in place
- The new bridge will be 10m long x 4.2m wide with a castellated kerb
- The bridge will consist of cast in place reinforced concrete abutments, 4nr prestressed concrete beams, reinforced cast in situ concrete deck slab with castellated kerbs

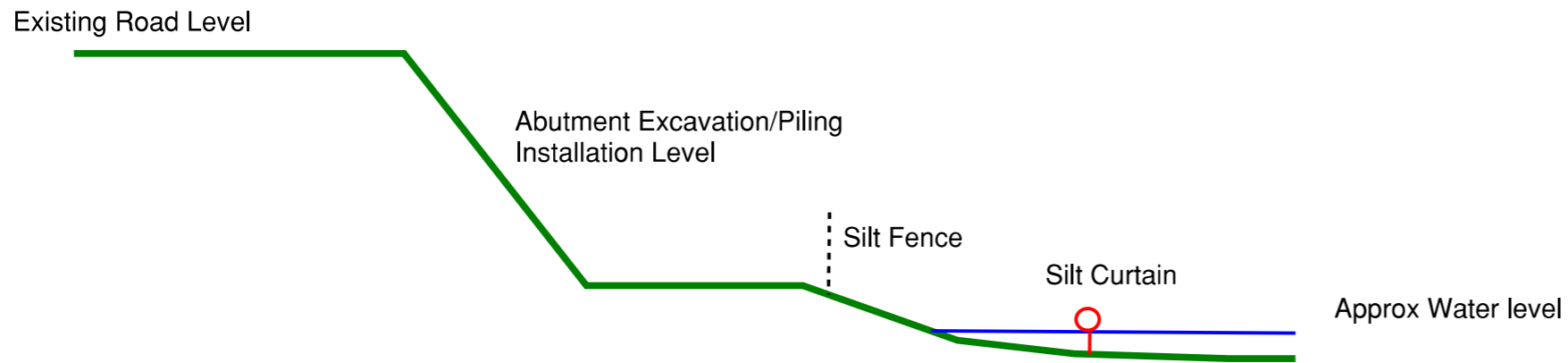
Existing Bridge removal and Abutment Excavation

- Remove transverse decking from the bridge deck
- Lift out the existing bridge bearers using an excavator or crane /pending weight of beam.
- The existing bridge abutments will be removed simultaneously as abutment excavation is carried out.

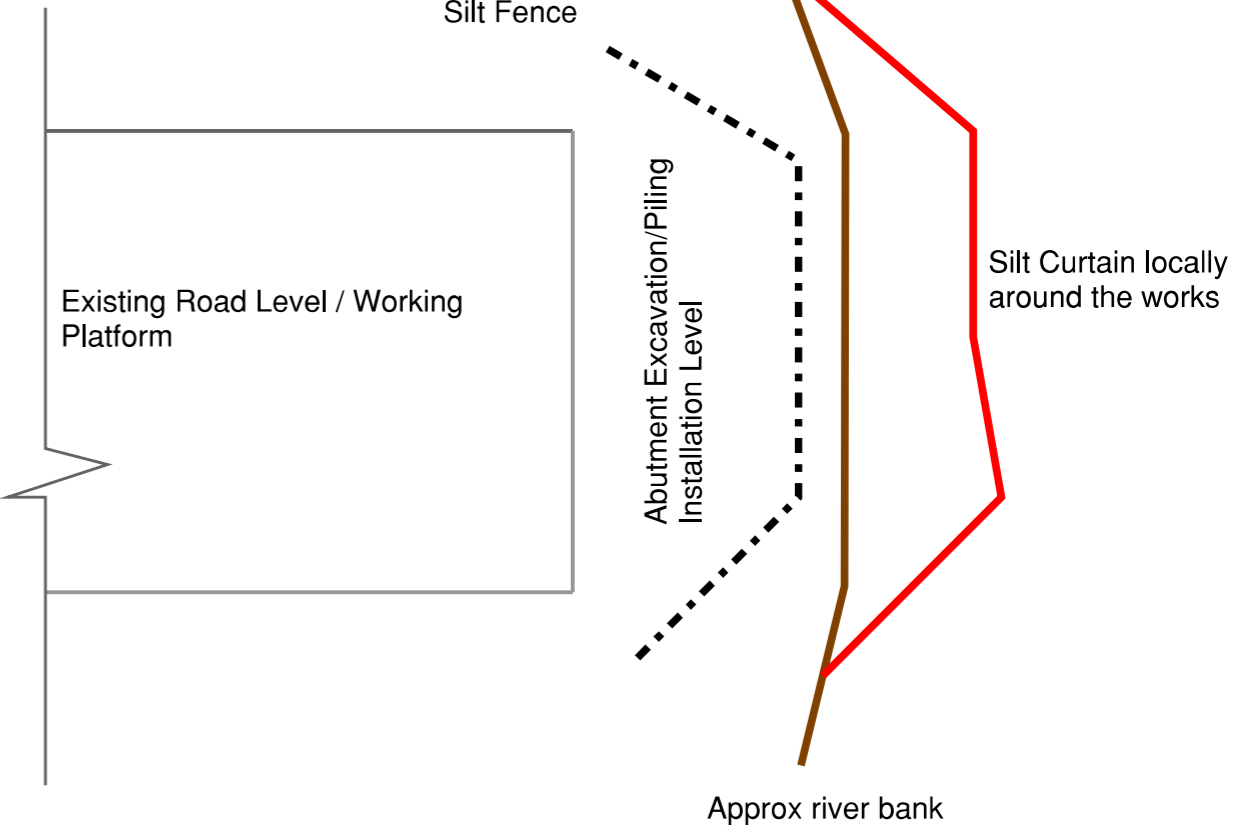


Abutment Excavation Plan View

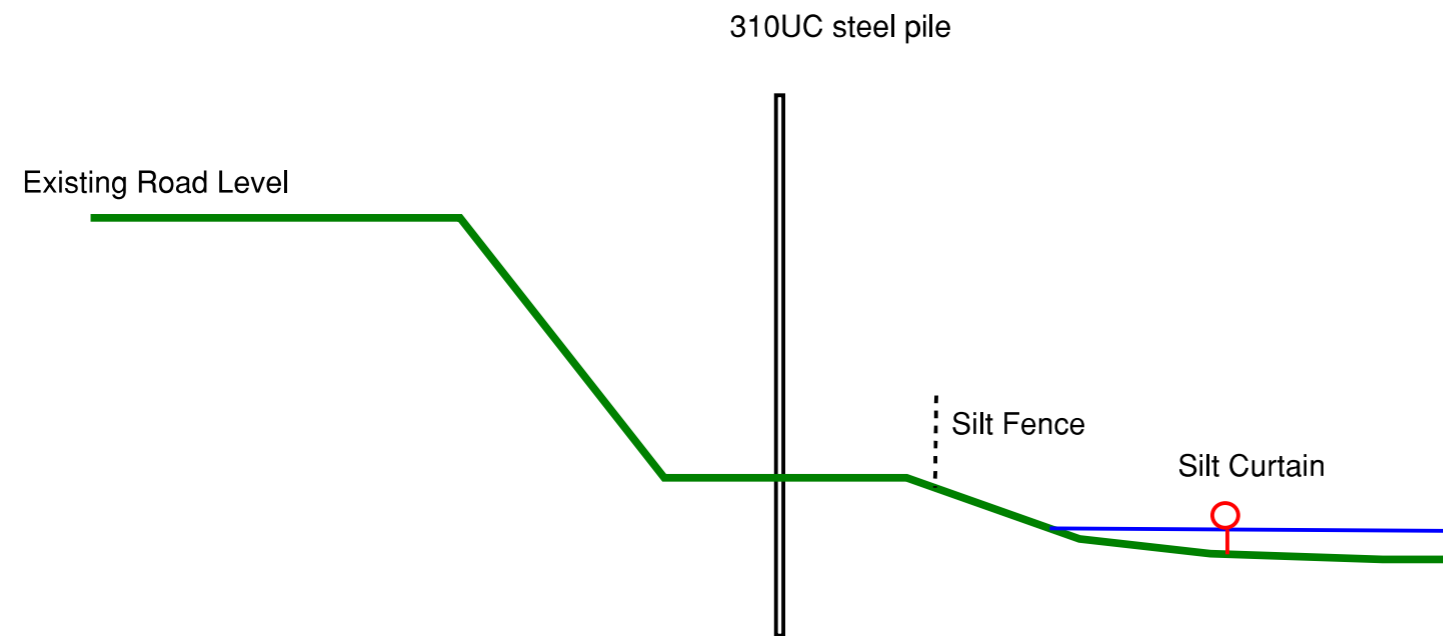
Abutment Excavation Section



- Both abutments will be excavated down to underside of the new abutment.
- All fill can be stockpiled on site for later reuse
- This excavated platform will then be used to facilitate pile installation



Step 01 Pitch the pile and secure/stabilise with the excavator and grabs

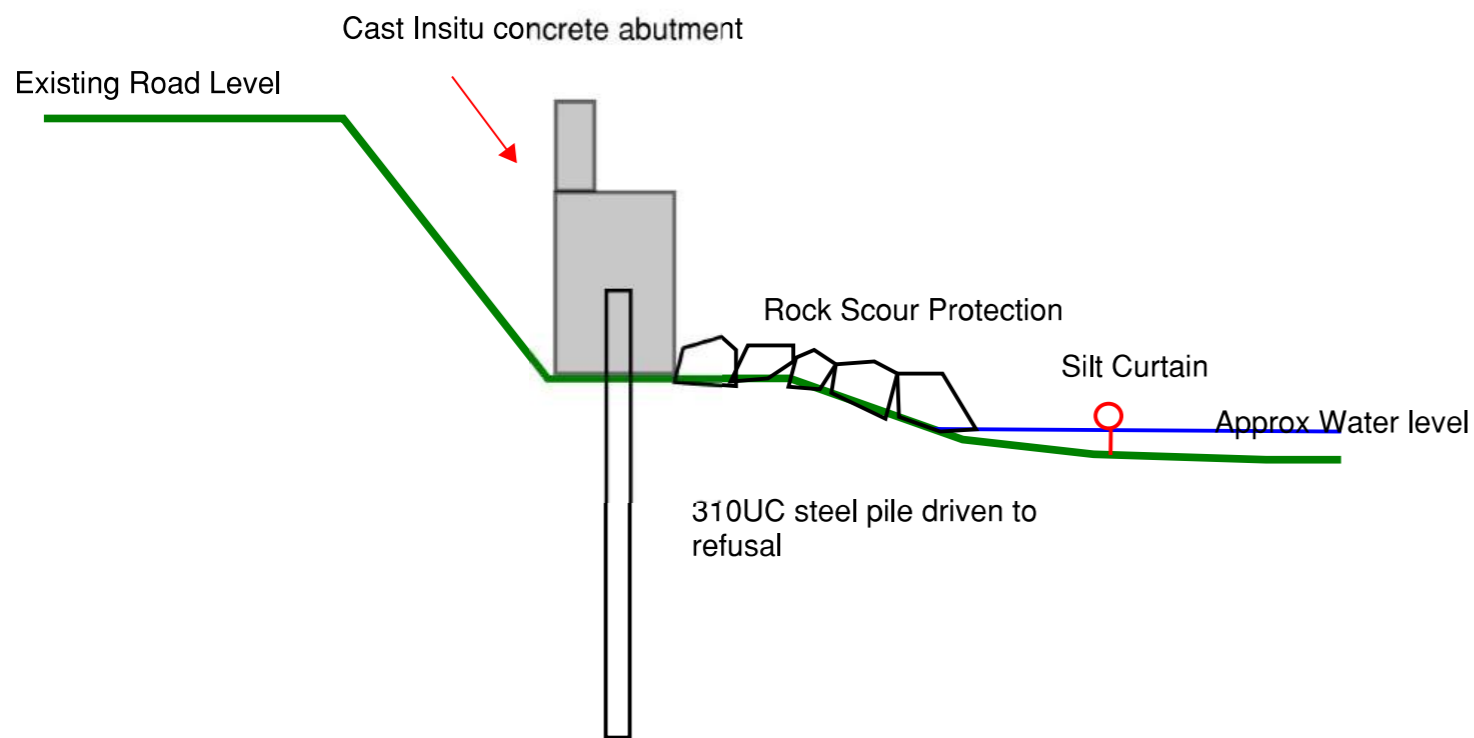


Step 02 - Drive to refusal with Dawson Hammer

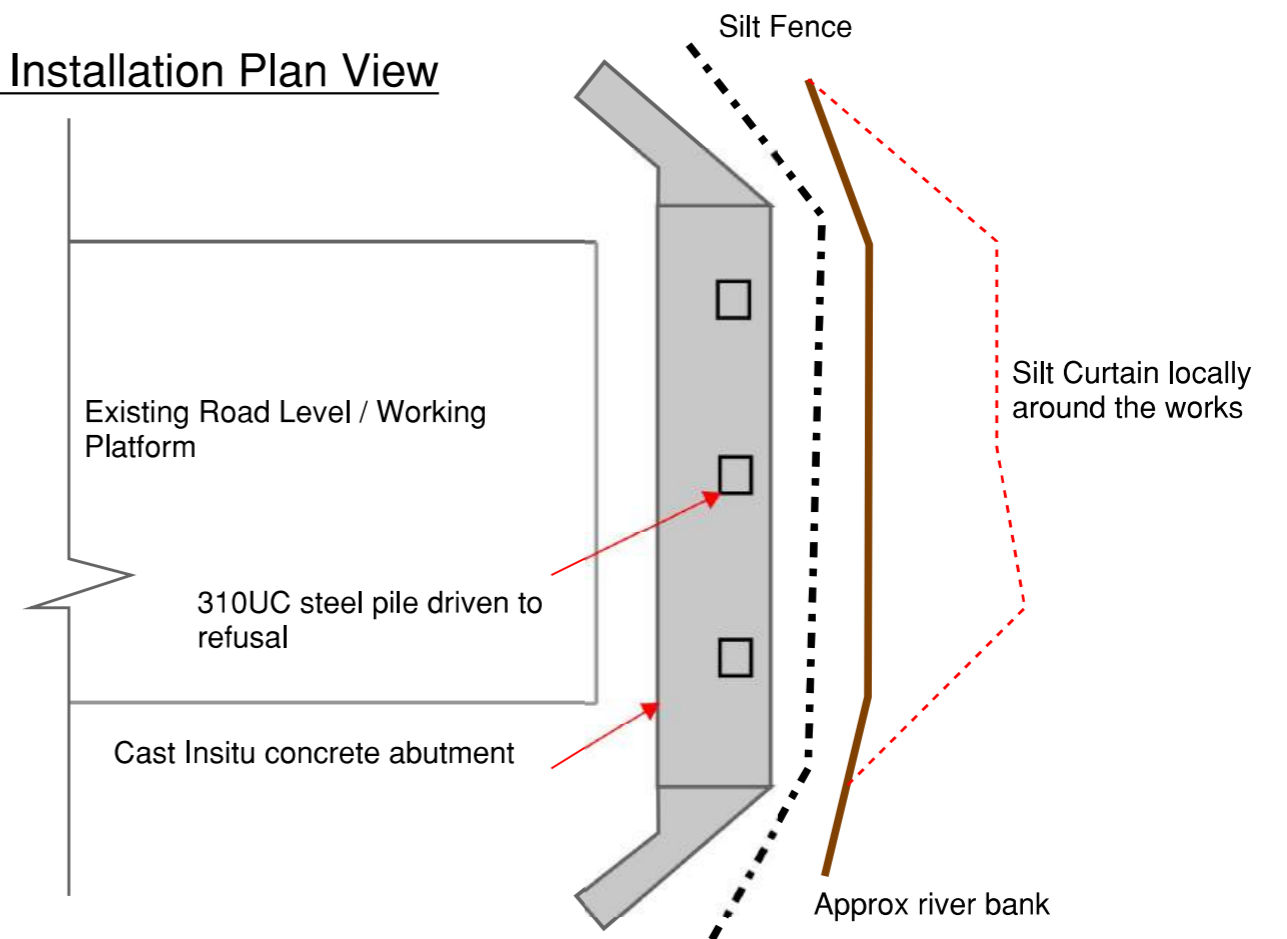
- Lift the Dawson Hammer into position with a mobile crane
- Excavator and grabs maintains position of pile whilst the Hammer drives the pile
- Continue driving the pile using the Dawson Hammer, the pile get to point approx 4-5m embedment where the excavator will then release the pile as it will be no longer required and hammer will continue driving
- Drive to refusal and record sets



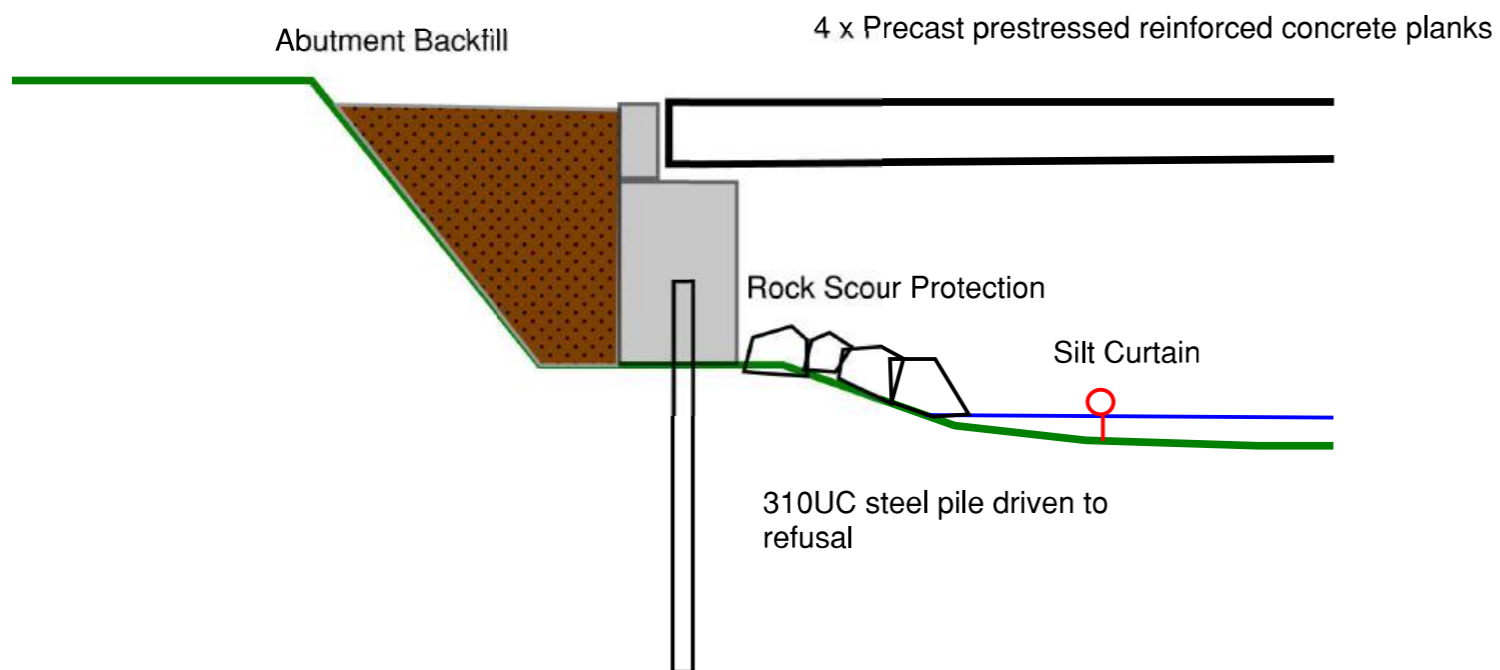
Abutment Installation



Abutment Installation Plan View

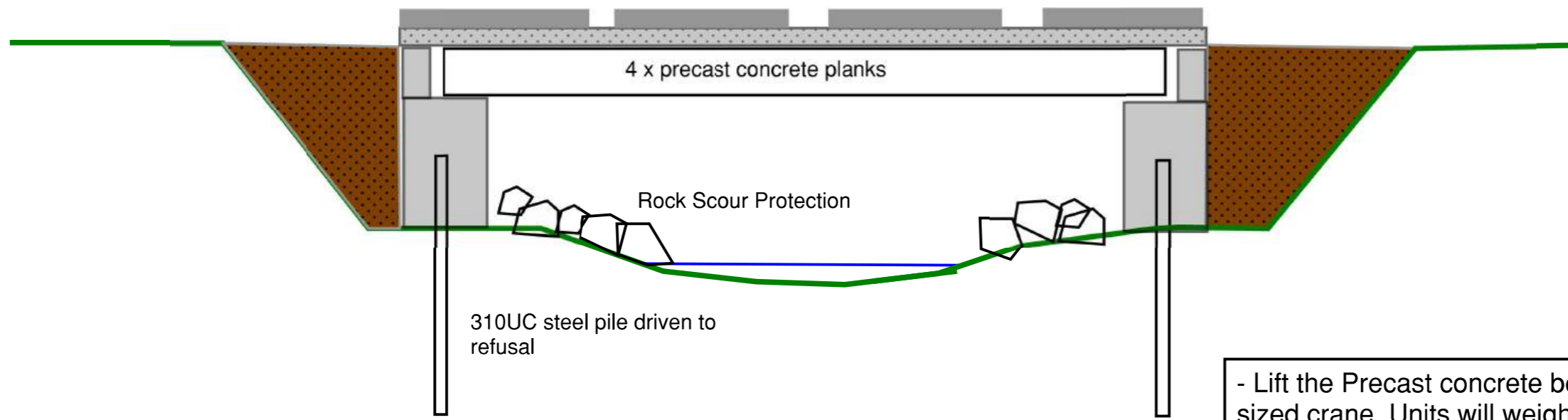


Deck Beam Installation



- Lift prefabricated reinforcement cages into position. Form up abutments and wing walls and pour concrete
- Localised rock scour protection will be placed at the front of the abutment.
- Abutments can be backfilled with existing material and compacted to standard.
- Lift the Precast concrete beams into position using an appropriately sized crane. Units will weigh approx 6.4tn each

Deck Construction



- Lift the Precast concrete beams into position using an appropriately sized crane. Units will weigh approx 6.4tn each
- Install sacrificial formwork between each plank to support the wet concrete in the deck until concrete has gained sufficient strength
- Place reinforcement to deck and fix edge boards into position
- Pour concrete deck

Deck PLAN View

